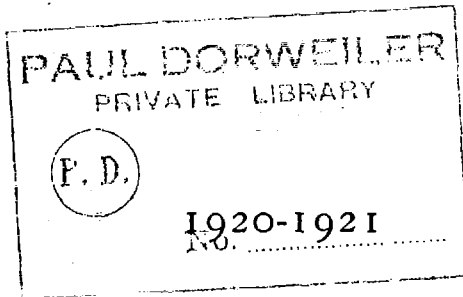


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## PROCEEDINGS

NOVEMBER 17, 1920.

REVIEW OF ACTUARIAL AND STATISTICAL WORK IN  
THE VARIOUS BRANCHES OF THE CASUALTY  
INSURANCE BUSINESS.

ADDRESS OF THE PRESIDENT, B. D. FLYNN.

A few months ago, an organization of companies writing Personal Accident and Health insurance called upon its members for certain Health experience which when combined would serve as a basis for new rates. For several years, all of the companies had been writing this line of business, generally in increasing volume and with poor business results. The experience called for was not elaborate. It was the simple, fundamental statistics which each company should have kept to direct its underwriting policy. Of the forty-nine companies which replied to the call, only three were able to report the information, eight could not supply the experience but could give some figures in a crude and unusable form, while thirty-five admitted that they were doing practically nothing in the way of statistical work and could furnish no experience whatever.

Deplorable as this state of affairs is, can we say that it could not be duplicated in one or two other important branches of the casualty insurance business? Can we say that the situation is not just as bad in many carriers doing a large and growing business in various other casualty lines? We know that in some branches little has as yet been done, and in others the handling and interpreting of experience and other scientific work has made great progress. Some carriers wisely develop actuarial and statistical work, while others do not. Consideration of the general situation by us as members of this Society leads to several important questions: What is the present stage of development of actuarial and statistical work in the various branches of the casualty insurance business? Cannot more be done to bring to managers of insurance carriers or insurance organizations a better realization of the value of scientific

assistance, let us say, in handling the problems of the business? Have we developed our usefulness to the point where the manager will testify that in the handling of his business problems the help of an actuary or statistician is indispensable? A consideration of these questions this morning would seem to be a profitable undertaking and one which might point out to us how we can direct our efforts to progress further the work of scientific treatment of casualty insurance problems.

In reviewing the situation in the various casualty branches, let us first consider that of Workmen's Compensation, in which field, it seems safe to say, the scientific treatment of business problems has made most progress. Even in the days of Employers' Liability insurance—which preceded Workmen's Compensation—practically all carriers compiled experience by industrial classifications, as well as various other statistical information, and many of them employed men properly trained to analyze and interpret the results. The old Liability Conference was probably the first effort to combine classification experience of carriers as a basis for rate making. With the advent of the new form of insurance—Workmen's Compensation—the companies realized from the first the necessity of combining forces in order to obtain best results in experience preparation and in rate making. As important states adopted Compensation, with the right of supervision or regulation of rate making, further progress was made in the problem of analysis of experience for rate making purposes. Schedule "Z," first required by Massachusetts in 1914 and since then adopted by a number of other states, has developed into a thorough analysis of Workmen's Compensation classification experience. Several general rate revisions have been made—notably, those of 1915, 1917 and 1920—in all of which, the combined experience of the carriers and the knowledge of underwriters, actuaries and statisticians have been utilized in an effort to place rates upon a sound scientific basis. Only those who have participated in rate making work from the beginning of Workmen's Compensation in this country, can fully appreciate the progress which has been made in this important work. It is true, that this progress has at all times been limited by the volume of the combined experience, but it can truthfully be said that the scientific treatment of the experience and of the rate making problems has made great strides. It is the opinion of the speaker, that the work of Compensation rate making—judged from



a scientific standpoint—has reached a high plane and compares favorable with the older and well developed work in Life insurance rate making.

In the analysis of statistics for uses other than for rate making, the carriers have not as yet progressed far. An excellent and comprehensive plan has been formulated by the statisticians of company members of the National Workmen's Compensation Service Bureau, but because of practical difficulties which arose during the war period, few of the companies have accomplished much in this work. The foundation has been laid, however, and it is hoped that before long the combined results of the statistical analysis will be available. In rating methods, the actuary and the statistician have been of great assistance. They have worked together to produce an equitable plan and satisfactory working methods. In the formation of schedule rating plans, statistics have not as yet been used to any appreciable extent, but it is the hope and intention of those interested to adjust some day the schedules upon a firmer statistical basis. In other lines of activity—such as the formation of reserve methods and in the countless problems requiring the help of a scientific viewpoint in their solution—good work has been done. Judging generally, therefore, in Workmen's Compensations Insurance, actuarial and statistical work has progressed to a remarkable extent and most insurance managers operating in this line are fully convinced of the great good which has been accomplished thus far and the necessity of a trained man in helping to handle these problems. There is still a large amount of actuarial and statistical work to be done in this branch of the business, but judging from the capabilities of the men who are handling it and the willingness of company managers to back up their efforts, the future development of scientific work in Workmen's Compensation Insurance is assured.

In the Automobile lines—Liability, Property Damage and Collision—statistics have been compiled for years as a basis for manual rates. The division of experience by type of car, location of assured, and so on, has provided the means for intelligent rate making work. The development of this business has disclosed many new and peculiar problems and rating difficulties. The basis of rates has changed from Horse Power to List Price, to Symbol Group. Studies are now being made as to further refinements in

the basis of experience. It is clear that there is still important scientific work to be done in this branch of the business.

The companies writing Burglary Insurance have for the past five years been preparing experience data and sending them to a central bureau for tabulation. For the past two years, Burglary rates have been made upon the basis of this combined experience. The tabulation and rate making work is now being undertaken by the National Workmen's Compensation Service Bureau. The change should be beneficial, in that the experience in rate making work will now come under the supervision of a large committee of statisticians and actuaries of the company members.

Plate Glass experience, which offers a perplexing problem for the statistician when he endeavors to obtain a basis for rates, is also prepared by the companies and forwarded to a central bureau. A study of the statistical plan is now being made, in an endeavor to overcome some of the difficulties which have been met, and to provide better rate making indications. In this line—possibly because of the difficulties of analyzing the experience to give clear indications—rate making has not been based fully upon statistics. It is possibly because of the knowledge of the weakness of the present statistical plan that a number of companies have not been supplying cards regularly. The problem, however, is susceptible of a scientific solution and it is hoped that actuaries and statisticians will give further study to the rate making situation of the Plate Glass business.

In Steam Boiler insurance, the loss provision in the rate is only ten per cent. and, therefore, the experience compiled can have but little bearing upon rate making. In this line, the statistician's problem is largely one of analyzing inspection cost. The practical difficulties in the way of an analysis of inspection cost as a basis for rate making are so great, and the weaknesses of the figures are so many, that there is a question as to the extent to which statistics can be used to good advantage. The analysis of loss experience and inspection costs, however, have been of material assistance to the underwriter in the formation of rates.

Although a number of the companies writing Fidelity and Surety business are keeping their own experience, little or nothing has been done in the way of obtaining a uniform basis of experience compilation or of combining such experience as a basis for manual rates. As the premium for a Surety bond is not intended to pay a

loss, but is, in fact, more of a service charge, the lack of a plan for compiling statistics in this branch of the business can be explained. In the Fidelity business, however, there is a probable loss to be met by the premium, and there would seem to be a great necessity for a sounder statistical basis reflecting the combined experience of the companies for rate making purposes.

In Personal Accident and Health insurance—the branch of the Accident business with which the speaker is most familiar—little general progress has been made, probably due to the fact that the companies writing this line have not co-operated to any appreciable extent. Probably outside of a half-dozen companies, little or nothing has been done in statistical work or in the development of the scientific handling of the business. There seems to be a better feeling toward co-operation between companies at the present time, however, and it is possible that some advance can be made in the near future. An actuarial committee of the companies has been formed to study the problem of a proper premium and reserve basis for Non-Cancelable Accident and Health insurance. The dangers and difficulties of this long-term, non-cancelable policy are so much greater than those of the one-year-term, cancelable policy generally written by accident insurance companies in this country, that it is hoped that the committee's recommendations will be adopted by all companies which intend to take up this comparatively new line of underwriting. Another committee of statisticians is now working upon a plan for compiling Health experience, which if put in operation by the companies should pave the way for further efforts toward the scientific handling of many of the problems of the business.

In Group Accident and Health insurance, a favorable start has been made, in that the leading companies writing this form of protection have adopted uniform scales of benefits, contract provisions and general underwriting practices. It is planned that a uniform basis for the compilation of statistics will be adopted, so that as early as possible the combined experience of companies will be obtainable for rate making purposes. As this line may some day prove to have been the forerunner of Workmen's Sickness insurance in this country, it is important that a sound foundation upon a scientific basis be laid.

In Group Life insurance, which while essentially Life insurance is in its business practice and administration more like Workmen's

Compensation insurance, mortality experience has been combined as a basis for rate making. The influence of the rating methods in Workmen's Compensation upon the future rating methods of Group insurance, should be one of the interesting developments of this new and important line of business.

From the preceding review, it can be seen that actuarial and statistical work has progressed far in some branches, although just beginning in others. Judged as a whole, however, this work has not yet been given the encouragement and help which it should receive from company managers. It is unfortunate that there is little appreciation by some company managers of the good which can come from such work and little inclination on their part to incur expense for it. Managers of those companies where this work has progressed are convinced that the compilation and analysis of statistics and the use of actuarial and statistical knowledge as a help in directing the business have become absolutely essential. The problem seems to be mainly one of showing to the company managers that the business advantages to be derived from such work far outweigh the expense involved.

I am not unmindful of the handicaps which have confronted the company managers in the administration of the casualty insurance business in the past few years. It is probably a fact, that many of them have a true appreciation of the importance of statistical research and study and a realization of the necessity for the introduction of proper statistical methods in the development of rates and business practices; but, notwithstanding this, they have been prevented by business conditions from making their plans immediately effective. It is to be hoped that the handicaps have been largely, if not entirely, overcome, and that as we enter a new era there will be an earnest effort upon the part of all company managers to further statistical research and thus produce a condition which will be beneficial to all concerned. In any event, it is possible that a few words which would give one person's idea of the worth of such scientific work in handling the casualty insurance business would be profitable.

The value of actuarial and statistical work in casualty branches to the company manager lies first, in directing the business of the company along lines indicated by experience results and in the good which comes from the proper handling of its scientific problems; and, second, in the use of properly compiled statistics and

of scientific methods as a foundation for co-operation among insurance carriers. Arguments to substantiate the first of these claims would seem to be unnecessary in the present stage of development of the casualty business. Rate making, the preparation and development of rating methods, the computation of proper reserves, the preparation of various annual statement schedules and other statement work, the analysis and assignment of expenses, are only a few of the many important problems of the business requiring scientific knowledge in their handling. Even the company writing only a small volume in one or two branches of the business cannot afford to be without this assistance, as it can safely be said that the gain derived from clear and sound ideas of the progress of the companies' affairs far outweighs the factor of expense. Putting the matter in another way, the monetary gain to the carrier measured in business results should be far greater than the expense of keeping experience statistics and of employing a trained person to interpret them. We are engaged in a business with many intricate problems and perplexing, rapid changes and developments. The company which is properly equipped to sense these changes and to solve the problems which are susceptible of a scientific solution, will far outstrip in business results its short-sighted competitor.

Much can be said in favor of the usefulness of statistics and of scientific solutions as a basis of co-operation among insurance carriers. A fundamental in the insurance business, and I presume in others, for profitable and constructive building, is co-operative effort among companies. The fact that good business results are obtained from this co-operation will probably not be denied. It is true, that an individualistic policy is somewhat impeded by this general course, but the balance of good results under co-operation is so much greater that there seems to be no room for argument in the matter. The surest foundation of sound co-operation is combined statistics upon a uniform basis and the scientific treatment of the problems which may arise. If uniform rates are to be prepared for all carriers, it is a requisite that the experience of each company be represented in the combined experience used as a basis. Furthermore, if each company can be in touch, through its actuary or statistician, with the development and solution of the problems which arise, it can more readily accept the conclusions reached and a stronger bond of co-operation is established.

There is another phase of this company co-operation problem

upon which something might be said. It appeals to the speaker that if more of the inter-carrier problems—such as rate making, rating methods, and so on—were handled by practical and broadly trained actuaries and statisticians, there would be a gain in co-operation and in general business results. In Workmen's Compensation, this has been the tendency for some time. In that branch of the business, however, most of the companies are fortunate in having men in charge of the underwriting work who have had statistical and actuarial training. In many of the inter-company problems which arise, a solution agreeable to all can only be reached upon the foundation of scientific work. Many of the delays and difficulties in getting companies to work together upon important matters—other than purely of business administration—have been due to lack of knowledge by some of the carriers of the fundamental, scientific points involved and the consequent feeling of distrust upon their part. Inter-company work in other lines—as, for instance, Group insurance—has been greatly helped by the fact that the persons representing the companies doing this business have been the actuaries of the companies, who were either in close touch or in charge of the underwriting. The result in this branch of the business has been a rapid, sound and profitable growth. The statement seems safe to make, that the development of inter-company co-operation in recent years has been due to a great extent to the growing tendency to view business problems from a scientific standpoint and place the responsibilities for their solution largely in the hands of the men who have been trained to solve these problems upon an unbiased, scientific basis.

The foregoing, you will say, gives considerable prominence to the advice and work of the actuary and statistician in the casualty insurance business. Speaking to the younger men, I would say that in order to warrant a company manager in thus placing this responsibility, the actuary or statistician must be capable and well equipped in his professional knowledge. But, on the other hand, he cannot look upon business problems from a theoretical standpoint only. He must learn as much as possible of the underwriter's, claim adjuster's and agency man's work, in order to give proper weight to their equally important viewpoints. He must remember that most business problems are solved, not simply by mathematics, but by properly weighing the theoretical and practical factors involved. He must realize, further, that if the advice

of the actuary is to have weight, he must present his facts or arguments in a way which the business man can grasp. A company manager cannot be blamed if he fails to give weight to the advice of his actuary or statistician, even if it be excellent advice, if it is stated in theoretical terms and generally in a complicated and unintelligible manner. Even the most involved matter can be stated in a simple, clear fashion and the actuarial adviser should always endeavor to put his ideas and arguments in this form. Helpfulness based upon practical knowledge, should be his slogan. When the actuary can use his scientific knowledge in a practical and helpful way; then his viewpoint will gain ground in the councils of the company and better business results will follow. If each of us will endeavor to broaden his practical knowledge of the business and handle his work in the most helpful manner so that his scientific viewpoint, let us call it, will be sought for by the company manager in most of his business problems, there can be no question of the future of actuarial and statistical work in the casualty insurance business.

## DISABILITY BENEFITS IN LIFE INSURANCE POLICIES.

BY

J. H. WOODWARD.

## I.

This paper is a brief description of prevailing practices in underwriting the disability hazard as an incident to the issue of life insurance policies. It offers nothing original but is intended primarily to be of assistance to students who may feel disposed to gain some acquaintance with this subject but whose interests do not lead them into a study of its technical refinements. An attempt is also made to summarize the history of the disability clause and to interpret in a few words its economic significance.

## II.

It is doubtful whether the disability clause originated in a conscious desire to make the fullest possible use of the system of life insurance as a means for insuring human values. It was at first urged by its advocates mainly as a good "talking point" for selling life insurance. Its opponents viewed it as a dangerous "novelty" and a "frill" of questionable worth. Few today, however, will deny that it is a feature of definite social value which, in its more-or-less perfected form, has won for itself a permanent place in the American system of life insurance. Yet, on reflection, the strange thing is not that the disability clause, once introduced, should have had so uninterrupted a development and advanced so rapidly in popular favor, but that the wonderful potentialities of the life insurance system as a means for furnishing a more nearly complete protection against the hazards of death, disablement and old age had not sooner been realized and acted upon.

A fundamental difficulty in supplying the community with the insurance protection that it needs is the problem of expense. No considerable volume of voluntary insurance can be built up in the absence of an organization of trained men whose function it is to



secure the business, and no more important problem today confronts the institution of corporate insurance than that of how to make a given amount of effort expended by these men have a maximum social value—that is, result in a maximum amount of insurance protection.

The chief economic advantage of having disability insurance written in connection with life insurance is the saving in expense. The life insurance companies in any event incur such expense as is incidental to securing life insurance. At slight additional expense they can supply protection against the more serious cases of sickness or disability. In addition to the commission paid to the agent, the issue of a life insurance policy involves the expense of a medical examination and of an inspection report. It is clear that if we have a medical examination and an inspection report we can sell disability insurance on the basis of a much more careful selection and gradation of risks than any company attempting to issue such insurance without these advantages could hope to achieve. Furthermore, the effort of selling a limited amount of disability insurance at the same time that life insurance is sold is little, if any, greater than the effort of selling life insurance alone. Indeed, the original motive for incorporating the disability clause in the life insurance contract was to make the sale of that contract easier than would be the sale of the life insurance without it. Further advantages are that when disability insurance is issued in connection with life insurance the acquisition cost is paid only once, the renewal expense is relatively low, and, finally, that the purchase of a substantial amount of life insurance along with the disability benefit is an evidence of good faith and tends to improve the moral hazard.

There is no serious conflict, however, between the disability coverage provided as an incident to life insurance and that supplied under the usual plans of personal accident and health insurance. Policies of the latter sort cover a much wider field since they indemnify for the lesser disabilities as well as the greater ones. Thus such contracts ordinarily include surgical and hospital benefits, lump sum indemnities for specific injuries, temporary benefits for partial disabilities as well as life annuities for total disabilities arising from accident. Some of the more liberal health policies now provide for a life annuity for total disability arising from disease but more often the coverage for non-accidental disability is

limited to a period of 52 weeks. The cost of such all-embracing protection is necessarily considerable. Much of this cost arises from the frequency of minor disabilities and from the expense of adjusting such cases. But these minor disabilities do not have the catastrophic character of a protracted disablement, nor do they exert so disrupting an effect on family life.

The history of sickness insurance shows the great difficulty and expense of administering from a central office the adjustment of a multitude of small claims. For this reason, if for no other, a wholesale and indiscriminate entry of a life insurance company into the field of accident and health insurance, while it may be desirable, is nevertheless a very different matter from a full use of its peculiar advantages for furnishing protection against those long term disablements which, although of comparatively rare occurrence, have the gravest economic consequences.

### III.

The first form of disability benefit to be incorporated in life insurance policies was the waiver-of-premium clause providing that after the occurrence of permanent and total disability no further premiums would be payable but the contract would go on increasing in value in the same manner as though premiums were being paid. The Fidelity Mutual adopted such a clause in 1896 and the Travelers in 1904. The idea was not a new one, however, as it had been more or less extensively employed on the continent of Europe.

It was soon recognized that a mere waiver of premium was not sufficient. The family of the insured was in many cases worse off on the occurrence of the permanent disability of the bread-winner than if the bread-winner had died. Not merely was there a complete discontinuance of income: there was, besides, a heavy additional expense. To meet this situation the contract was next improved so as to provide for its maturity in instalments on the occurrence of disability. There are many interesting features in such an arrangement to which, however, we shall not advert, since this stage in the development of the clause seems likely to prove only temporary.

It presently appeared that the instalment idea was only a compromise solution. In the event of becoming permanently incapacitated the insured needed not merely that premiums should cease and that he should commence to receive payments under his policy,

but he needed to be certain that those payments would continue throughout his life, however protracted might be his period of invalidism. Finally, he needed to have the principal sum of the policy paid in full to his family at his death without any deductions whatever on account of payments made or premiums waived by way of disability benefit.

Out of these requirements was born the so-called waiver-and-annuity clause, which, in spite of imperfections in the coverage still to be overcome, marks the farthest advance in insurance protection which any life insurance contract has yet attained. It has largely displaced the disability instalment benefit and is the predominating type today. As is well known, the waiver-and-annuity clause provides, in addition to waiver of premium upon the occurrence of disability, an annuity, generally of ten dollars per month or \$120 per year for each \$1,000 principal sum, during the continuance of disability, the sum insured to be payable in full at death just as though disability had not occurred.

One of the difficulties to be overcome in arranging for insurance protection against disability is that at the higher ages disability becomes indistinguishable from mere senility or old age and as the higher ages are approached the rate of disablement increases so rapidly as to make insurance at those ages very expensive. Fortunately the need for disability protection is greatest at the ages where its cost is least: at the older ages of the insured the children in his family are generally old enough to support themselves. At first there was considerable difference in the practice of the companies as to the age up to which the risk of disability was covered. It varied from 55 to 70. Gradually, however, prevailing practice has settled upon 60 as the age before which disability must occur if the benefit is to be paid.

We are all familiar with the old Latin expression: *Natura non facit saltum*—an assertion of the essentially continuous nature of most natural processes. And so it is a little difficult to reconcile the fact that if a man becomes disabled at age 59 he will receive a life annuity while if he becomes disabled at age 60 he will not. However, a line has to be drawn somewhere if the cost of this insurance is to be kept within reasonable limits. The almost universal use of age 60 as the limiting age for disability coverage suggests the use of an endowment at 60 wherever the risk of dependency in old age is of special importance.

Under the waiver-of-premium clause there is not usually a complete discontinuance of the benefit where disability occurs at age 60 or over, one method of treatment being to waive the premiums but provide that the insurance in force shall be reduced by the amount of the premiums waived.

A factor in the disability clause which is of great importance is what is often termed the "probationary period"—that is, the time which must elapse after the occurrence of disability before the benefit attaches. It is obvious that the existence of such a provision tends to rule out of consideration disabilities of short duration. The most common requirement is that premiums will be waived commencing with the next premium falling due after receipt of due proof of a permanent total disability which, at the time of making the proof, must have existed for a period of 60 days. A frequent requirement in the matter of the annuity benefit is that such annuity is to commence six months after receipt of such proof. The probationary period may be taken as somewhat analogous to the "waiting period" under workmen's compensation laws. It is justifiable since it greatly reduces the number of small claims to be adjusted, makes the cost of the insurance less, and tends to confine this benefit to those more serious cases which are in greater need of it. Strictly speaking, practically every one becomes totally and permanently disabled for some time before he dies, the only exceptions being those who are instantaneously killed.

#### IV.

Those desiring a full understanding of the actuarial intricacies involved in the computation of premiums and reserves for disability benefits will find a wealth of material in numerous papers which have been contributed to actuarial societies. For casualty students and underwriters, however, a brief non-mathematical statement of how such a benefit is looked at from the actuarial standpoint and some remarks on the nature of the underlying statistics which are required may not be without interest.

Suppose we have before us an ordinary life policy to which it is desired to attach a clause providing for the waiver of premiums in the event of total and permanent disability occurring before age 60. We note first that the benefit is an annuity, the annual amount of which is equal to the gross premium payable under the ordinary life policy. This annuity commences at the disablement of an

active life and terminates at the death of a disabled life: it is an annuity during disablement. The extra annual premium for the benefit is payable until age 60 as long as the life, now active, remains active, and ceases when he dies or becomes disabled. Hence to get the annual premium we also need to know the value of an annuity on an active life payable until death or disablement. Dividing the first of these annuity values by the second gives us the required net extra premium for the benefit. Premiums for other types of disability benefit can be computed in a similar manner. The premium reserve may be viewed as the difference between the net single premium for the benefit at the attained age of the insured and the present value of the future net premiums. This refers to active lives. After a disability claim has arisen the reserve consists of an annuity to a disabled life for the amount of the benefit.

In order to compute values for the necessary annuities we must have statistics showing:

1. The rate of disablement among active lives;
2. The rate of mortality among disabled lives;
3. The rate of mortality among active lives.

The disability table in general use in this country is the table known as Hunter's Disability Table which was prepared by Mr. Arthur Hunter from the experience of several large fraternal societies in the United States which commenced a good many years ago to grant disability benefits. Ultimately the companies will undoubtedly have a table based upon their own experience. For the time being the existing table appears to be giving satisfactory results. The rates at which active lives become disabled, according to Mr. Hunter's table, are, per ten thousand exposed to risk, as follows:

Age	Disability Rate per 10,000 Exposed.
20 .....	5.1
30 .....	5.6
40 .....	8.3
50 .....	17.0
60 .....	54.0
65 .....	123.9

These rates are much lower than the rates of invalidity shown by European experience, based chiefly on the experience of certain mutual organizations for insuring particular trade groups. Fully

satisfactory reasons why American statistics show so much lighter rates of disability than European statistics have never been advanced, although this is probably due partly to the preponderance of hazardous occupations in the foreign experience, but chiefly to a different definition or conception as to what constitutes disability. This last factor is of more importance than might be supposed.

The other statistical information which we require is the rate of mortality among disabled lives. The main peculiarity of this mortality is that for the period of time immediately succeeding the occurrence of disability the rate depends primarily on the nature of the disability rather than on the age of the individual. As the time since the occurrence of disability increases, the rate of mortality among the disabled shows a tendency to decrease until a certain point is reached, after which it begins to increase with age. This subject is very complicated and a satisfactory practical solution was reached by Mr. Hunter by excluding from his table the experience during the policy year following the occurrence of disability.

On this basis the rates of mortality per thousand among disabled lives are as follows:

Age.	Disabled Lives Death Rate per 1,000	"Mixed" Lives (American Experience) Death Rate per 1,000.
20 .....	205 .....	7.8
30 .....	106 .....	8.4
40 .....	85 .....	9.8
50 .....	91 .....	13.8
60 .....	111 .....	26.7
70 .....	115 .....	62.0

In the parallel column is given the American Experience rates of mortality for the purpose of comparison, and it may be readily perceived what an important factor is the rate of mortality among the disabled in determining the premiums and reserves under this business. An interesting feature is the high rate of mortality at the younger ages, probably due to the preponderance of tuberculosis cases at those ages.

The accounting problems to which the incorporation of disability benefits in life contracts gives rise are of special interest in that they both emphasize the importance of a correct concept of the various kinds of disability benefits and serve to illustrate many of the more subtle principles of insurance accounting. The most

helpful way in which to approach a disability accounting problem is to suppose the disability part of the contract to be issued by an entirely separate company which receives the extra premiums, maintains the necessary reserves and pays the claims under the disability benefit. This point of view is also indispensable to the correct drafting of disability clauses.

## V.

The adoption of the disability benefit has brought new problems to the claim departments of life insurance companies—problems of a difficult kind which have hitherto been principally confined to the claim departments of casualty companies. The fact of death and the identity of the deceased is a matter susceptible of relatively easy proof. The existence and extent of disability within the meaning of the policy contract is a much more complicated problem. However liberal or the reverse may be the company's interpretation of its contract, there must be somewhere a boundary about which the border line cases will cluster.

It is the duty of the claim adjuster to see that the claimant, however ignorant he may be of his rights, gets the full amount to which he is legally and equitably entitled under his contract of insurance. This is just as much his obligation as it is to see that the other policyholders of the company are not injured through the allowance of fraudulent or unreasonable demands. It is the practice of at least one of the large companies granting the disability benefit to go back in every case where a death claim has been presented arising from insanity and find out whether or not the insured, if he had made an application for disability benefits, would have been entitled to a waiver of his premiums or to the payment of an annuity. If he would have been so entitled, regardless of his technical non-compliance with the contract in the matter of proof, the amounts of these benefits are added to the death claim which is paid to his beneficiary. It is in the interest of every living and healthy policyholder that a company should settle its claims in this spirit of liberality. It costs not much more than does strict insistence on the technical requirements of the contract and the money so spent is vastly more effective in building up good will than if it were saved and later paid out to the healthy and active policyholders as an increase in their dividends.

When we think of disability as related to its cause, we are apt to

think first of disability arising from accident. As a matter of fact, however, only about three or four per cent. of a company's disability claims arise from this cause. The two major causes of disability are tuberculosis and insanity or mental infirmity. Probably a third of a company's claims under the disability clause will be tuberculosis claims and about a quarter of the claims will be insanity claims. Paralysis is the third most important cause of disability.

As to tuberculosis, it is evident that there is wide opportunity under the present wording of the disability clause for the practice of companies to differ. The contract requires that disability shall not merely be total but shall be permanent. Obviously it is difficult or impossible to show that tuberculosis will presumably progress to a fatal termination until some time after the condition has arisen. A liberal interpretation of the contract, however, requires that claims should be admitted as soon as the disease has produced incapacity to labor and the insured has given up his work and placed himself in a sanitarium or under treatment designed to arrest its progress.

Another difficult question in the adjustment of claims is the requirement of the contract that the insured shall not merely be permanently and continuously prevented from engaging in his usual and customary occupation but that he must be permanently and continuously prevented from engaging in *any occupation whatsoever* for remuneration or profit. This leads us to a discussion of the general question of what constitutes permanent and total disability within the meaning of the contract.

## VI.

The Bureau of War Risk Insurance has defined total disability as "any impairment of mind or body which renders it impossible for the disabled soldier to follow continuously any substantially gainful occupation. Total disability shall be deemed permanent whenever it is founded on conditions which render it reasonably certain that it will continue throughout the life of the person suffering from it." The Compulsory Health Insurance bill passed by the New York Senate in April, 1919, defined disability as "inability to pursue the usual gainful occupation" of the insured. The German compulsory insurance law defines in-



validity as total when the earning power of the insured is reduced to one-third of the normal.

It has been held by the Indiana Court of Appeals (*Ind. Life Endowment Co. vs. Read*, 54 Ind. App. 450) that if the policy entitled the insured to recover if he becomes totally and permanently disabled from performing any kind of manual labor upon which he depends for a livelihood, the insured can recover if he becomes totally and permanently disabled from following any business by which he might reasonably earn a livelihood. Again, in order that disability may be construed to be total it is not necessary that the insured should be absolutely helpless. Total disability is a relative matter and is held to depend on the peculiar circumstances of each case and on the nature of the occupation and the capabilities of the person injured. The real test is loss of earning power.

An investigation of the causes of permanent total disability indicate that a large majority of them would incapacitate a man from performing the duties of any occupation whatever as well as the duties of his regular occupation. This gives ground for hoping that some way may be found to safely remove the present limitations so as to make the benefits apply to total disability from performing the duties of the insured's regular occupation.

## VII.

Several important points must be kept in mind by a company's home office in underwriting disability benefits. In order to obtain a favorable experience under such insurance it is in the first place necessary to minimize the effect of selection against the company by issuing a very large amount of it. The clause itself must be liberal, attractive and unambiguous, and the agents and the public must be kept educated as to its value. Application forms, rate-books and canvassing literature should be so arranged that affirmative action is necessary on the part of the applicant if the policy is *not* to contain the disability clause. Generally speaking, applicants should, as it were, have the disability benefit thrust upon them unless they specifically ask that it be omitted from their contracts.

But it should be borne in mind that this insurance is in the nature of indemnity for loss of earning power and that for practical purposes this means indemnity against the loss of ability to earn money. It is very much easier to *overinsure* a man under a

disability clause than under a life insurance policy. No companies grant the disability annuity benefit on any larger an amount of life insurance than \$25,000 which carries with it a monthly disability annuity of \$250. If, however, the applicant carries such insurance in several different companies it is easy to see how he might provide himself with an income which would make disability financially profitable to him. It is not necessary to impute any dishonest intent in such cases to perceive that total disability is likely to begin earlier and last longer than where the insured himself carries a substantial part of the hazard. The disability annuity benefit ought never to be granted for an amount disproportionate to the applicant's salary or wages.

Having determined that the amount of the benefit applied for falls well within the limits of the insurable interest, the next question is as to the physical and occupational eligibility of the applicant.

There are several types of cases where the disability benefit should be granted with great caution, if at all. We have seen that the principal cause of disability is tuberculosis. Hence the benefit should not be granted at regular rates to underweights at the younger ages unless the family history and other features of the risk are exceptionally good. Mr. R. G. Hunter has recently pointed out\* that in the case of tubercular family history the disability rate bears "a much higher percentage to the normal disability rate than the mortality rate due to tubercular family history does to the normal mortality rate." Next to tuberculosis, insanity and paralysis are the most frequent causes of disability. It follows that the benefit should not be granted at standard rates where there is a personal history of mental or nervous disorder or of any leptic infection or where there is more than one case of insanity or nervous disease in the family history.

Another group to which the benefit should not be granted is unmarried women who are not in receipt of a salary or wages. Where a disability clause is attached to a policy issued to a woman, it should provide that the clause shall be cancelled upon the marriage of the insured. There are doubtless self-supporting married women to whom the benefit might safely be granted, but these are not to be readily distinguished from the others.

\* Record of the American Institute of Actuaries, Vol. IX, page 29.

A difficult question, similar to the same one raised in connection with workmen's compensation laws, is what to do with applicants who are already partially disabled—who have lost the sight of one eye, the use of one arm, hand or leg. Obviously the risk of total blindness or total dismemberment is greatly increased in such cases, and although the number of cases is not great, still the financial consequences are apt to be considerable because of the exceptionally low rate of mortality among the disabled of this type. The existing impairment has two effects: it increases the liability to accidents in general and it specifically increases the liability to total blindness or dismemberment. The safest practice is, of course, not to grant the benefit to such an applicant. On the other hand, it is not very praiseworthy to evade the performance of a service when with a little additional trouble some satisfactory way of meeting the difficulty can be found. Many companies modify the clause in such cases, so that the loss of another eye or member will not constitute a valid disability claim—sometimes with an increase of 50 per cent. in the premium to cover the additional extra hazard.

The question of what to do with the disability benefit in the case of hazardous or unhealthy occupations is a difficult one because of lack of sufficient statistical information. When the occupation is such as to greatly increase the chances of disability, either through accident or disease, the benefits cannot safely be granted. In intermediate cases they may be granted in consideration of an extra premium predicated on the degree of extra risk assumed.

### VIII.

The progress and evolution of the disability clause has been rapid and a high standard of accomplishment has been set in this field. There is no reason to suppose, however, that further improvements in the coverage and a wider adoption of this feature may not be anticipated. Indeed, one of the large companies has very recently announced a modification of its disability clause under which any disability which is total and has had a continuous duration of three months is construed to be "permanent" until recovery. This is a wholly admirable provision which will doubtless be extensively adopted. It is not improbable that some safe way will presently be found to insure against total incapacity to

perform the duties of the insured's regular vocation as distinguished from total disability to perform any kind of work whatsoever for remuneration or profit.

All of these improvements which have a permanent social and economic value take their place among the innumerable human achievements which, taken by themselves, may seem trivial, but which taken together make up the sum total of human progress.

## CORPORATE BONDING.

BY

RALPH H. BLANCHARD AND GEORGE D. MOORE.

Whenever two parties enter a relation under the terms of which one of the parties is obligated to perform certain services in a certain manner for the other, a risk is created that the former party will fail to fulfill his obligations. Such failure may be due to dishonesty, to inability or to a combination of the two. In any event it is likely to cause financial loss or other hardship to the second party. In recognition of this risk there grew up the practice of personal bonding under which a third party, called the *surety*, guaranteed the honesty or efficiency of the party who had undertaken the primary obligation, known as the *principal*. This guarantee or *bond* ran in favor of the *obligee* for whom the services were to be performed.\* The purpose of such an arrangement was, of course, to decrease the risk carried by the obligee by adding to the obligation of the principal that of the surety, usually an individual of actual or reputed means.

This arrangement was unsatisfactory to everyone concerned. The surety usually lent his name and credit without compensation, made no particular preparation for the possible financial losses involved, and often was seriously embarrassed by the necessity of fulfilling an obligation not logically his. The principal found it necessary to ask for a bond as a matter of personal favor and ran the risk of involving a friend in losses. The obligee, while his position was strengthened, often found that the enforcement of his claim against the surety was difficult or impossible.

With the growth of complexity in business relations and with the development of corporate enterprise in the indemnification of losses there evolved the corporate surety, a corporation which, for a consideration, offers to make itself financially responsible for the fulfillment of obligations. A company was organized for this purpose

\* The italicized terms should clearly be understood at this point as they will be used without further definition in the remainder of the paper.

in the state of New York in 1876 but did not commence business until 1880. During 1919 thirty-four companies wrote aggregate premiums of \$42,235,965 on bonding business. Four of these companies wrote \$24,060,568 in premiums representing 57 per cent. of the aggregate. Seven companies wrote no other lines, two specialized in bonding, while the remainder did a general casualty business.\* These corporations are classified under the law as insurance organizations and, as such, are subject to the insurance laws of the states and are under the jurisdiction of the officials administering those laws. The superiority of the protection which they offer as compared with that afforded by personal bonds has been generally recognized and this fact, coupled with the risk involved in becoming a bondsman, has resulted in corporate bonding largely supplanting personal bonding.

#### CLASSIFICATION OF BONDING CONTRACTS.

Possible variation in coverage of bonding contracts is coextensive with the variation in obligations arising from social relations. Their practical application has been limited to those cases where the financial loss to the obligee may be measured and indemnified or where a definite financial forfeit has been predetermined. The limit beyond which the surety cannot be called upon for payment of indemnity or forfeit is expressed in the contract and is known as the *penalty* of the bond. The general nature of the bonding contract is summarized effectively by Mackall as follows:

“Suretyship presupposes the existence of a primary obligation; and the undertaking of the surety is that the primary obligor, or principal, will perform that obligation. The undertaking is usually in the form of a bond of both the principal and the surety for payment of a definite sum of money upon condition that if the principal shall perform the obligation, the bond shall be void. However, in case of default the bond will be satisfied by the payment of the resulting monetary damage, not exceeding in any event the amount of the bond; and the principal is bound, to the extent of his resources, to pay that damage or to reimburse the surety in case the surety should pay it. It is however, the practice of surety companies to require all applicants to execute an express undertaking to indemnify the surety not only against loss but also against all costs, expenses and counsel fees.”†

\* Based on figures from Best's Insurance Reports, Casualty and Miscellaneous, 1920.

† Mackall, Luther E., "The Principles of Surety Underwriting," Baltimore, 1914, p. 17.

There is little uniformity in the bases of designation of the various classes of bonds; one class takes its name from the obligation, performance of which is guaranteed; another, from the status of the principal; another, from the nature of the transaction giving rise to the obligation. Indeed, it is difficult to suggest a serviceable classification which would have a uniform basis. The following classes of bonds to which short explanations are appended represent the present-day practical groupings:\*

### *Fidelity.*

Fidelity bonds guarantee honesty. They are usually written on employees of private employers or on public employees who are not required by law to be bonded but who are bonded for the protection of their superior. The narrower forms cover losses from larceny or embezzlement only, the broader forms, losses from dishonesty of any kind. Blanket bonds may be written in favor of financial institutions to cover losses of money or property due to the dishonesty or negligence of anyone, employee or otherwise, as limited in the contract. Schedule bonds cover groups of employees, listed in an attached schedule, individual bonds are written on individual employees, and position bonds are written to cover anyone who may occupy a specified position with the employer. These bonds are usually written for a definite term and are cancellable by the surety on notice as to future default.

### *Public Official.*

Public official bonds are required by law to be given by officers of the United States or of any of their political subdivisions. "A public official bond . . . generally guarantees the faithful performance by the officer of all the duties required of him by law, and as a rule cannot be made subject to any restrictions upon the liability of the surety. The surety is liable, therefore, not only for any public money the officer may convert to his own use, but also

\* State insurance departments divide bonds into two classes, fidelity and surety. "Broadly speaking, the difference between them is as follows: a Fidelity Bond is a negative guarantee, and its intent is that the principal will not commit certain acts under certain circumstances; whereas, a Surety Bond is a positive guarantee, and under its operation the principal is expected to perform definite things or to comply with certain requirements." Penniman, H. G., "Manual of Fidelity Insurance and Corporate Suretyship," New York, 1911, pp. vii-viii.

for any loss resulting from the failure of the officer to perform his duties or from the negligent or improper manner in which he performs them . . . as a rule it is not feasible or useful to put in the bond the conditions limiting the surety's liability as fixed by the law. Such a bond would probably not be accepted; and if it were, the conditions would probably be declared void by the courts."\*

Such bonds run for the term of office of the official although statutory provision for release from liability following the date of release are not unusual.

### *Judicial.*

Judicial bonds arise from obligations incurred in connection with judicial proceedings and are frequently called *court bonds*. They are of three general kinds: *bonds of fiduciaries*, *credit guarantee bonds*, and *bail bonds*.

Fiduciary bonds guarantee the faithful performance of the duties of the fiduciary. The surety is liable for failure in performance whether a result of dishonesty or of an error made in good faith. The bond usually continues in force as long as the principal acts as fiduciary. Prior termination is possible under the laws of some states but is usually difficult or impossible.

Credit guarantee bonds are generally required by law in civil proceedings in case the principal has in his hands money or property which might be levied upon for the satisfaction of a judgment and which he might misappropriate. "They guarantee, in effect, that the principal, if unsuccessful in the litigation in which the bond is filed, will satisfy the judgment of the court."† The bond is terminated only when the judgment has been satisfied.

A bail bond is a contract to forfeit the penalty of the bond in case the principal fails to appear in court at the time specified in the order admitting him to bail. It terminates at that time.

### *Contract.*

Contract bonds are written in connection with construction or supply work and are of three kinds: the *bid bond*, guaranteeing that the principal will sign the contract and give bond for its performance, if it is awarded to him; the *construction bond*, guaranteeing the performance of the contract; and the *maintenance bond*, guaranteeing the wearing qualities or efficiency of the thing con-

\* Mackall, L. E., op. cit., pp. 48-9.

† Mackall, L. E., op. cit., p. 125.



structed or supplied. The first two bonds expire only with the performance of the obligations which they reinforce, the third runs for a specified term.

#### *Depository.*

Depository bonds guarantee the safety of moneys deposited in banks and their return to the depositor on legal demand. They are usually in favor of a state, city or other governmental organization as obligee but are occasionally written to protect private individuals or corporations. The right to terminate such bonds by cancellation is retained by the surety wherever possible.

#### *License and Permit.*

This classification is ordinarily used to designate bonds given by plumbers, pawnbrokers, users of explosives, warehousemen and others who are licensed by states or by smaller political divisions. They guarantee compliance with local laws or protection from damage on account of the activities licensed.

Of a similar nature are internal revenue and customs bonds which guarantee compliance with the revenue laws of the United States government.

Bonds of this class are written on officially prescribed forms and, in general, their term coincides with that of the license or permit in connection with which performance is guaranteed.

#### *Miscellaneous.*

The principal types of bonds have been described; there are, in addition, a considerable number of miscellaneous forms such as bonds protecting corporations against loss resulting from replacing lost securities, bonds for employers carrying their own workmen's compensation risks, bonds for insurance companies guaranteeing payment of losses, patent infringement bonds, bonds guaranteeing the payment of rent, etc. There are great possibilities of extension but these minor forms contribute little to volume of business.

### CONTRACT LIMITATIONS.

In no other form of protection are contracts so free from restrictions, the bonding company rather protecting itself by declining risks. Statutory forms of bonds usually contain no restrictions. Other forms ordinarily contain provisions for prompt notice of loss from the obligee; for aid by the obligee in determining the amount

of the loss and in prosecuting the principal; for limitation of period during which claims may be filed with, or suits instituted against, the surety; for cancellation of the bond on notice.

#### PECULIARITIES OF BONDING.

The bonding business is unique in many ways. It is essentially insurance since its economic justification is found in its contribution to the elimination of uncertainty, and since a fund is accumulated for meeting losses, but it is held by some underwriters that bonds in the nature of financial guarantees are more closely allied to banking as the company in passing upon the risk must take into consideration the same elements and conditions that are considered by a banker in granting a loan. But the methods used in this form of insurance and the conditions under which it is conducted make it a highly specialized and, for the inexperienced, a highly hazardous calling. The quality of underwriting judgment as evidenced by selection of risks and by careful adaptation of contracts to circumstances is more in evidence here than elsewhere.

While bonding is, in general, insurance a considerable portion of the premium may be regarded as a payment for service. This service element is smallest in connection with fidelity bonds, where the surety expects a considerable loss ratio, and is largest in connection with bonds where the surety demands full protection against loss in the form of a deposit of collateral by the principal. This point will be considered more in detail.

The term of the contract is often indeterminate particularly in connection with bonds whose termination is conditioned by the performance of certain specified obligations as, for example, the settlement of an estate or the final adjudication and satisfaction of a claim for damages. The term may be further rendered indeterminate because of the uncertainty of the law having to do with release of the surety from liability.

In most cases non-payment of the premium does not invalidate the bond. The premium is paid by the principal while the contract is in favor of the obligee. In some cases the surety may secure relief from future liability by exercising its right of cancellation, but even this right does not, in many cases, exist.

The surety is entitled to indemnification by the principal. This

is true of probably all bonds except bail bonds. Its practical importance is limited by the possibility and expense of collecting such indemnity. In most cases the principal is required to execute an agreement providing for the indemnification of the principal. Sometimes personal sureties subscribe to the bond of indemnity. Often the principal is required to deposit sufficient collateral with the surety to meet any losses under the bond.

The contract form and/or premium rate to be charged are, in certain states, prescribed by law, particularly for public official, court, and license and permit bonds.

#### BONDING HAZARDS.

The performance of an obligation by the principal is dependent on one or more of three factors: honesty, ability, financial responsibility. Each bond written is a guarantee that, as to the factors involved in the underlying obligation, the principal is worthy of confidence. To the extent that events prove him deficient in these respects the surety is liable for the financial consequences, not exceeding the penalty, or amount, of the bond. The hazards involved in the bonding business are, then, to be determined from facts indicative of the degree to which confidence may be placed in the principal.

The facts, varying in their importance according to the class of bond in question, are, among others: the previous record of the applicant under comparable conditions; the nature of the business as indicating the probable grade of employees attracted; personal associations and their probable influence on integrity; personal habits; financial resources; relation of total obligations of principal to his capacity for meeting them; probable financial backing from friends, relatives, or organizations; auditing of accounts, indicating the probability that abstractions will be discovered; values under principal's control, indicating opportunities for abstraction; inducements to fulfill or neglect obligations, such as probable profit or loss from operations; degree of punishment for delinquency and its probable deterrent effect; standing of the principal in the community.

A few examples will best serve to make clear the bearing which these indications of hazard have in particular cases and the use

which is made of them by underwriters in determining the acceptability of risks and, if accepted, their relative desirability.\*

In considering an applicant for a fidelity bond comparatively little attention would be given to a man's financial standing. More important would be his past record in positions of trust, habits which might lead to misappropriation of funds, such as extravagance and drunkenness, the adequacy of his compensation to his standard of life, the opportunities which his position affords for dishonesty and the possibilities of concealment over considerable periods of time, the probability that friends or relatives would make shortages good in order to save the principal from disgrace.

Public official bonds call for an investigation along similar lines but, in addition, the capability of the principal must usually be considered for these bonds guarantee efficient performance. Particular attention must be directed to the laws governing this sort of bond and the checks provided by law in the way of periodical audits. There is also danger of cumulative losses where an officer holds office for several terms and opportunity for concealment where an officer has under his control two or more distinct funds for which he accounts separately and at different times.

In underwriting contract bonds ability and financial responsibility are of special importance. Depository bonds call for an investigation of financial stability. Court bonds involve, in the case of fiduciaries, a careful check on the conduct of the affairs placed in their hands; in the case of credit guarantees, determination of financial status or requirement of adequate collateral.

Examples might be multiplied. These will indicate the type of information which the underwriter must seek and the important part which underwriting knowledge and judgment play in the success or failure of the bonding business.

#### PREMIUM RATES.

As in other forms of insurance an analysis of the premiums charged for bonds shows them to be made up normally of three parts; provision for the payment of losses, provision for expenses,

\* No attempt will be made to treat exhaustively the underwriting considerations involved in bonding. For further discussion of these points the reader is referred to the works of Mackall and Penniman cited above and to "Live Articles on Suretyship" published by The Underwriting Printing and Publishing Co., New York.

and a residual amount which contributes to the surplus of the surety. But the proportions which should be assigned to these several purposes varies considerably between different classes of bonds, and can, for no one class, be stated in uniform percentages. No formula method for the calculation of bonding premiums has been devised or applied. The loss ratio will be found to be highest in the fidelity classes which are underwritten with the expectation of a proportion of losses. The loss ratio will be lowest or will disappear in those classes where protection by collateral is required, for losses will occur only when the collateral is insufficient. In these latter classes the surety is simply lending its name and credit to the principal and the premium charged is a fee for that service.

In practically all types of bonds there is a large element of service for which a corresponding charge must be made. For example, when a contractor is bonded, the obligee is not only protected by the surety from loss due to failure to complete the work for which the contract was let. He is assured by the willingness of the surety to issue its bond that the contractor employed meets certain standards and that it is unlikely that the work will be interrupted by the necessity of making arrangements for completion or for indemnity by the surety. For the service of investigation incident to the underwriting of the bond the contractor must expect a charge in the premium. Similarly an employer protected by a fidelity bond has, to some degree, the assurance that applicants for positions approved by the surety will not prove to be dishonest.

This service consists largely in investigations conducted into the status of each applicant for a bond, more or less rigorous as the particular cases may seem to require. The work necessary for such investigations is justified by the pressure thereby applied in the direction of sane personal and business methods.

The lack of uniformity observable in the bonding business is evident in the rate structure. Uniformity of rates as between carriers there undoubtedly is as practically the entire business is written at rates prescribed by a central rating bureau to which the carriers subscribe. The units of exposure used for the quotation of rates are so various that no general statement will cover all. Nor is the total premium always determined by multiplying the unit of exposure by the rate as is usual in other lines of insurance. Quotation of rates is, for many bonds, made in terms of the hundred dollar units of

penalty per annum.\* But the basic rate is subject to a minimum per man, per organization appearing as obligee, or per bond. Further, on large schedule bonds the rate is reduced as the amount of the penalty and/or the number of principals increases. In some cases a rate is made for the term of the bond instead of for one year. In automobile embezzlement coverage the car is made the unit of exposure. Other bases for quotation are number of employees, units of penalty running into many thousands of dollars, number of branches covered, geographical dispersion of business units, price paid for work to be done (as in contracts). There are also flat rates applicable to each bond issued though these may usually be converted into rates for units of penalty and term if the bond is standardized by statute.†

#### DETERMINATION OF RATES.

Looking at rates in the large, they are undoubtedly determined by the experience of the companies. Rates as a whole are expected to yield sufficient income to cover something more than the disbursements attributable to the business to which the rates apply. The bonding business has reached a stage of development where this can be roughly accomplished. The extent to which statistical experience is used in determining rates for particular types of bonds varies considerably. In no case is there a rigid application of experience figures. Probably the rates for fidelity bonds and for contract bonds are determined with more regard for actuarial principles than are those for other classes. The rating situation is such that a given rate is dependent upon the judgment of underwriters, upon statutory enactments, and upon the give and take of local situations.‡ The carriers would prefer doubtless to charge the rate which actually covers the probability of loss and the probable expenses necessary for each type of bond. In the present situation this is impossible.

The difficulties of applying actuarial methods to the determination of rates for this business are many. New types of bonds are constantly being demanded by business men or required by the gov-

\* Occasionally thousand dollar units are used.

† For further detail on this subject see the rate manual used by the carriers.

‡ See "Report on Examination of the Towner Rating Bureau" dated May, 1914, issued by the Insurance Department of the State of New York.

ernment. Statistics are of little service in quoting rates for many of the newer types of bonds. As has been stated a statutory requirement for a bond often specifies the rate of premium which shall be required as well as the form of bond, and carriers find it impracticable to depart from such requirements in most cases. The bonding contracts, while in a measure standardized, are subject to many limitations of coverage of such a nature that experience under them would be distorted. A company may, for example, write several bonds of a general class at the same rate while making allowance for variations in hazard by inserting limitations in the contract.

Another difficulty is found in deferred losses for which no standards of valuation have been set up and which are especially troublesome in this form of insurance. The extreme variability of risks, involving as they do a considerable intangible moral hazard which seems best estimated by the application of personal judgment, will probably continue for many years to demand the application of the judgment of the underwriter to a greater degree than the demonstration of the statistician.

There is ample opportunity for the development of statistics, however, in this field even though it may give less promise of usefulness than in other lines. Experience at present available is no more than a general guide to the situation.

#### LOSS RESERVES.

In the state of New York the bonding business comes under the general provisions of law for the maintenance of loss reserves for casualty companies which require that such reserves shall be "at least equal to the aggregate estimated amounts due or to become due on account of all losses and claims of which the corporation has received notice, provided that such loss reserve shall also include the estimated liability on any notices received by the corporation of the occurrence of any event which may result in a loss, and the estimated liability for all losses which have occurred but on which no notice has been received."\*

Reserves for each carrier may be calculated as seems best to the individual carrier, subject to the right of the Superintendent of Insurance to require additional reserves if in his judgment the reserve as calculated by the carrier is inadequate. Loss reserves must

\* Consolidated Laws, Chapter 28, Article 86.

be set up for at least the following items: claims made but not finally settled, claims incurred but unreported, "trouble notices" indicating possibility of a claim. No standard method of calculation has been evolved, each company adopting such standards as its judgment and experience seem to demand. Reserves for claims in hand are determined by the individual estimate method.

The adequacy of reserves set up in the past is indicated by the following table based on the individual statements for 1919 of the ten principal bonding companies.

EXHIBIT OF FIDELITY AND SURETY RESERVES.

Showing estimates at end of each year with development to  
December 31, 1919.

*Fidelity.*

Date.	Original Estimate.	Developments to 12/31/19.	Ratio.
Dec. 31, 1909..	\$ 432,246.00	\$ 316,768.00	73.28
" 1910..	925,274.00	440,661.00	47.62
" 1911..	716,188.00	536,720.00	74.94
" 1912..	1,258,667.00	949,377.00	75.43
" 1913..	1,414,094.00	1,050,387.00	74.28
" 1914..	1,542,386.00	1,320,356.00	85.60
" 1915..	1,696,824.00	1,133,159.00	66.78
" 1916..	1,603,199.00	1,208,733.00	75.40
" 1917..	2,123,727.00	1,549,774.00	72.97
" 1918..	2,449,337.00	2,045,231.00	83.50

*Surety.*

Dec. 31, 1909..	\$1,591,726.00	\$1,705,618.00	107.16
" 1910..	2,166,800.00	2,112,342.00	97.49
" 1911..	1,999,475.00	2,339,961.00	117.03
" 1912..	1,980,750.00	2,268,433.00	114.52
" 1913..	2,514,320.00	3,940,115.00	156.71
" 1914..	2,618,530.00	2,675,926.00	102.19
" 1915..	2,551,279.00	2,520,795.00	98.81
" 1916..	3,177,575.00	2,346,058.00	73.83
" 1917..	3,837,261.00	5,229,233.00	136.28
" 1918..	4,882,854.00	5,849,022.00	119.79

EXPERIENCE.

The following table indicates the general experience of ten leading carriers for a period of ten years:



## EXHIBIT OF FIDELITY AND SURETY LOSS RATIO EXPERIENCE.

*Fidelity.*

Cal. Yr.	Premiums Written.	Premiums Earned.	Losses Paid.	Loss Incurred.	Ratio Losses Incurred to Premium Earned.
1910	\$ 4,598,654.00	\$ 5,245,116.00	\$ 1,082,474.00	\$ 1,051,459.00	20.05
1911	4,945,737.00	4,676,938.00	1,408,339.00	1,465,129.00	31.33
1912	5,352,340.00	5,042,033.00	1,469,245.00	1,642,015.00	32.57
1913	6,034,239.00	5,734,987.00	1,878,506.00	2,123,704.00	37.07
1914	6,608,844.00	6,198,248.00	2,169,090.00	2,514,596.00	40.57
1915	6,742,502.00	6,652,528.00	2,321,030.00	2,603,570.00	39.14
1916	7,426,623.00	7,006,592.00	2,110,047.00	1,936,616.00	27.64
1917	8,569,980.00	8,014,220.00	2,135,641.00	2,857,872.00	35.66
1918	9,608,172.00	8,835,392.00	2,744,168.00	3,194,012.00	36.15
1919	12,120,294.00	10,763,319.00	3,959,418.00	4,074,580.00	37.86
Total	\$72,007,385.00	\$68,169,373.00	\$21,277,958.00	\$23,463,553.00	34.42

*Surety.*

1910	7,323,685.00	5,976,342.00	1,225,046.00	2,121,656.00	35.50
1911	7,937,274.00	7,675,631.00	2,145,341.00	2,110,670.00	27.50
1912	8,664,506.00	8,023,291.00	2,312,277.00	2,518,100.00	31.38
1913	9,652,679.00	9,000,059.00	3,152,905.00	4,113,654.00	45.71
1914	10,988,638.00	10,551,050.00	4,115,017.00	4,195,633.00	39.77
1915	11,247,245.00	10,880,625.00	3,343,710.00	3,242,173.00	29.80
1916	13,870,818.00	12,219,421.00	3,148,575.00	4,039,256.00	33.06
1917	16,280,995.00	14,564,624.00	4,232,080.00	5,162,760.00	35.45
1918	16,432,667.00	16,652,101.00	4,564,868.00	6,000,894.00	36.04
1919	22,414,585.00	18,684,520.00	3,809,873.00	4,350,850.00	23.29
Total	124,813,092.00	114,227,664.00	32,049,692.00	37,855,646.00	30.33

## CONCLUSION.

It will be seen from this brief outline of corporate bonding that it is a field for future work on the part of the actuarial and statistical professions. So little has been accomplished thus far in the application of scientific methods, in fact so little has been attempted, that there is ample opportunity for original investigations and the development of a new procedure.

A SUGGESTED SYSTEM OF STANDARD NOTATION FOR  
ACTUARIAL WORK IN WORKMEN'S COMPEN-  
SATION INSURANCE.

BY

SANFORD B. PERKINS.

Actuarial science having kept pace with the rapid growth of workmen's compensation insurance, it seems opportune at the present time to attempt a standardization of the notation employed in rate making, experience rating, and the determination of loss reserves of this form of insurance. As a normal development of workmen's compensation insurance out of employer's liability insurance, certain terms such as premium, pure premium and manual rate, which have been included in insurance parlance for so long, were accepted without hesitation as part of the vocabulary of workmen's compensation insurance. The treatment of such terms might seem entirely superfluous at this time, until it is realized that in the development of rating procedure by many individual organizations different symbols have been assigned to the same terms, and in the various rating organizations a given symbol may represent different items. For the sake of completeness, then, this paper will attempt to cover all of the more common workmen's compensation insurance terms for which there seems to be a need of standardization.

In order that the problem may be attacked and developed with some logical sequence, the process of construction of workmen's compensation rates, according to the methods recently adopted by the National Council on Workmen's Compensation Insurance, will be used as a skeleton with the thought that, having covered the terms used in connection with the problems incidental thereto, this paper would have about completed its purpose.

The story of the rate revision itself has been told in detail by Mr. G. F. Michelbacher in his paper, "The Technique of Rate Making," which appeared in Volume VI, Part II, No. 14, of the *Proceedings* of this Society. References will be made from time to

time to portions of that paper. This will avoid lengthy explanation of specific operations in order that this paper may proceed more directly with its own problem—namely, that of establishing notation for these operations.

When the National Council on Workmen's Compensation Insurance undertook the task of establishing rates for the numerous classifications\* for various states, there was available the experience of a number of representative carriers as reported to the state departments which require such data, or to central organizations, such as the National Workmen's Compensation Service Bureau and the National Association of Mutual Casualty Companies, part of whose function it has been to assemble such statistical information. The data was filed on the form known as Schedule "Z" and was subdivided by state, policy year and classification. For each classification there was reported the exposure in terms of payroll and premium. The payroll will be referred to by the symbol  $W$ , inasmuch as it represents the aggregate wages paid to all employees covered by the classification. It will also be necessary to indicate the state or policy years, and even the classification to which the payroll under consideration is related. The state and policy year will be indicated by a superscript or symbol appearing at the upper right corner of the symbol representing payroll. Thus if  $Yr$  represents the state of New York and 16 and 17 represent respectively the policy years 1916 and 1917,  $W^{Yr::16:17}$  represents the entire payroll for the state of New York for the policy years 1916 and 1917. The classification may be conveniently indicated by the use as a subscript of the code number. Thus  $W_{3632}^{Yr::16:17}$  would represent the payroll for Classification No. 3632 which was covered in New York during the policy years 1916 and 1917.

The following list of state abbreviations is submitted for use in connection with this method of indication with the full realization that, whereas they are not standard abbreviations, they possess the quality of brevity and are intended in part to bring to mind phonetically the states which they represent. Further, a two letter code has been established because of the fact that, although one letter would suffice in many instances, the same letters are suggested in other parts of this paper to represent different items. Where the system of subscripts, superscripts, presubscripts and

\* See G. F. Michelbacher, "The Technique of Rate Making . . .," *Proceedings*, Vol. VI, Part II, No. 14, page 205.

presuperscripts has been devised in such a way that the position of the modifying notation with respect to the main symbol will properly identify it, some confusion might be caused in the minds of those who had not thoroughly acquainted themselves with the system if there were any apparent duplication of symbols.

State	Symbol
Alabama .....	<i>Ab</i>
Alaska .....	<i>Al</i>
Arizona .....	<i>Ar</i>
Arkansas .....	<i>Ak</i>
California .....	<i>Ca</i>
Colorado .....	<i>Cl</i>
Connecticut .....	<i>Ct</i>
Delaware .....	<i>Di</i>
Florida .....	<i>Fl</i>
Georgia .....	<i>Ga</i>
Idaho .....	<i>Id</i>
Illinois .....	<i>Il</i>
Indiana .....	<i>In</i>
Iowa .....	<i>Io</i>
Kansas .....	<i>Ks</i>
Kentucky .....	<i>Ky</i>
Louisiana .....	<i>La</i>
Maine .....	<i>Me</i>
Maryland .....	<i>Md</i>
Massachusetts .....	<i>Ms</i>
Michigan .....	<i>Mg</i>
Minnesota .....	<i>Mn</i>
Mississippi .....	<i>Mp</i>
Missouri .....	<i>Mo</i>
Montana .....	<i>Mt</i>
Nebraska .....	<i>Nb</i>
Nevada .....	<i>Nv</i>
New Hampshire .....	<i>Hm</i>
New Jersey .....	<i>Jr</i>
New Mexico .....	<i>Mx</i>
New York .....	<i>Yr</i>
North Carolina .....	<i>Cn</i>
North Dakota .....	<i>Dn</i>
Ohio .....	<i>Oh</i>
Oklahoma .....	<i>Ok</i>
Oregon .....	<i>Or</i>
Pennsylvania .....	<i>Pa</i>
Rhode Island .....	<i>Rd</i>
South Carolina .....	<i>Cs</i>
South Dakota .....	<i>Ds</i>

Tennessee .....	<i>Tn</i>
Texas .....	<i>Tx</i>
Utah .....	<i>Ut</i>
Vermont .....	<i>Vt</i>
Virginia .....	<i>Va</i>
Washington .....	<i>Wa</i>
West Virginia .....	<i>Vw</i>
Wisconsin .....	<i>Ws</i>
Wyoming .....	<i>Wy</i>
* Eastern Group .....	<i>EG</i>
Central Group .....	<i>CG</i>
Western Group .....	<i>WG</i>
Southern Group .....	<i>SG</i>
United States .....	<i>US</i>

There are included in the above list all the states of the United States, although at the present time there are some in which workmen's compensation insurance is not written. There have also been added the four groups of states into which the National Council divided the workmen's compensation experience for territorial comparisons, as well as the United States, which in this instance refers to all of the states for which experience was available.

According premium the same treatment as was given payroll and allowing premium to be represented by *P*, the state or policy years and classification would be indicated by means of the same superscripts and subscripts. Thus,  $P_{3632}^{Fr::16:17}$  would represent the premium earned from policies covering payrolls to the extent of  $W_{3632}^{Fr::16:17}$  in New York for the policy years 1916 and 1917 for Classification No. 3632.

The losses were reported for each classification by nature of injury† and, although the division as to nature of injury was not made on exactly the same basis at all of the sources of reported information, nevertheless it was possible to segregate all of the loss payments into three general groups, namely, "Death and Permanent Total," "Medical," and "All Other." It has, however, been found advantageous to establish a universal form upon which such information should be reported and in the future it may be pos-

\* See G. F. Michelbacher, "The Technique of Rate Making . . .," *Proceedings*, Vol. VI, Part II, No. 14, page 218.

† See G. F. Michelbacher, "The Technique of Rate Making . . .," *Proceedings*, Vol. VI, Part II, No. 14, page 215.

sible to subdivide the losses into more closely defined groups. The Universal Schedule "Z" form which has been adopted divides the losses into the following groups.

Death	Minor Permanent
Permanent Total	Indeterminate
Major Permanent	Temporary

Medical

It will therefore be necessary to refer to losses in a more detailed way than to payroll or premium. The nature of injury under which the losses were incurred will be indicated by a presubscript appearing at the upper left-hand corner of the symbol *L* which represents losses in general. Losses incurred for deaths in the State of New York during the policy years 1916 and 1917 for Classification No. 3632 would be represented by  ${}^{DC}L_{3632}^{16:17}$ . In order that there may be symbols for all kinds of injury for which reports may be received, the following symbols are suggested. For the same reason as obtained in the state symbolization a two letter code is used for nature of injury.

Nature of Injury	Symbol
Death .....	<i>DC</i>
Permanent Total .....	<i>PT</i>
Major Permanent .....	<i>MP</i>
Minor Permanent .....	<i>PM</i>
Indeterminate .....	<i>IC</i>
Temporary .....	<i>TT</i>
Temporary in Permanent Partial .....	<i>TP</i>
Medical .....	<i>MC</i>
Death and Permanent Total .....	<i>DP</i>
All Others .....	<i>AO</i>

The first operation which was performed on the experience of the various states was that of combining it on a basic level.\* For this basic level the 1917 policy year of the state of New York was chosen. The *basic level* is the experience level as indicated by the workmen's compensation experience reported under policies written in the state of New York during the calendar year 1917 and expiring not more than one year later. New York will therefore be considered the *basic state*. A state other than the basic state whose experience is to be converted to the basic level is known as the *addi-*

\* See G. F. Michelbacher, "The Technique of Rate Making . . .," *Proceedings*, Vol. VI, Part II, No. 14, page 215.

*tional state.* The experience for the policy year 1916 for the state of New York must not, therefore, be referred to as basic experience but must be treated exactly in the same manner as the experience of an additional state.

In order to avoid an error which was inherent in the old method of law differentials, namely, that of ignoring the differences in accident distribution in the various states as regards nature of injury, the Manual was split into three groups called manual groups.\* The first of these was made up of classifications representative of outdoor industries. It consisted of classifications under which were expected severe and long time temporary disabilities. This group was intended to reflect the effect of those portions of the compensation acts which dealt with temporary total benefits. The second group consisted of classifications under which dismembersments were expected. This group was intended to reflect the effect of the so-called specific schedules of the various compensation acts. The third group was comprised of the remaining classifications.

The losses within each manual group were then subdivided into three sub-groups. The first of these sub-groups consisted of "Death and Permanent Total" losses reported by number only. Inasmuch as death and permanent total cases were later treated on an average cost basis, it was only necessary to determine the accident rate in terms of number of accidents per unit of payroll, and these accident rates needed only to be applied to the average cost for death and permanent total cases established for a given classification to produce the death and permanent total partial pure premium for that classification in dollars and cents per unit of payroll. In establishing basic partial pure premiums for death and permanent total New York average values were used.† The second sub-group of losses was called the "All Other" group and consisted of all losses not death and permanent total or medical. The "Medical" losses made up the third sub-group.

Since "death and permanent total" losses were reported by number of cases it was only necessary to accumulate these additively to bring them to the basic level. In translating "all other" and "medical" losses to the basic level a method known as conversion

\* *Ibid.*, page 217.

† See G. F. Michelbacher, "The Technique of Rate Making . . .," *Proceedings*, Vol. VI, Part II, No. 14, page 221.

was employed. This method consisted of determining experience differentials known as conversion factors. A *conversion factor* is one such that, if it be applied to the losses of an additional state, the pure premiums developed by the combination of such modified losses with the actual losses of the basic state and the combined payrolls of the two states, when applied to the actual payrolls of the basic state, will exactly reproduce the losses experienced therein.

Mr. W. W. Greene in his original development of the formula,\* which was adopted in a modified form by the Actuarial Committee of the National Council on Workmen's Compensation Insurance for the purpose of combining experience, assigned to his conversion factor the symbol  $E$ . The weakness of this symbol lies in the fact that it does not indicate in itself the particular state to the experience of which it is applicable nor the basis to which this experience is to be converted. Mr. A. H. Mowbray, in a memorandum to the Actuarial Committee of the National Council, suggested the use of a symbol  $C$  for conversion factor in general, with an appropriate superscript to indicate the additional state for which the experience was to be used and a subscript to represent the basic state. Thus,  $C_{Yr}^J$  would represent the factor for converting New Jersey experience to the New York basis. This might profitably be extended one step further by appending to the superscript the policy year or years to the experience of which the factor was applicable and by substituting for the subscript  $Yr$  the subscript  $B$  to represent the basic level. Thus,  $C_B^{Jr:16:17}$  would represent the factor for converting New Jersey experience for the policy years 1916 and 1917 to the basic level. If, at a later time another state should be chosen as the base, a subscript such as  $Jr:17$  could be used to indicate that the experience has been converted to the New Jersey 1917 level.

Since with but four exceptions the experience for the policy years 1916 and 1917 was used in the revision, a very natural question might be raised as to why the 16:17 need be included in the symbol for the conversion factors. The symbols are, however, suggested with the idea of general use, and it was thought advisable to abide by the fundamental principle of allowing the superscript to represent the particular policy year or years involved.

Conversion factors were established for the "all other" and

\* See W. W. Greene, "Upon Combining Compensation Experience from Several States," *Proceedings*, Vol. VI, Part I, No. 13, pages 10-30.



“medical” loss groups and, in order to identify the conversion factor for a state and policy year with the proper loss group, the same device has been utilized as was employed in a preceding paragraph in associating losses with kind of injury. This was a superscript. In this way  ${}^{AOC}_B^{::16:17}$  represents the conversion factor for converting the “all other” losses of New Jersey included in the experience of the 1916 and 1917 policy years to the basic level. Similarly,  ${}^{MOC}_B^{::16:17}$  refers to the corresponding “medical” losses.

When the experience for all states had been converted to the basic level in the manner described, there was prepared an exhibit for each classification consisting of the converted experience for each state. The states were divided into four territorial groups called respectively Eastern, Central, Western and Southern. The experience for each of these groups of states, as well as for the whole country, appeared on the exhibit. The experience itself consisted of payroll, premium, number and cost of the “death and permanent total” cases, number of cases and amount of the “all other” losses, amount of the “medical” losses and the “total amount.” All loss amounts were on a converted basis. In addition, partial pure premiums for “death and permanent total,” “all other” and “medical” were presented together with the total pure premium. These partial pure premiums were obtained by dividing respectively the “death and permanent total,” “all other,” “medical” and “total” losses by the payroll in units of \$100.

The cost of the “death and permanent total” cases was calculated on an average value basis. Since the policy year 1917 for the state of New York was adopted as the basic level, the average values assigned to “death and permanent total” cases were determined from the 1917 Schedule “Z” for the state of New York. The manual classifications were segregated into schedules and for each schedule an actual average value was calculated. The average values were found to fall naturally into five groups, with the exception of a very few instances where there was not sufficient experience within a schedule to satisfactorily indicate an average. Such schedules were combined with others which, in the opinion of the Actuarial Committee of the National Council, were analogous with regard to those conditions upon which an average “death and permanent total” value depends.

In referring to basic pure premiums the symbol  $\pi$  will be em-

ployed while  $p$  will indicate the pure premium of an additional state. A partial pure premium will be indicated by the addition of a presuperscript referring to the division of the pure premium to which it applies. The state and policy year will be denoted by superscripts while a subscript will indicate the classification. Thus, the "death and permanent total" basic partial pure premium for Classification No. 3632 would be written  $DP_{\pi_{3632}}$  and similarly  $DP_{3632}^{Jr:17}$  would refer to the New Jersey 1917 "death and permanent total" partial pure premium for Classification No. 3632.

With the data submitted in the above described form it devolved upon the General Rating Committee of the National Council at this point to establish basic pure premiums for all of the manual classifications. In order to furnish a measure of the deviation of classification experience from the average experience of certain other more or less homogeneous classifications, the whole manual was divided into groups of classifications and the experience for these groups was combined and submitted to the Committee in addition to the individual classification experience. Before adopting partial pure premiums for a given classification, the Committee studied the data by states, territorial groups, and country as a whole, and compared the total classification experience with the group experience. Deaths or permanent total cases which had occurred as the result of catastrophes—a catastrophe being defined as an accident involving losses equal to or exceeding the cost of five deaths—were in general excluded on the theory that they represented a class of losses which should be covered by the one cent catastrophe loading which is to be applied to every rate. The Committee then proceeded to adopt partial and total pure premiums for the various classifications, the selections being governed principally by the experience. Where the experience was abnormal for one or more states and of enough volume to be indicative, and where possibly that abnormality could be specifically assigned to local conditions, an exception was created for that particular state or group of states. Generally, such experience was excluded from the total in determining basic pure premiums. Certain classifications were eliminated entirely, the experience reported for them being combined with the experience of the classifications under which would be written the policies which had furnished the particular data for the classifications which were eliminated. Other classifications were combined in the belief that it would be impossible for a payroll auditor to obtain a correct

division of the payroll, and with the knowledge that any differentiation in the hazards of the classifications on the basis of the limited experience available would be fallacious.

Having decided upon basic pure premiums on the basic level of New York, 1917, three problems presented themselves. The first problem was that of translating the basic pure premiums to the state level for which workmen's compensation rates were to be promulgated; the second, that of modifying the individual state pure premiums in such a way as to reflect the differences in all conditions which would effect pure premium level as between the period over which the experience was collected and that for which the rates would apply; and the third, the problem of measuring the effect which amendments to existing compensation acts, effective since 1917, should have had on the pure premium level.

The first problem was a comparatively simple one, the method having really been determined in the creation of conversion factors. It is obvious that any method which correctly translates the experience of a given state to the basic level may just as correctly be used to convert basic experience to the level of any additional state. This process was called translation and the factors were called translation factors. A *translation factor* is one which, when applied to an established partial basic pure premium, will produce a partial pure premium for an additional state.

The foregoing definition of a translation factor differs slightly from the definition originally adopted by the Actuarial Committee of the National Council on Workmen's Compensation Insurance in that "partial pure premium for an additional state" has been substituted for "partial gross rate for an additional state." The justification of this change lies in the fact that there are many distinct problems involved in creating rates for individual states from combined basic experience which may be solved independently. Were a translation factor defined as that factor which would translate basic pure premiums to state partial gross rates, the factor in itself could not be determined until every problem incidental to the creation of rates was settled, and such a factor in itself would be meaningless unless analyzed.

Since translation is therefore a particular application of conversion, the same general symbol as applies to conversion might also well apply to translation. For instance,  $C_{r:17}^B$  would represent the factor for the translation of the basic experience to the level of

the 1917 policy year for the state of New Jersey. The fact that a translation factor applies to basic partial pure premiums and that a conversion factor applies to losses is immaterial, for since partial pure premiums are merely the ratio of losses to payroll, it is evident that a factor applied to the losses would produce the same effect upon the result as if it were applied to the pure premium obtained by the use of the unmodified losses. Nature of injury or loss groups and classifications should be indicated in the manner already described.

The second problem, that of bringing the state partial pure premiums to the period of rate application, was a complicated one because of the many elements which would directly influence the result. Among these there may be mentioned as prominent (a) change in accident rate—*accident rate* is defined as the number of accidents occurring per 1,000 employee years; (b) change in average accident severity—*accident severity* is the measure of the loss of earning capacity resulting from any one industrial accident; (c) change in ratio of compensation to wages; (d) change in administration of the compensation acts; (e) effect of industrial fatigue; (f) amendments to compensation acts, effective subsequent to 1917. Present day conditions of unemployment, labor turnover and industrial unrest, although much less tangible, have also a distinct influence on the pure premium level.

After a careful study of the situation, the Actuarial Committee came to the conclusion that a single factor would measure collectively the effect of not only the other elements hereinbefore listed exclusive of amendments, but any others that might exist. This factor consisted of the ratio of the loss ratios for the policy years 1919 and 1916–1917 on a modified basis\* for the state under consideration. Provided the loss ratio for the policy years 1916–1917 could be obtained on the basis of the 1919 manual rates, such a factor would indicate the necessary adjustment in the pure premiums of the 1916–1917 level to produce adequate but not unreasonable pure premiums for 1919.

A *loss ratio* symbolized by  $\rho$  for the experience of any policy year is defined as the ratio between the incurred losses and the ultimate

\* See A. H. Mowbray, "Actuarial Problems of 1920 Revision . . .," *Proceedings*, Vol. VI, Part II, pages 270–277; also see G. F. Michelbacher, "The Technique of Rate Making . . .," *Proceedings*, Vol. VI, Part II, No. 14, page 244.

earned premium. In this manner  $\rho^{Yr:19}$  represents the loss ratio for the state of New York for the policy year 1919. By *incurred losses* for any given year is meant the aggregate amount of money which will have been paid to injured employees in the form of compensation benefits or for medical and surgical treatment for the benefit of injured employees when every case assignable to that particular policy year has been finally closed. Such losses are indicated by  $L_i$ . As of any given date the incurred losses may be divided into *paid losses* and *unpaid or outstanding losses*. These would be respectively  $L_p$  and  $L_o$ . In the event that a particular classification were referred to, the subscript representing incurred, paid or outstanding should appear first, and should be separated from the classification by a colon. Thus,  $L_{i:3632}$  would represent the incurred losses for Classification No. 3632.

In dealing with loss ratios, unconverted incurred losses should be used. The reason for this is obvious, since, in projecting the basic experience to the individual state levels, the experience for the additional states have established their own levels; and since the factors which are to be hereafter developed apply to the state partial pure premiums, unconverted state experience must be used in connection therewith.

*Ultimate earned premiums* refer to the final adjusted premiums collected under policies assigned to a given policy year. Ultimate earned premiums differ from *written premiums* in that written premiums are based upon advance estimates of annual payrolls. The ultimate earned premiums may be divided as of any given date into *earned premiums* and *unearned premiums*. Earned premiums represent the premium obtained by applying the final adjusted rate to the payrolls actually expended at the time as of which earned premiums are being calculated. The difference between ultimate earned premium and earned premium is the unearned premium. Written, ultimate earned, earned and unearned premiums will be referred to respectively as  $P_w$ ,  $P_u$ ,  $P_e$  and  $P_o$ .

The accuracy of a loss ratio depends to a large extent upon the period between the beginning of the policy year under consideration and the date as of which the loss ratio is determined. In any case the results depend upon the accuracy with which the losses outstanding are estimated. The date, therefore, as of which a loss ratio is estimated, is sometimes as significant in interpreting the loss ratio as the ratio itself, and it might be well to make some

provision for this date in the symbol. The presubscript space is available for this time indication and a presubscript indicating the number of months after the beginning of the policy year under consideration should be used. To represent a loss ratio for the 1917 policy year for the state of New York estimated as of December 31, 1919, the symbol  ${}_{36\rho}{}^{Yr:17}$  is recommended. The ratio between any two loss ratios would be symbolized as  $\beta$  in which case this relation exists.

$$\frac{{}_{12\rho}{}^{Yr:19}}{{}_{36\rho}{}^{Yr:17}} = \beta_{Yr:19/17}.$$

The factor  $\beta$  is termed *projection factor*. It was realized that such a factor would not apply equally to the various loss groups, and it was therefore split into three factors, which should be applied to the "Death and Permanent Total," "All Other" and "Medical" partial state pure premium respectively. These three factors shall be referred to as  ${}^{DP}\beta$ ,  ${}^{AO}\beta$ , and  ${}^{MC}\beta$  with the proper indication for state and policy years. The factor  $\beta^{Tr:19/17}$  provides only for the adjustment of the pure premiums to the level of the 1919 policy year. If, however, it is eventually decided to attempt to forecast the conditions of 1920, 1921 or 1922 as affecting loss ratios it would not affect the symbols or procedure as previously set forth. The only changes necessary would be the alteration of the superscript from 19/17 to 20/17 or 21/17, depending upon whether the loss ratio for 1920 or for 1921 was estimated.

The solution of the third problem, namely that of evaluating amendments effective subsequent to 1917, is dependent in its accuracy upon the stability of the distribution of accidents by nature of injury throughout the various compensation states. The National Council on Workmen's Compensation Insurance has, on the basis of the entire compensation experience reported, compiled what is known as the American Accident Table. This table is a distribution of industrial accidents by nature of injury and presents the number of "Fatal," "Permanent Total," "Permanent Partial" and "Temporary Total" accidents occurring per 100,000 compensable industrial accidents. The fatal cases are distributed by number, relationship and age of dependents. The average age of those permanently and totally injured is indicated. Permanent partial cases are distributed by nature of injury. In this distribution

nature of injury has been interpreted as reflecting the surgical effect of an industrial accident.

Temporary total cases and temporary total cases resulting in permanent partial disability have been distributed by duration of total disability. To denote the number of temporary total cases in the American Accident Table with a duration of disability of more than thirty weeks the symbol  ${}_{30}TT$  is used. The number of temporary total cases resulting in permanent partial disability of which the duration of total disability is less than thirty weeks is represented by  ${}_{30}TP$ . Use of the symbol  $TT$  without modification denotes the total number of temporary total cases in the American Accident Table. Similarly,  $PP$  represents the total number of permanent partial cases;  $MP$  major permanent partial cases;  $PM$  minor permanent;  $PT$  permanent total; and  $DC$  death cases. Permanent partial cases may be further subdivided into dismemberment cases  $PP^d$  and non-dismemberment cases  $PP^n$ .

The benefits payable for the number of accidents of any type that appears in the American Accident Table should be indicated by the addition of the presuperscript  $c$  to the symbols just described. Thus  ${}^cTT^{Jr:17}$  would represent the cost of "Temporary Total" accidents according to the American Accident Table and under the 1917 New Jersey Compensation Act.

In valuing annuities under the various compensation acts the regular life insurance notation should be continued. Thus,  ${}_n a_x^{(m)}$  would represent the present value of a temporary life annuity payable  $m$  times a year for  $n$  years at age  $x$  the first payment at the end of the first period. A deferred annuity should be denoted by  ${}_n | a_x^{(m)}$  which would represent the present value of an annuity, the first payment to be made at the end of the first period after  $n$  years payable  $m$  times a year at the present age  $x$  and payable until the end of life. Again,  $a_x^{(m)}$  would represent the present value of an ordinary life annuity payable  $m$  times a year, the first payment to be at the end of the first period and to continue to the end of life. There have been various symbols used with reference to the present value of an annuity payable to a widow until death or remarriage. It is recommended that  $a_x^w$  represent the present value of an annuity payable to a widow until death or remarriage.

Factors which reflect the effect of amendments to compensation acts are known as *amendment factors*. Amendment factors have

been calculated for the three leading groups and may be indicated by  $DP\alpha$ ,  $AO\alpha$  and  $MC\alpha$ , which refer respectively to the "death and permanent total," "all other" and "medical" loss groups.

The product of the projection and amendment factors and the corresponding state partial pure premiums would produce state partial pure premiums on the basis of the period of rate application. The state partial pure premiums here referred to of course are obtained by multiplying the basic partial pure premiums by the translation factor applying to the state under consideration. The sum of the three state partial pure premiums on this basis would produce the state total pure premiums for any desired classification. There remains the determination of the expense, tax and catastrophe loadings to have the complete data from which manual rates may be determined. Symbolizing the expense factor by  $\epsilon$ , the tax by  $\tau$ , the catastrophe loading by  $\gamma$ , and the manual rate by  $R$ , any manual rate could be determined by performing the following algebraic calculation:

$$R = \frac{DP_p DP_\alpha DP_\beta + AO_p AO_\alpha AO_\beta + MC_p MC_\alpha MC_\beta}{1 - (\epsilon + \tau)} + \gamma.$$

$R$  in this formula represents the manual rate for a nonschedule rate classification. If, however, the classification be a schedule rated one and if  $\sigma$  be assigned as the symbol for the schedule rating factor then

$$R = \frac{(DP_p DP_\alpha DP_\beta + AO_p AO_\alpha AO_\beta + MC_p MC_\alpha MC_\beta)\sigma}{1 - (\epsilon + \tau)} + \gamma$$

would represent the manual rate for such a classification.

The manual rates will be adjusted, for some classifications at least, by schedule and experience rating.  $R_S$  is offered as a symbol for manual rate adjusted by schedule application or as the schedule rate. Similarly,  $R_E$  should be used to indicate an experience rate. According to the present practice schedule rating is applied before experience rating and, therefore, the experience rate would oftentimes be a modification of the schedule rate. However, this does not effect the symbol.

In all the states in which experience rating is applied, the plan in use provides for a division in the premium producing partial premiums, each of which is designed to cover some particular group



of losses. It is generally understood that all but one of these states will continue on such a basis, and the writer believes this to be certain enough to warrant the inclusion of a series of notations applicable to experience rating terms and processes.

Because of the slight differences in the exact grouping of the losses in the various state plans, it is recommended that the groups be referred to by subscripts 1, 2, 3, etc., the first in each case to refer to the group including the losses of the most serious nature with the provision only that the last group shall consist of the catastrophe losses if they are reported separately. Thus, if  ${}_xP$  represents, in general, premium subject to experience rating,  ${}_xP_1$ ,  ${}_xP_2$ ,  ${}_xP_3$ , etc., would represent the partial premiums designed to cover the losses of the various loss groups in the descending order of their severity. *Premium subject to experience rating* is the premium computed by extending the actual payrolls at the manual rates for classifications which are not subject to schedule rating and by extending at the appropriate schedule rates the actual payrolls subject thereto. Similarly, *premium subject to schedule rating* would be indicated by  $sP$ .

The actual losses reported are subdivided into the loss groups as indicated and these are brought to a premium level by the application of the same factors as would apply to pure premiums established on the bases of those losses in order to construct rates. The factors which translate losses to a premium level are called *modification factors*. When the losses have been translated to premium level, they are known as *indicated partial premiums* and should be symbolized as  $I$  with the proper subscripts.

The differences between the indicated premiums and the corresponding partial premiums subject to experience rating are known as *indicated departures* and may be represented by  $Y_1$ ,  $Y_2$ ,  $Y_3$ , etc. These indicated departures are given a weight, depending upon the size of the risk being rated. This weight measures the credibility of the risk experience and the factors which indicate the exact weights are called *credibility factors* and are indicated by  $z_1$ ,  $z_2$ ,  $z_3$ , etc. The product of the credibility factors and the indicated departures produce the *partial premium modifications*. The algebraic sum of these premium modifications represents the actual premium modification allowed for the particular risk. The symbol  $X$  represents this premium modification. Utilizing the above notation, an

experience rate for a risk would be indicated by

$$R_E = R \left( 1 + \frac{X}{{}_E P} \right).$$

For a risk subject to schedule rating  $R_S = R_E \left( 1 + \frac{X}{{}_E P} \right)$  where  $R_E$  represents the experience rate, with  $X$  representing the premium modification and  ${}_E P$  representing the premium subject to experience rating. The expression  ${}_E P + X$  would represent the adjusted premium as a result of experience rating.

A paper on workmen's compensation notation would not be complete without some mention of loss reserves. These may be set up on the basis of accumulated individual reserves or as a percentage of earned premiums less paid losses and claim expenses. The majority of compensation states require that reserves be set up on the former basis for the earlier policy years and on a percentage basis for the later years. The symbol  $Q$  serves to indicate in general a special reserve for unpaid workmen's compensation losses as found in Part II of Schedule "P." A prefixed superscript is used to denote the basis upon which the reserve is set up,  $v$  indicating individual claim basis and the numerical value of the percentage being used to denote the latter basis, as well as the percentage used. If the former method is employed and a system of loading is applied to the results obtained on the individual claim basis,  $v'$  should then be used. A superscript gives the territory to which the reserve is applicable, as well as the policy years for which it is set up. If a particular classification is being dealt with, this is indicated by a subscript. Thus,  ${}^{65}Q_{3632}^{US:11-16}$  represents the reserve for workmen's compensation losses on Classification No. 3632 for the United States for policy years 1911 to 1916 inclusive, the reserve being set up on a 65 per cent. basis. Similarly,  ${}^V Q_{3632}^{US:11-16}$  represents the corresponding reserve on an unloaded individual claim basis.

The subject of workmen's compensation notation has been presented in the narrative form with the thought that, if the reader were following mentally the constructive procedure outlined herein, the context would clarify and possibly emphasize the need of the suggested symbols. Undoubtedly a subject as comprehensive as workmen's compensation notation cannot be covered thoroughly in such a brief article, but this paper has been presented with the hope

that it may serve as a basis of discussion and that it might lead ultimately to the adoption of some system of notation by the Society.

APPENDIX.

For purposes of reference a list of the recommended symbols and codes has been prepared in the order in which they appear in this paper. Instead of listing each symbol separately specific instances of the application of each symbol have been used as they were used in the main body of the paper.

PAYROLL—Classification No. 3632, New York State, 1916-1917

policy years ..... *W*<sub>3632</sub><sup>Yr.:16:17</sup>

STATES

Alabama .....	<i>Ab</i>
Alaska .....	<i>Al</i>
Arizona .....	<i>Ar</i>
Arkansas .....	<i>Ark</i>
California .....	<i>Ca</i>
Colorado .....	<i>Cl</i>
Connecticut .....	<i>Ct</i>
Delaware .....	<i>Dl</i>
Florida .....	<i>Fl</i>
Georgia .....	<i>Gr</i>
Idaho .....	<i>Id</i>
Illinois .....	<i>Il</i>
Indiana .....	<i>In</i>
Iowa .....	<i>Io</i>
Kansas .....	<i>Ks</i>
Kentucky .....	<i>Ky</i>
Louisiana .....	<i>La</i>
Maine .....	<i>Me</i>
Maryland .....	<i>Md</i>
Massachusetts .....	<i>Ms</i>
Michigan .....	<i>Mg</i>
Minnesota .....	<i>Mn</i>
Mississippi .....	<i>Mp</i>
Missouri .....	<i>Mo</i>
Montana .....	<i>Mt</i>
Nebraska .....	<i>Nb</i>
Nevada .....	<i>Nv</i>
New Hampshire .....	<i>Hm</i>
New Jersey .....	<i>Jr</i>
New Mexico .....	<i>Mx</i>
New York .....	<i>Yr</i>

North Carolina .....	<i>Cn</i>
North Dakota .....	<i>Dn</i>
Ohio .....	<i>Oh</i>
Oklahoma .....	<i>Ok</i>
Oregon .....	<i>Or</i>
Pennsylvania .....	<i>Pa</i>
Rhode Island .....	<i>Rd</i>
South Carolina .....	<i>Cs</i>
South Dakota .....	<i>Ds</i>
Tennessee .....	<i>Tn</i>
Texas .....	<i>Tx</i>
Utah .....	<i>Ut</i>
Vermont .....	<i>Vt</i>
Virginia .....	<i>Va</i>
Washington .....	<i>Wa</i>
West Virginia .....	<i>Vw</i>
Wisconsin .....	<i>Ws</i>
Wyoming .....	<i>Wy</i>
TERRITORIAL GROUPS	
Eastern Group .....	<i>EG</i>
Central Group .....	<i>CG</i>
Western Group .....	<i>WG</i>
Southern Group .....	<i>SG</i>
United States .....	<i>US</i>
PREMIUM—Classification No. 3632, New York State, 1916–	
1917 policy years .....	$P_{3632}^{Yr:16:17}$
LOSSES—Death losses, Class No. 3632, New York State, 1916–	
1917 policy years .....	$DL_{3632}^{Yr:16:17}$
NATURE OF INJURY	
Death .....	<i>DC</i>
Permanent Total .....	<i>PT</i>
Major Permanent .....	<i>MP</i>
Minor Permanent .....	<i>PM</i>
Indeterminate .....	<i>IC</i>
Temporary Total .....	<i>TT</i>
Temporary in Permanent Partial .....	<i>TP</i>
Medical .....	<i>MC</i>
Death and Permanent Total .....	<i>DP</i>
All Other .....	<i>AO</i>
CONVERSION FACTOR—New Jersey 1916 and 1917 to basic level	
for All Other losses .....	${}^{AO}C_B^{Jr:16:17}$
PARTIAL PURE PREMIUM	
Death and Permanent Total basic partial pure pre-	
mium for Classification No. 3632 .....	$DP_{3632}$
New Jersey 1917 Death and Permanent Total partial	
pure premium for Classification No. 3632 .....	$DP_{3632}^{Jr:17}$

TRANSLATION FACTORS

From basic to New Jersey 1917 policy year level.....  $C_{Jr}^B$  17

LOSS RATIO

New York 1919 loss ratio .....  $\rho$   $Yr:19$

LOSSES

Incurred .....  $L_i$

Paid .....  $L_p$

Outstanding .....  $L_o$

PREMIUMS

Written .....  $P_w$

Ultimate Earned .....  $P_u$

Earned .....  $P_e$

Unearned .....  $P_o$

PROJECTION FACTOR

For adjustment of basic pure premiums to New York  
1919 level .....  $\beta$   $Yr:19/17$

AMERICAN ACCIDENT TABLE DATA

Number of temporary total cases per 100,000 industrial accidents of more than 30 weeks' duration... |  $_{30}TT$

Number of temporary total in permanent partial cases per 100,000 industrial accidents of 30 weeks' or less duration ..... |  $TP$

Total number of:

Temporary total cases .....  $TT$

Permanent partial cases .....  $PP$

Major permanent partial cases.....  $MP$

Minor permanent partial cases.....  $PM$

Dismemberments .....  $PP$

Permanent partial non-dismemberment cases .....  $PP$

Permanent total cases .....  $PT$

Death cases .....  $DC$

THEORETICAL COST IN WEEKS' WAGES

Cost of temporary total cases in American Accident Table under New Jersey 1917 Act .....  $OTTJr:17$

PRESENT VALUE OF:

*Temporary Annuity*

Temporary annuity payable  $m$  times a year for  $n$  years age  $x$  ..... |  ${}_n a_x^{(m)}$

*Deferred Annuity*

Age  $x$  deferred  $n$  years payable  $m$  times a year..... |  $a_x^{(m)}$

*Life Annuity*

Age  $x$  payable  $m$  times a year.....  $a_x^{(m)}$

*Annuity to Widow* until death or remarriage.....  $a_x^{18}$

AMENDMENT FACTOR

Effect of an amendment on "Death and permanent total" loss group .....	$DP\alpha$
EXPENSE LOADING in per cent. of gross rate .....	$\epsilon$
TAX LOADING in per cent. of gross rate .....	$\tau$
CATASTROPHE LOADING in cents to be added to gross rate....	$\gamma$

RATE

Manual Rate .....	$R$
Adjusted by schedule rating .....	$R_S$
Adjusted by experience rating .....	$R_E$
PREMIUM SUBJECT TO EXPERIENCE RATING .....	$E^P$
PREMIUM SUBJECT TO SCHEDULE RATING .....	$S^P$
INDICATED DEPARTURES .....	$Y$
CREDIBILITY FACTOR .....	$z$
PREMIUM MODIFICATION .....	$X$

RESERVES

Reserve for losses under Classification No. 3632 for the United States, policy years 1911 to 1916 inclusive set up on a 65 per cent. basis.....	${}^{65}Q_{3632}^{US: 11-16}$
Reserve for losses under Classification No. 3632 for the United States, policy years 1911 to 1916 inclusive set up on an unloaded individual claim basis .....	$VQ_{36}^{US: 11-16}$

## AN AMERICAN ACCIDENT TABLE.

BY

OLIVE E. OUTWATER.

When the first workmen's compensation laws became effective and the insurance carriers faced the problem of establishing rates to employers for this form of coverage, it became necessary to establish some method for measuring the difference in costs between the varying benefit scales of state laws. For this purpose an industrial accident distribution according to the nature of injury was required and, due to an almost complete lack of American statistics, Dr. Rubinow compiled his Standard Accident Table from European data.

Since that time efforts have been made to obtain satisfactory American statistics, but the difficulty of coordinating the statistical records published by the various state accident commissions has made it practically impossible to combine results, and the statistics of a single state, no matter how carefully compiled, have been too limited for dependability. However, the various Boards and Bureaus which call for Schedule "Z" reports have realized the necessity of securing adequate accident data, and for the first time, in 1919, uniformly called upon the insurance carriers to report the number of death, permanent total, permanent partial, and temporary total cases upon which compensation had been paid. When the National Council took up its work of revising workmen's compensation rates for the various states, 1919 Schedule "Z" was available, and the accident distribution obtained therefrom was of sufficient volume to form a dependable basis for a new accident table. It was necessary for the National Council in its work to calculate the value of amendments to the state compensation laws, and it was desirable that such calculations should be based upon the latest available accident distribution. Therefore, the task of developing a new accident table was undertaken.

From Schedule "Z" for policy years 1916 and 1917 were obtained the total number of fatal, permanent total, permanent par-

tial, and temporary total cases compensated in all compensation states where stock and mutual companies were operating, with the exception of Maine, Massachusetts, California, and Pennsylvania. Maine and Massachusetts failed to report number of temporary total and permanent partial cases. Pennsylvania compensates as temporary total some minor dismemberment cases which, in other states, are compensated on a schedule basis and included in the reports as permanent partial disability. Massachusetts reported by nature of payment rather than nature of injury. That is, temporary total payments made in permanent partial cases were reported as temporary total instead of permanent partial as in other states. The California reports were not complete for 1916, the number of temporary total cases not having been given, hence only 1917 figures were used for this State. Four states, New York, New Jersey, Massachusetts, and Wisconsin, reported a small number of indeterminate cases, or injuries which had not yet developed sufficiently to enable a determination of their final outcome. These were distributed as follows: .1 to permanent total, .3 to permanent partial, .6 to temporary total, such distribution having been used in the making of coal mine rates from Pennsylvania experience. The combined results showed a total of 271,173 accidents for which compensation had been paid.

The first problem presenting itself was that of determining from the number of compensable cases reported, the number of tabulatable accidents, or those lasting beyond the day or shift in which the injury occurred. The waiting period varied from state to state, and in many cases had been changed at some time during the period covered by policy years 1916 and 1917. An assumption was made that the business, and therefore the number of accidents reported, was evenly distributed throughout the year, and an adjustment factor was determined by the use of a distribution of temporary total disability, which, when applied to the number of compensable temporary total cases, would produce the number of tabulatable accidents excluding permanent and fatal. For this purpose we used the ungraduated data obtained from state reports as described hereafter. For example, in California the number of temporary total cases reported was 12,048. The waiting period in 1916 was two weeks, but on January 1, 1918, was changed to ten days. One-half of the period covered by policy year 1917 was affected by the two weeks waiting period, and one-half by the ten



days waiting period. According to the distribution of temporary total disability (Table B), 32,793 cases out of a total of 95,388 last longer than two weeks. Therefore, the quotient of 95,388 divided by 32,793, or 2.9088, is the factor which must be applied to the number of cases lasting more than two weeks, to obtain the total number of tabulatable accidents. The factor obtained similarly to increase the number of cases lasting more than ten days, to number of tabulatable accidents, is 2.3128. Giving each of these factors a weight of one-half, the resultant factor is 2.6108, which, when applied to the 12,048 cases compensated, shows a total of 31,455 tabulatable temporary total cases. The material used for each state and the adjustment factors are given in detail in Table "A." With this adjustment made for all states, a grand total of 637,088 cases was obtained. Reduced to the basis of 100,000 accidents the results are as follows:

Fatal .....	762
Permanent Total .....	62
Permanent Partial .....	3,788
Temporary Total .....	95,388

A distribution was made for each of the four sections of the country—Eastern, Central, Western, and Southern states—and a comparison of results is interesting, although care should be exercised in the proper use of such figures. The distribution follows:

	Fatal.	Permanent Total.	Permanent Partial.	Temporary Total.
Eastern .....	728	63	4,154	95,055
Central .....	732	66	3,777	95,425
Western .....	1,035	46	2,601	96,318
Southern .....	855	55	2,549	96,541

In the 1920 rate revision, country wide partial pure premiums were established, and exception pure premiums adopted for any state whose experience was of substantial volume and showed results at variance with those for the country as a whole. The accident table was used to compute the increase in cost due to amendments in the law, three amendment factors being calculated for each law, one for "D. and P. T. D." cost, one for "All Other," and one for "Medical." Thus the fact that the western states show a greater proportion of death cases was reflected in the pure pre-

miums established and the accident table was used only to compute amount of increase in cost.

*Duration of Temporary Total Disability.*—For the duration of temporary total disability, the only reports available were those of state industrial accident commissions. It was necessary to exercise considerable care in their use, since some states presenting good reports of this character had not compiled them on such a basis as would make it possible to combine results with those of other states. For example, Massachusetts reported duration of total disability in all non-fatal cases. Washington, California, and Ohio reported for temporary total cases only. Some states reported duration of disability by days; others reported it by weeks. In order to obtain as broad a spread as possible, the reports of all states showing a distribution for duration of disability in temporary total cases only was used, obtaining first a graduation by one week periods and later breaking this up by the use of the data for states showing such distribution by days. The first summation (see Table "B") showed the following distribution:

1 week or less .....	223,698
1 to 2 weeks .....	88,275
2 to 3 weeks .....	54,452
3 to 4 weeks .....	31,246
4 to 13 weeks .....	67,028
13 and over .....	10,724
	<b>475,423</b>

The next step was to break up the totals for one and two weeks to secure the distribution by days, since many states have a waiting period of ten days and one has a waiting period of three days only. This was accomplished by using the proportions shown by the California data. The period from four to thirteen weeks was broken up by means of statistics from six states, Washington, Ohio, California, West Virginia, Oregon, and Wisconsin. Four states, Washington, California, West Virginia, and Oregon, furnished data for the division of the period over thirteen weeks in duration. Finally the results were reduced to the basis of 95,388 tabulatable temporary total cases, the distribution was plotted and the curve showed decided irregularities at the ten-day, one week, two weeks, two, three, four, and five-month periods. It is reasonable to suppose that many men whose disabilities last approximately either

one or two weeks, return to work at the end of the weekly period rather than just before or just after its close. However, the same psychological reason does not hold for the ten-day period, and no satisfactory reason for an irregularity at this point has been suggested. It was therefore decided to ignore it. It is possible that the same cause assigned for the break at the end of one and two weeks is also felt at the end of two, three, four, and five months. No increase was evident at one month, however, and the statistics at this end of the curve were not of sufficient volume to prove that the irregularity was not due to chance. The distribution was therefore smoothed graphically throughout, except at the one and two week periods.

Very little material was available for a distribution of temporary total disability in permanent partial cases, only two states, Cali-

Duration.	Cal. '18, Ore. '15.	On Basis of 3,788 Total.	Smoothed Distribu- tion.	%.	% Standard Table.
Under 1 week . . . . .	81	206	206	5.5	5.7
1- 2 weeks . . . . .	67	171	171	4.5	5.6
2- 3 " . . . . .	106	270	270	7.1	5.9
3- 4 " . . . . .	142	362	362	9.5	6.5
4- 5 " . . . . .	149	380	380	10.0	7.8
5- 6 " . . . . .	127	324	324	8.6	7.5
6- 7 " . . . . .	107	273	273	7.2	7.0
7- 8 " . . . . .	71	181	224	5.9	6.6
8- 9 " . . . . .	90	229	193	5.1	6.9
9-10 " . . . . .	56	143	166	4.4	5.2
10-11 " . . . . .	55	140	141	3.7	4.7
11-12 " . . . . .	52	133	122	3.2	4.3
12-13 " . . . . .	53	135	105	2.8	4.0
13-14 " . . . . .	36	92	92		
14-15 " . . . . .	21	53	71		
15-16 " . . . . .	26	66	59		
16-17 " . . . . .	20	51	51		
17-18 " . . . . .	24	61	48		
18-19 " . . . . .	14	36	45		
19-20 " . . . . .	14	36	41		
20-21 " . . . . .	13	33	39		
21-22 " . . . . .	14	36	37		
22-23 " . . . . .	17	43	34		
23-24 " . . . . .	12	31	33		
24-25 " . . . . .	13	33	31		
25-26 " . . . . .	12	31	30		
6- 7 months . . . . .	31	79	79		
7- 8 " . . . . .	17	43	52		
8- 9 " . . . . .	20	51	39		
9-10 " . . . . .	7	18	29		
10-11 " . . . . .	9	23	22		
11-12 " . . . . .	10	25	19		
				22.5	22.3
	1,486	3,788	3,788	100.0	100.0

for California and Oregon, having presented such statistics and these for only one year each. However, the results followed very closely those obtained by Dr. Rubinow in the Standard Accident Table and it was felt that the data when smoothed was sufficiently reliable for the present purpose. The comparison with Dr. Rubinow's results obtained by the use of Russian statistics which is presented on the preceding page is interesting.

*Permanent Partial Disability.*—The best material available for a distribution of permanent partial disability was a report furnished by the Travelers Insurance Company covering their experience in all compensation states where the Company operated, from January 1, 1916, to June 30, 1919, developments being brought down to January 1, 1920. This tabulation which showed 9464 permanent partial injuries, distributed as to nature of injury, was a detailed one and distinguished between amputation, loss of use and partial loss of use of members. Some of the state reports consulted gave distributions for dismemberment, but included no data as to loss of use and failed to state the number of permanent partial cases not dismemberment. Most of the compensation laws at the present time state that total loss of use of any member shall be compensated the same as loss of such member. It was therefore deemed advisable to construct a table covering the combined loss rather than amputation alone. Wisconsin state reports from 1914 to 1918 have been compiled on the same basis as the Travelers' table, and the combined statistics showed a total of 12,923 cases, which, when reduced to the basis of 100,000 accidents showed the following division:

Dismemberment or total loss of use .....	2,754
Other permanent partial .....	1,034

For the dismemberment distribution it was possible to use Ohio and Nevada reports covering an additional 2,193 cases. (Table C.)

Few state laws make any distinction in the amount paid for injury to a major or minor member. It was felt that the figures available for such division were too limited to make results entirely dependable, and therefore such a partition was not warranted.

In compensating permanent partial disability other than dismemberment, many state laws specify that the amount paid for injury to any member shall be determined by the relation of that injury to total loss of the member. There are very few permanent

partial cases which cannot be related directly to some dismemberment in the schedule. Other states, however, specify that such injury shall be compensated on a basis of loss in earning capacity, and a maximum period for the duration of payments is specified. It is felt that in such cases the commissions in charge often fix the duration of compensation, so that the amount paid shall bear the proper relation to that paid for total loss of the same member. It was necessary, therefore, for the purpose of law differential calculations, to determine the relation which partial disability bears to total loss or loss of use. The Wisconsin and Oregon state reports showed a total of 1,102 cases of permanent partial not dismemberment, with an average disability of 44.0 per cent. of total loss, such reports being based on the degree of impairment of the member affected. In the tabulation of the Travelers Insurance Company 2,156 cases of permanent partial not dismemberment, including 25 per cent., 50 per cent., and 75 per cent. of loss of use of various members, showed an average of 43.5 per cent. of total loss of use. 354 cases of permanent partial could not be related to dismemberment and were distributed as follows:

	No. of Cases
Loss of one leg at the hip and injury to other.....	1
Loss of one leg at the ankle and injury to other .....	1
Tip of forefinger .....	77
Loss of one eye and injury to other .....	1
Permanent injury to head .....	49
Internal injuries .....	63
Spinal trouble .....	38
Loss of movement at the knee .....	7
Loss of grasping power .....	16
50 per cent. loss of grasping power .....	3
Permanent partial—not otherwise classified .....	98

It will be noted that some of the injuries, especially multiple dismemberments, would probably result in a large degree of disability, while others, such as the 77 cases of loss of tip of forefinger, would amount to very little and in many states might receive no compensation except during the period of total disability. On the whole, a safe assumption seemed to be that the average cost per case of a permanent partial disability, not dismemberment, would equal 55 per cent. of the average cost per case for total loss or loss of use.

Many of the states distinguish between major and minor permanent partial cases, and the National Council, in its "Instructions for the Preparation of Schedule 'Z'—1920," defines as major permanent partial

- (a) "Every permanent injury, not constituting permanent total disability, which involves the loss of sight of an eye or the loss of a hand, foot, arm, or leg;
- (b) "Every permanent injury involving the impairment to the extent of 50 per cent. or more of a hand, foot, arm or leg;
- (c) "Any permanent injury, whether enumerated above or not, which is compensated on the basis of 25 per cent. or more of permanent total disability (or 25 per cent. or more of the full benefit for permanent total disability allowed under the Act applicable thereto)."

The distribution furnished by the Travelers Insurance Company enabled us to make a division in accordance with these instructions.

*Permanent Total.*—Such a small proportion of industrial accidents result in permanent total disability that it was difficult to obtain any satisfactory statistics concerning them. However, the laws of a few states make it necessary to estimate the number of cases of loss of both legs, both arms, and both eyes. The following tabulation is a combination of such material as could be combined from the state reports of Wisconsin, 1915 to 1918; Ohio, 1914–1916; Washington, 1917–1918; the reports of the Travelers Insurance Company before referred to, and the individual reports sent to the National Council as a part of Schedule "Z":

Nature of Injury	No. Cases	Reduced Totals
Loss or loss of use of both feet .....	1	
Loss or loss of use of both legs .....	32	5
Loss or loss of use of both hands .....	11	2
Loss or loss of use of both arms .....	6	1
Loss or loss of use of both eyes .....	54	7
Paralysis .....	28	4
Injury to back or spine .....	64	8
Injury to head .....	69	9
Fracture of back .....	11	2
General mental deficiency .....	10	2
Insanity .....	5	
Not otherwise classified .....	163	22
	<u>454</u>	<u>62</u>

253 permanent total cases reported in Schedule "Z" states for policy years 1916 and 1917 showed an average age of 42 years.

*Distribution of Dependents in Fatal Cases.*—Schedule "Z" as reported for policy years 1916 and 1917 called for individual death reports stating the number and relationship of dependents. In many of the states, such as Connecticut, where the amount of compensation is not determined by the number of dependents, the companies evidently did not secure such information in all cases, so that the reports available for use in determining the distribution of dependents were largely based on accidents in those states\* where the amount of compensation is determined by number and relationship of dependents. Our study was based on 5,877 actual fatal cases. The experience was punched on Hollerith cards which were then run through the tabulating machine and totals recorded as follows:

Total Distribution	No. Cases
No dependents .....	1,343
Widow and no children .....	1,369
Widow and 1 child .....	608
Widow and 2 children .....	524
Widow and 3 children .....	361
Widow and 4 children .....	219
Widow and 5 children .....	133
Widow and 6 children .....	53
Widow and 7 children .....	39
Widow and 8 or 9 children .....	19
One orphan .....	99
Two orphans .....	45
Three orphans .....	22
Four orphans .....	17
Five orphans .....	8
Six or more orphans .....	7
One parent .....	509
Two parents .....	269
One brother or sister .....	54
Two brothers or sisters .....	18
Three brothers or sisters .....	3
Four brothers or sisters .....	3
Five brothers or sisters .....	2

\* States for which experience was available: New York, Connecticut, Maine, Massachusetts, New Jersey, Pennsylvania, Rhode Island, Vermont, Maryland, Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Nebraska, South Dakota, Wisconsin, Colorado, Montana, New Mexico, Utah, Kentucky, Louisiana, Oklahoma, and Texas.

One parent and one brother or sister .....	36
One parent and two brothers or sisters .....	26
One parent and three brothers or sisters .....	8
One parent and four or more brothers or sisters .....	6
Two parents and one brother or sister .....	11
Two parents and two brothers or sisters .....	4
Two parents and three brothers or sisters .....	5
Two parents and four or more brothers and sisters .....	9
Widow and one parent .....	11
Widow, no child, other dependents .....	3
Widow, one child, other dependents .....	3
Widow, two children, other dependents .....	7
Widow, three children, other dependents .....	4
Other dependents (average number 3) .....	20
	<u>5,877</u>

An investigation was also conducted to determine the average age of dependents and the following data shows conclusively that satisfactory results are not obtainable by assuming a single average in the case of either widows or parents.

	No. Cases.	Average Age.
Widow with no children .....	538	47.3
Widow with one child .....	317	36.3
Widow with two children .....	272	35.1
Widow with three children .....	167	35.6
All others .....	257	36.4
	<u>1,551</u>	<u>39.8</u>

The variation in the case of a widow with no children is accounted for by the fact that in the majority of these cases the children have reached an age beyond that specified in the law for the termination of dependency. Such an average is of course lowered by the cases of very young widows. The variation was so great that it seemed best to make a distinction in this case, and 47 was used as an average age for widows with no children and 36 for widows with children.

The 3638 children showed an average age of 8.0 years, and the 147 brothers and sisters, an average age of 10.9 years.

The average age of dependent parents showed a marked difference in cases where there were also brothers and sisters and cases where there were none. Fifty cases of parents with brothers and sisters show an average age of 50.3 years; 362 cases of parents with no brothers or sisters show an average age of 61.2 years. This difference is readily accounted for by the fact that where there are dependent brothers and sisters, the parents are probably of middle age, the family usually consisting of a widow with young children,



while in other cases the dependent parents are too old for self-support.

The results may be summarized in the following tabular form:

GENERAL DISTRIBUTION.

Fatal .....	762
Permanent Total .....	62
Permanent Partial .....	3,788
Major Permanent Partial .....	924
Minor Permanent Partial .....	2,864
Temporary Total .....	95,388
	100,000

DURATION OF TEMPORARY TOTAL DISABILITY.

Temporary Total.		Permanent Partial.	
Duration.	No. of Cases.	Duration.	No. of Cases.
1 day .....	8,823	1 wk. or less	206
2 days .....	8,086	1- 2 weeks	171
3 " .....	7,282	2- 3 " "	270
4 " .....	6,014	3- 4 " "	362
5 " .....	5,255	4- 5 " "	380
6 " .....	4,606	5- 6 " "	324
7 " .....	4,817	6- 7 " "	273
8 " .....	3,090	7- 8 " "	224
9 " .....	3,074	8- 9 " "	193
10 " .....	2,740	9-10 " "	166
11 " .....	2,475	10-11 " "	141
12 " .....	2,275	11-12 " "	122
13 " .....	1,868	12-13 " "	105
14 " .....	2,190	13-14 " "	92
2- 3 weeks .....	10,925	14-15 " "	71
3- 4 " .....	6,269	15-16 " "	59
4- 5 " .....	4,345	16-17 " "	51
5- 6 " .....	2,674	17-18 " "	48
6- 7 " .....	1,923	18-19 " "	45
7- 8 " .....	1,298	19-20 " "	41
8- 9 " .....	966	20-21 " "	39
9-10 " .....	745	21-22 " "	37
10-11 " .....	549	22-23 " "	34
11-12 " .....	447	23-24 " "	33
12-13 " .....	358	24-25 " "	31
13-14 " .....	296	25-26 " "	30
14-15 " .....	254	6- 7 months	79
15-16 " .....	216	7- 8 " "	52
16-17 " .....	182	8- 9 " "	39
17-18 " .....	154	9-10 " "	29
18-19 " .....	131	10-11 " "	22
19-20 " .....	110	11-12 " "	19
20-21 " .....	94		
21-22 " .....	79		
22-23 " .....	68		
23-24 " .....	56		
24-25 " .....	45		
Over 25 weeks .....	609		
	95,388		3,788

Permanent Partial Disability .....	3,788
Dismemberment or Loss of Use .....	2,704
Arm .....	61
Hand .....	86
Thumb .....	96
One phalange of thumb .....	152
Index finger .....	301
One phalange index finger .....	261
Second finger .....	147
One phalange second finger .....	172
Third finger .....	104
One phalange third finger .....	89
Fourth finger .....	119
One phalange fourth finger .....	65
Thumb or finger and loss of or injury to other fingers .....	532
Leg .....	62
Foot .....	43
Great toe .....	37
One phalange great toe .....	16
One toe other than great toe .....	19
One phalange of toe, not great toe.....	11
One toe and loss of or injury to other toes.	35
Hearing, one ear .....	5
Hearing, both ears .....	1
Eye .....	290
Disfigurement .....	50
Other Permanent Partial .....	1,034

## DISTRIBUTION OF FATAL CASES.

No dependents .....	174
Widow alone .....	177
Widow and children .....	253
Widow and one child .....	79
Widow and two children .....	68
Widow and three children .....	47
Widow and four children .....	28
Widow and five children .....	17
Widow and six or more* .....	14
Orphans .....	26
1 orphan .....	13
2 orphans .....	6
3 orphans .....	3
4 orphans .....	2
5 or more† orphans .....	2

\* Average number of children, 7.

† Average number of orphans, 6.

Widow and other dependents .....	4
Widow and one parent .....	2
Widow and children* with other dependents .....	2
Parents and/or brothers or sisters .....	125
One parent .....	66
Two parents .....	35
One brother or sister .....	7
Two brothers or sisters .....	2
Three or more† brothers or sisters .....	1
One parent and one brother or sister .....	5
One parent and two brothers or sisters .....	3
One parent and three or more brothers or sisters .....	2
Two parents and brothers or sisters‡ .....	4
Other dependents§ .....	3
<b>Total .....</b>	<b>762</b>

*Comparison with Standard Accident Table.*—The following comparison between the above tabulation based on American statistics and the Standard Accident Table based on European statistics is interesting:

	American Table.	Standard Table.
Fatal .....	762	932
Permanent Total .....	62	110
Permanent Partial .....	3,788	4,765
Temporary Total .....	95,388	94,193

The new table shows a smaller number of serious accidents, yet the results are remarkably close, considering the wide difference in the basic material; in fact the difference is less than that shown between sections of the United States.

Probably the greatest divergence is shown in the dismemberment schedule, but it must be remembered that the Standard Table lists dismemberments while the figures of the American Table include total loss of use as well as amputation. This fact must also be remembered in comparing the 55 per cent. degree of disability adopted for permanent partial cases, not dismemberment, with the 70 per cent. formerly used in the calculation of law differentials.¶ It is assumed that the 70 per cent. formerly used included total loss of use, which has now been included in the dismemberment schedule. Other interesting comparisons may be made, but the striking feature is the similarity between the two distributions.

\* Average number of children, 2.

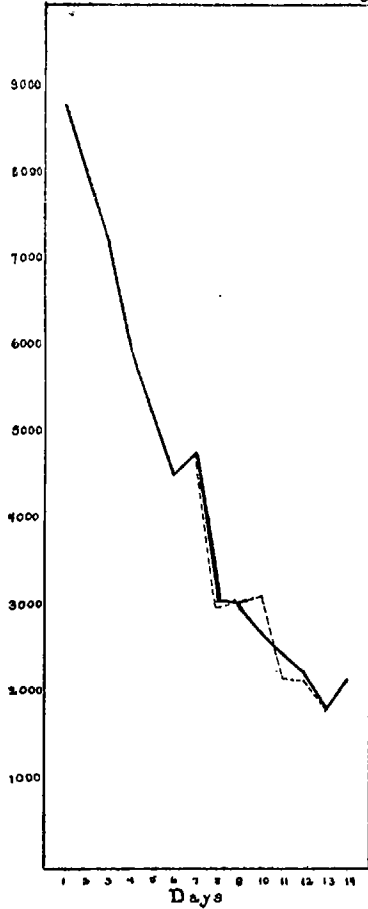
† Average number of brothers and sisters, 4.

‡ Average number of brothers and sisters, 3.

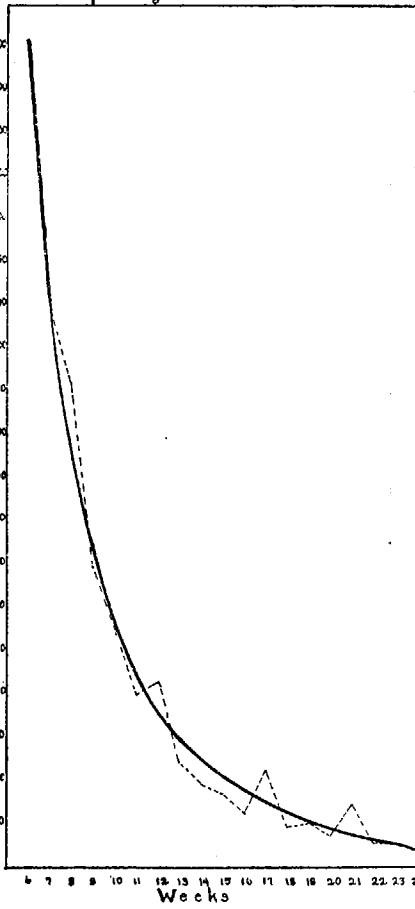
§ Average number of dependents, 3.

¶ See Dr. I. M. Rubinow's "Theory and Practice of Law Differentials," *Proceedings*, Vol. IV.

Duration of Disability in Temporary Total Cases



Duration of T. T. Disability in Permanent Partial Cases



Duration of T. T. Disability in Permanent Partial Cases

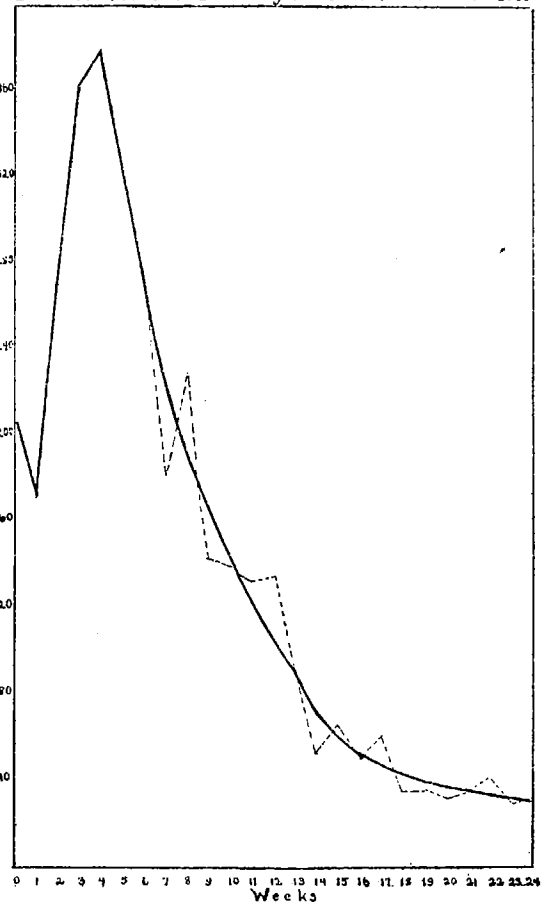


TABLE A.  
ACCIDENTS REPORTED ON SCHEDULE Z, POLICY YEARS 1916 AND 1917.

State.	Fatal.	Perm. Total.	Perm. Part.	Temp. Total.	Waiting Period.	Adjustment Factor.	Modified T. T.	Total.
New York . . . . .	1,534	161	8,721	75,170	2 weeks	2.9087	218,647	
Connecticut . . . . .	193	12	1,075	11,354	10 days; 7-1-17, 1 wk.	2.1007	23,851	
New Jersey . . . . .	460	24	3,060	16,085	2 weeks	2.9087	46,786	
Rhode Island . . . . .	45	6	235	2,708	2 wk; 6-1-17, 2 wk. retroactive at 4	2.9087	7,877	
Vermont . . . . .	49	2	207	1,577	2 weeks	2.9087	4,587	
Maryland . . . . .	136	4	488	4,707	2 weeks	2.9087	13,691	
Total . . . . .	2,417	209	13,786				315,439	331,851
Illinois . . . . .	425	33	2,624	35,112	1 week	1.8887	66,316	
Indiana . . . . .	175	12	1,123	10,122	2 wks; 5-31-17, 1 wk.	2.3570	23,858	
Iowa . . . . .	124	14	470	3,884	2 weeks	2.9087	11,297	
Kansas . . . . .	58	5	193	2,094	2 wks; 5-26-17, 1 wk.	2.3570	4,936	
Michigan . . . . .	265	31	1,539	12,516	2 wks, retroactive at 8	2.9087	36,405	
Minnesota . . . . .	173	15	655	7,214	2 wks; 4-17, 1 wk.	2.2925	16,538	
Nebraska . . . . .	53	4	110	2,035	2 wks. retroactive at 8; 7-24-17, 1 wk. retroactive at 6	2.4412	4,968	
South Dakota . . . . .	10	0	18	177	2 weeks, retroactive at 8	2.9087	515	
Wisconsin . . . . .	233	22	1,085	17,307	1 wk. retroactive at 4	1.8887	32,688	
Total . . . . .	1,516	136	7,817				197,521	206,990
California . . . . .	291	10	782	12,048	2 wks; 1-1-18, 10 days	2.6108	31,455	
Colorado . . . . .	125	9	243	2,152	3 wks; 4-23-17, 2 weeks	3.5142	7,563	
Montana . . . . .	23	0	88	794	2 weeks	2.9087	2,310	
New Mexico . . . . .	6	0	22	84	3 weeks	4.3618	366	
Utah . . . . .	27	2	51	963	10 days	2.3127	2,227	
Total . . . . .	472	21	1,186				43,921	45,600
Kentucky . . . . .	74	4	317	3,202	2 weeks	2.9087	9,314	
Louisiana . . . . .	105	3	169	4,579	1 wk. retroactive at 6	1.8887	8,648	
Oklahoma . . . . .	104	8	230	2,763	2 weeks	2.9087	8,037	
Texas . . . . .	167	14	576	13,145	1 week	1.8887	24,827	
Total . . . . .	450	29	1,342				50,826	52,647
Grand Total . . . . .	4,855	395	24,131				607,707	637,088
Reduced to 100,000 Basis . . . . .	762	62	3,788				95,388	100,000

AN AMERICAN ACCIDENT TABLE.

TABLE B.  
DURATION OF TEMPORARY TOTAL DISABILITY.

(1) Duration.	(2) Wash. '13 to '17.	(3) Ohio 1-1-'14 to 6-30-'15.	(4) Ohio 5-15-'15 to 5-15-'16.	(5) Calif. '15 to '18.	(6) W. Va. 10-1-'13 to 6-30-'14.	(7) Oregon 6-30-'15 to 6-30-'17.
1 day.....				19,809		
2 days.....				18,153		
3 ".....				16,349		
4 ".....				13,502		
5 ".....				11,798		
6 ".....				10,341		
7 ".....	12,313*	52,359	48,391	10,815	4,918	4,136
8 ".....				6,738		
9 ".....				6,847		
10 ".....				7,043		
11 ".....				4,917		
12 ".....				4,870		
13 ".....				4,160		
14 ".....	17,489	15,591	10,509	4,878	1,451	3,099
2-3 weeks..	11,169	10,378	12,328	17,463	1,208	1,537
3-4 ".....	6,658	6,053	4,589	12,024	838	854
4-5 ".....	5,499		1,913	9,046	554	563
5-6 ".....	3,006		885	6,253	352	389
6-7 ".....	2,425		521	4,571	222	302
7-8 ".....	1,505		338	3,207	160	148
8-9 ".....	1,810		198	2,512	131	143
9-10 ".....	780		155	1,780	105	86
10-11 ".....	786		119	1,259	71	67
11-12 ".....	485		80	1,039	56	35
12-13 ".....	899	11,124	61	815	53	56
13-14 ".....	280			664	49	
14-15 ".....	246			510	35	
15-16 ".....	250			418	24	
16-17 ".....	127			360	28	
17-18 ".....	526			355	31	
18-19 ".....	137			239	19	
19-20 ".....	163			235	22	
20-21 ".....	100			176	21	
21-22 ".....	378			209	12	
22-23 ".....	83			128	18	
23-24 ".....	87			132	8	
24-25 ".....	72			102	9	
Over 25.....	1,507	1,386	276	818	148	274
	68,780	96,891	80,363	204,535	10,543	11,689

\* Represents total for 1 week. Other totals are similarly inserted on the last line of the group which is summed.

TABLE B—(continued).

## DURATION OF TEMPORARY TOTAL DISABILITY.

Duration.	(8) Oregon 1915.	(9) Wisconsin 7-1-'16 to 7-1-'18.	(10) Total (2) to (8) Inclusive.	(11) Total (2) and (4) to (9) Inclusive.	(12) Total (2) + (5) + (6) + (8).	(13) Total Reduced to 95,388.
1 day.....						8,823
2 days.....		No				8,086
3 ".....						7,282
4 ".....		data				6,014
5 ".....						5,255
6 ".....		for				4,606
7 ".....	814	—	223,698	—	—	4,817
8 ".....						3,025
9 ".....		first				3,074
10 ".....						3,162
11 ".....		two				2,207
12 ".....						2,186
13 ".....		weeks				1,868
14 ".....	683	—	88,275	—	—	2,190
2-3 weeks..	369	6,919	54,452	—	—	10,925
3-4 ".....	230	3,870	31,246	—	—	6,269
4-5 ".....	180	2,700		20,455		4,345
5-6 ".....	84	1,616		12,585		2,674
6-7 ".....	61	950		9,052		1,923
7-8 ".....	32	722		6,112		1,298
8-9 ".....	36	451		5,281		1,122
9-10 ".....	20	352		3,278		696
10-11 ".....	17	266		2,585		549
12-12 ".....	11	188		1,894		402
12-13 ".....	23	159	67,028	2,066	—	439
13-14 ".....	6				999	245
14-15 ".....	6				797	195
15-16 ".....	6				698	171
16-17 ".....	4				519	127
17-18 ".....	9				921	226
18-19 ".....	2				397	97
19-20 ".....	2				422	103
20-21 ".....	2				299	73
21-22 ".....	3				602	147
22-23 ".....	3				232	57
23-24 ".....	2				229	56
24-25 ".....	2				185	45
Over 25.....	15	962	10,724	—	2,488	609
	2,622		475,423			95,388

TABLE C.  
DISMEMBERMENT OR TOTAL LOSS OF USE.

Nature of Injury.	Travelers.		Loss or Loss of Use.		
	Amputation.	Loss of Use.	Wisconsin '14 to '18.	Total.	Ohio Jan. '14 to July '15.
Loss of arm . . . . .	53	48	17	118	
“ “ fore arm . . . . .	47	45	12	104	
“ “ arm . . . . .					33
Loss of hand . . . . .	156	122	27	305	54
“ “ thumb . . . . .	235	60	31	326	74
“ “ 1 phalange of thumb . . . . .	383		162	545	90
“ “ forefinger . . . . .	744	132	190	1,066	189
“ “ phalange of forefinger . . . . .	514		345	859	230
“ “ 2nd finger . . . . .	344	55	124	523	94
“ “ phalange of 2nd finger . . . . .	275		227	502	216
“ “ 3rd finger . . . . .	273	40	72	385	52
“ “ phalange of 3rd finger . . . . .	154		119	273	99
“ “ 4th finger . . . . .	266	52	86	404	87
“ “ phalange of 4th finger . . . . .	94		96	190	81
“ “ thumb and fingers . . . . .	26	10	16	52	43
“ “ 2 or more fingers . . . . .	1,000	79	180	1,259	
“ “ fingers and injuries to others . . . . .	141	7	322	470	403
“ “ leg . . . . .	45	52	6	103	11
“ “ leg at or below knee . . . . .	54	53	40	147	
“ “ foot . . . . .	82	59	10	151	26
“ “ great toe . . . . .	73	30	25	128	16
“ “ 1 phalange great toe . . . . .	33		24	57	
“ “ 1 other toe . . . . .	40		24	64	41
“ “ 1 phalange other toe . . . . .	6		31	37	
“ “ One toe and loss of or injury to other toes . . . . .	84		36	120	28
Loss of hearing one ear . . . . .		10	1	11	6
“ “ 2 ears . . . . .		3	2	5	0
“ “ sight in one eye . . . . .		792	196	988	216
Disfigurement . . . . .		183	26	209	
Sub Total . . . . .	5,122	1,832	2,447	9,401	2,089
Other permanent partial . . . . .		2,510	1,012	3,522	
Total . . . . .	9,464		3,459	12,923	



TABLE C—(continued).

## DISMEMBERMENT OR TOTAL LOSS OF USE.

Nature of Injury.	Loss or Loss of Use.			
	Nevada July '13 to July '16.	Grand Total.	Reduced Total.	
Loss of arm . . . . .	} 2	257	61	
“ “ forearm . . . . .		3	362	86
“ “ hand . . . . .		4	404	96
“ “ thumb . . . . .		3	638	152
“ “ 1 phalange of thumb . . . . .		11	1,266	301
“ “ forefinger . . . . .		8	1,097	261
“ “ phalange of forefinger . . . . .		4	621	147
“ “ 2nd finger . . . . .		8	726	172
“ “ phalange of 2nd finger . . . . .		1	438	104
“ “ 3rd finger . . . . .		3	375	89
“ “ phalange of 3rd finger . . . . .		9	500	119
“ “ 4th finger . . . . .		3	274	65
“ “ phalange 4th finger . . . . .		} 12	2,239	532
“ “ thumb and fingers . . . . .				
“ “ 2 or more fingers . . . . .		} 2	263	62
“ “ fingers and injuries to others . . . . .				
“ “ leg . . . . .		} 3	180	43
“ “ leg at or below knee . . . . .				
“ “ foot . . . . .		} 7	498	118
“ “ great toe . . . . .				
“ “ 1 phalange great toe . . . . .				
“ “ 1 other toe . . . . .				
“ “ 1 phalange other toe . . . . .				
“ “ One toe and loss of or injury to other toes . . . . .	3	20	5	
Loss of hearing one ear . . . . .	“ “ “ 2 ears . . . . .	5	1	
“ “ sight in one eye . . . . .	18	1,222	290	
Disfigurement . . . . .		209	50	
Sub Total . . . . .	104	11,594	2,754	
Other permanent partial . . . . .			1,034	
Total . . . . .			3,788	

TABLE D.  
DEGREE OF DISABILITY IN PERMANENT PARTIAL, NOT DISMEMBERMENT.

Degree of Disability.	No. of Cases.	Total No. Cases.	Total % Disability.
Wisconsin 1914			
.11-.25	47		
.26-.40	18		
.41-.60	27		
.61-.80	21		
.81-.99	48		
Total		161	8,604.0
Wisconsin 1915			
0-.16 $\frac{2}{3}$	24		
.17-.33 $\frac{1}{3}$	28		
.34-.50	22		
.51-.66 $\frac{2}{3}$	37		
.67-.83 $\frac{1}{3}$	24		
.84-.99	9		
Total		144	6,627.1
Wisconsin 1916			
0-.20	45		
.21-.40	61		
.41-.60	87		
.61-.80	31		
.81-.99	8		
Total		232	9,609.5
Wisconsin 1917			
0-.10	43		
.11-.20	50		
.21-.30	58		
.31-.40	42		
.41-.50	71		
.51-.60	15		
.61-.70	13		
.71-.80	22		
.81-.90	19		
.91-.99	2		
Total		335	12,350.0
Oregon '16 & '17			
0-.20	37		
.21-.40	61		
.41-.60	57		
.61-.80	31		
.81-.99	44		
Total		230	11,254.5
Grand Total		1,102	48,445.1

Average per cent. of disability = 44.0.

TABLE E.

DEGREE OF DISABILITY IN PERMANENT PARTIAL, NOT DISMEMBERMENT.  
 (EXPERIENCE OF TRAVELERS' INSURANCE CO.)

Nature of Injury.	Degree of Disability.		
	25 %.	50 %.	75 %.
Loss of use of			
arm at shoulder . . . . .	44	32	16
" " elbow . . . . .	70	38	35
hand . . . . .	183	107	70
thumb . . . . .	65	82	19
first finger . . . . .	66	73	33
second finger . . . . .	39	49	11
third finger . . . . .	39	23	8
fourth finger . . . . .	13	28	5
leg at hip . . . . .	43	34	25
leg at knee . . . . .	103	54	32
foot . . . . .	118	65	44
ear . . . . .	—	5	—
both ears . . . . .	1	1	1
one finger and injury to others . . . . .	—	1	—
thumb and injury to fingers . . . . .	—	8	—
2 or more fingers . . . . .	88	51	31
one eye . . . . .	72	75	83
finger (unknown) . . . . .	41	22	10
	985	748	423

Average degree of disability 43.5 per cent.

## GROUP HEALTH INSURANCE.

BY

JAMES D. CRAIG.

Interest of employers in the welfare of their employees is becoming more and more a part of the daily duties incident to industry. Since compensation insurance became generally effective, employers have had an ever increasing feeling of responsibility for the health and happiness of those who make up their working force. This has not resulted altogether from a spirit of benevolence, for close observation and carefully prepared statistics have convinced a number of employers that such interest when exercised judiciously has inured to their own advantage through increased production resulting from a more stable and contented personnel. As a result employers are conducting educational classes for their employees, are giving increased consideration to the questions of working hours and conditions, to medical care, insurance, savings, etc., of employees as well as using influence in their community to improve housing, transportation, amusement and other public necessities and conveniences.

Among the more recent developments is the furnishing of insurance to employees as a class. Compelled by compensation laws in most states to insure against deaths, accidents, sicknesses and invalidity due to occupation, the employer is beginning to feel that his obligation goes even further and is commencing to consider that compensation for losses due to all deaths, incapacities and old age is a proper charge against industry. Provision for the payment of occupational and non-occupational losses may be made by the employer. Under the mandate of most states compensation must be paid for occupational losses, and liability therefor may be insured in State Funds, Private companies, either mutual or stock, or carried by the employer himself if conditions warrant. Liability for non-occupational losses is not compulsory and in the United States no agencies existed for insurance against these upon a scientific basis with ample guarantee until insurance companies entered the field. True, health insurance has been conducted by labor unions,

benevolent associations and thousands of other petty health insurance funds, but the issuance of blanket policies to employers, covering non-occupational deaths, accidents and old age pensions has not been undertaken by these organizations. Practical interest along these lines has developed on the part of both the employer and the employee only since insurance companies have completed their plans for the underwriting of these benefits. The question of life insurance to employees has been discussed before this society in the past and now the President requests that I bring to your attention the plans generally adopted by insurance companies for insuring under group health contracts the employees of any given employer.

#### ONLY EMPLOYEES OF ONE EMPLOYER TO BE INSURED.

In issuing Group Health insurance the first question to be decided is what shall constitute a group for this purpose. Any number of people affiliated for a certain purpose naturally form a group, but what limitations are necessary in order that a group will be acceptable for insurance in accordance with the principles of good underwriting? When Group Life insurance was in its initial stages numerous benevolent and fraternal associations endeavored to obtain insurance under group contracts, but as a rule such associations made this effort only because their insurance by other methods had not proven wholly satisfactory. Associations in an apparently satisfactory financial condition, gave no thought to Group Insurance, with the result that those which applied for coverage exercised a decided selection against the insurance companies. On the few associations which were insured or reinsured on the Group plan, the experience has not proven satisfactory. Such underwriting practice developed very strenuous objections on the part of the more financially prosperous fraternal associations, so that in some states the law was amended to prohibit even the reinsurance of such associations, and by mutual consent Section 101A of the New York Insurance Law and similar sections of the laws of other states were enacted, defining Group Life insurance as "that form of life insurance covering not less than fifty employees with or without medical examination, written under a policy issued to the employer," thus limiting Group Life insurance to employees of one employer only. The same general considerations that apply to Group Life insurance apply to Group Health insurance, and the most satisfactory results

will probably be obtained by limiting Group Health policies to the employees of one employer. If the employer is paying all the premiums he will generally want all of his employees covered, or all of a certain class. In this respect the underwriting of Group Health policies follows the practice and principle of Group Life insurance as defined in the New York law which decrees that the insurance shall be "upon all of his employees, or all of any class or classes thereof determined by conditions pertaining to the employment." It frequently happens, however, that the employees of a certain employer have in the past organized an association which includes part but not all of the personnel in the plant, and rather than take a Group Health policy covering all employees, the employer wishing to encourage membership in the existing organization, prefers to limit the insurance to those employees who are members thereof. Here again the general rule adopted in Group Life insurance and written in the law applies, that at least 75 per cent. of the total eligible employees should be members of the association. Additional safeguards are necessary and the contract should be issued to the employer, who should pay a substantial proportion of the premiums, in order to eliminate malingering by making the employee's return to work a matter of pecuniary interest to him. Also, by writing the policy to the employer he is made the responsible party on whom the company depends for the carrying out of the terms of the policy, as well as the payment of premiums, and if he is contributing a substantial part of the premiums he will have a more direct appreciation of his responsibilities as well as being in a better position to collect the employees contributions.

#### CONTINGENCIES INSURED AGAINST.

The Group Health contract insures against sickness contracted or injuries sustained during the term of the policy, which term is usually one year, with the privilege of renewal, as explained later. When the contract is issued for one year, and an employee suffers incapacity on the last day of the year, the benefits are nevertheless payable in the subsequent year, even though the policy expires and is nominally cancelled on the books of the company, while incapacity contracted before the commencement of the policy is not insured against, as only those employees actually working for full

time and for full pay at the inception of the contract are covered. With occupational accidents covered under compensation laws in the majority of the states it is not generally necessary to again insure such injuries under the Group Health policy, and the insurance under these contracts is therefore supplemental to the insurance under the Workmen's Compensation Acts. The exclusion of occupational accidents is not compulsory, although in practice most Group Health policies do exclude them, except when issued in a state where there is no compensation law and where such coverage is desired or where an employer is anxious to augment the benefits provided under the law.

#### COVERAGE.

The question of coverage divides itself into the amount of weekly indemnity and the length of time during which such indemnity shall be paid. It is generally considered expedient to limit the maximum coverage to 66 $\frac{2}{3}$  per cent. of the average weekly earnings, but in no case to exceed \$40 a week. The period for which benefits are payable naturally varies with the desires of the employer and employees. The most usual period is 26 weeks, with no benefit payable for the first seven days of disability or in underwriting phraseology, "Foreign to occupation accidents and full health—26 weeks limit on both—seven days waiting period on both." While the large majority of the policies issued grant coverage for this period, and while it is desirable for experience and expense purposes to have a standard form of coverage as far as possible, nevertheless other periods are sometimes requested, the following of which are the most general. For the sake of completeness in this list the most usual period mentioned above is included:

1. Foreign to occupation accidents and full health—26 weeks limit on both—three days waiting period on both accident and health. Note: Disability peculiar to female excluded.

2. Foreign to occupation accidents and full health—26 weeks limit on both—seven days waiting period on both.

3. Foreign to occupation accidents coverage and full health—26 weeks limit on both—fourteen days waiting period on both.

4. Foreign to occupation accidents and full health—26 weeks limit on both—seven days waiting period on both except where sickness continues for at least 30 days, in which case full period of disability is paid for.

There is no limit, except that of life, to the time for which benefit can be payable, but 26 weeks is most customary, although 52 weeks is sometimes desired. After this latter period the insurance gradually changes from sickness to total and permanent disability insurance, partly for this reason and also from the fact that the demand therefor is negligible, but few companies extend the payment of benefit beyond one year.

#### ADVERSE SELECTION.

The problem of adverse selection in Group Health underwriting offers some difficulties, as there is opportunity for different forms of such selection. The Group Life insurance law of New York definitely provides that the amount of insurance shall be based upon some plan which will preclude individual selection and when the employer pays the premium requires either all of the employees or all in any one class to be covered but when part of the premium is paid by the employees permits the insurance if at least seventy-five per centum of the employees are covered.

In Group Health insurance the same principle applies. Individual selection must be precluded. In order to accomplish this a definite formula must be prescribed, stating clearly just which employees are covered (not less than 75 per cent. if employees pay part of the premium), when they are covered, how long the coverage is, and the method of determining the weekly benefit in such a way that it will apply automatically to each employee, and preclude individual selection. No individual employee should be given the privilege of selecting the amount of his benefit. In order to avoid insuring "floaters," employers often desire a clause in the formula to the effect that the insurance shall not commence until an employee has completed a definite period of service, such as three months or six months, which period is generally known as the "waiting period." Such a waiting period always applies to new employees, but employers are often desirous of having the contract cover all of the employees actually at work at the inception of the contract. If the waiting period is to apply for new employees, it would seem more logical that it should apply to employees who at the inception of the contract have not completed this period, but for some reason certain employers prefer to differentiate in this respect.



A problem which offers possibilities for considerable trouble is the insurance of those employees who are incapacitated at the inception of the contract and the formula should be very specific in its exclusion from insurance of such employees until they have returned to work in good health.

While the intention of the contract is to insure the employees of a given employer, cases have arisen where individuals working on part time are employees of more than one employer and the coverage under the policy issued to any one employer must therefore be very specific. As the contract is to cover employees working on full time and for full pay, such part time employees would seem to be excluded, but when the formula defines the amount of benefit as a percentage of the average weekly compensation and the premium is computed as a percentage of the payroll, the acceptance of this percentage on account of a part time employee would seem to carry a corresponding liability. The dangers incident to such payroll coverage should be carefully considered and some companies are very reluctant to consider this basis at all.

There is one risk that must be carried by the company, even though it results in adverse selection and increases the claim payments, and that is the risk of other insurance. A clause limiting the amount of benefit under the Group policy in any case where an employee carried individual health and accident insurance of such an amount to cause him to be over insured would not be satisfactory. When an employer insures his employees for a certain amount of weekly benefit, he expects that any incapacitated employee will receive this benefit regardless of any additional amounts which may be payable to the employee as the result of policies taken at his own expense. Should such additional benefits result in reducing the amount otherwise payable under the Group policy, the objective of the employer is nullified to a certain extent. From a practical standpoint a more satisfactory method is to allow the full coverage insured under the contract, irrespective of other insurance, and if this should result in abnormal claims, to increase the premium rate or in the case of a participating contract reduce the dividend. Of course, the original formula must be framed in such a manner with supplementary compensation or other insurance as not to permit the general over-insurance of all employees.

## GENERAL NATURE OF THE GROUP HEALTH POLICY.

The Group contract differs very materially from the individual standard accident and health policy. There is no cancellation clause. The group policy must be renewed at the option of the employer, but the company reserves the right to adjust the premium rates each year. This change is in harmony with the spirit of the insurance. If an employer desires to protect his employees and after due consideration places this coverage through a group health policy, he should have the privilege of continuing it as long as he is willing to pay the necessary premium.

Another difference is the elimination of the standard provisions. These were designed to have the state act as a general supervisor over the terms and conditions of the policy contract as well as to exercise its care in the ultimate payment of claims on the theory that the individual insured was not able to fully protect himself. Under Group policies the employer acts somewhat in the capacity of the state. As a rule he is a competent business man capable of making and understanding contracts. The terms of the policy have met his requirements, and it is therefore to his advantage as well as that of the insurance company to see that the terms and conditions of the policy are adhered to. Each has a part to play and without cooperation, mutual good will and trust, the policy will not function properly. The employer pays the premiums and advises as to the changes from time to time in the personnel, the company pays all legitimate claims as promptly as practical and with as little ceremony as possible. The simpler the terms of the contract, the better. No applications are required from the employees and are consequently not made part of the policy. The employer makes one application for the benefit of all his employees, determines in general what coverage shall be given, and then sees that such coverage is included in the contract. While simplicity is desirable, nevertheless certain restrictions must be inserted, the more general of which are: Only incapacities shall be recognized, which are treated by a regular licensed practising physician, or incapacity contracted within the continental limits of the United States or Canada, or in any part of either, south of the 60th degree of North Latitude, also that no benefits shall be paid if caused by war or any act of war or riot, or while participating in, or in consequence of having participated in aeronautics. The exclusion from benefits for other causes such

as are usually outlined in the individual policy contracts, hardly need to be included in a group contract.

#### GROUP HEALTH PREMIUM RATES.

##### *Premium Rates for Foreign to Occupational Accidents and Full Health.*

In the different publications on health insurance it has been shown that the Manchester Unity 1907 Experience corresponds as closely with American experience as any published table. Mr. George D. Eldridge selected this table as that conforming most nearly to the experience of the Workmen's Circle of New York, while Mr. Dawson in discussing the disability experience (comprising both sickness and accident) of the Brotherhood of Locomotive Engineers and of the Westinghouse Airbrake Company's Relief Fund concluded that the sickness rates of mechanical industries corresponds rather closely with the experience of the British Friendly Society. The late Mr. Messenger stated that the Travelers' general health business would have a rate of sickness approximating that of the Manchester Unity if allowance was made for the fact that the health policy did not cover disability from accident. The Manchester Unity Tables have therefore come into general use as a basis in this country, and Mr. Cammack made use of these tables in computing foreign to occupational accidents and full health group rates. The Manchester Unity Tables show the rate of sickness for each age and by duration, but the practice in dealing with employers tending toward simplicity as far as practical and in harmony with individual health insurance has resulted in an average rate being generally adopted. Mr. Cammack advises that from an analysis of the group business of his company it was found that the aggregate accident and group health premium for the whole group business on the books compiled at the actual ages of employees was equivalent to the premium produced by considering all the employees to be age 40, and accordingly calculations so far have generally been based on this age. Mr. Cammack estimated that on commercial risks approximately 13 per cent. of the total amount of disability arises from occupational accidents. He then subdivided the rate of sickness of the Manchester Unity A H J group into periods of sickness according to the formulæ on pages 591-593 of the Report for 1912-1913 on the Administra-

tion of the National Insurance Act, Part I, and prepared premium rates for a full health and foreign to occupational accident group contract. The net premium at age 40 according to the A H J table for a benefit of \$10 a week from the second to the 27th week is \$7.28 and deducting 13 per cent. for occupational accidents, the net premium for foreign to occupational accidents and full health benefit is \$6.34. The experience of the Metropolitan Life on a group policy during the years 1915-1918 indicates that from the 2d to the 14th weeks the claims actually incurred were 71½ per cent. of the expected under the Manchester Unity A H J Table. For the 15th to the 27th week the Metropolitan experienced 158.3 per cent., or a total percentage for the 2d to the 27th week of 86.6 per cent., as compared with Mr. Cammack's 87 per cent. The Metropolitan's experience was on male lives exclusively, whereas the experience of the Manchester Unity includes some females. It may be that the Metropolitan's rate is higher than would be experienced under commercial policies generally, but if it is assumed that the Metropolitan's rate represents the normal for an average grade of men in a non-hazardous occupation insured under a health policy, the net premium of Mr. Cammack would apply only to such groups. If, however, a group is assumed to consist of 90 per cent. males and 10 per cent. females and that the female sickness rate is 200 per cent. of the male, then the net premium would be raised from \$6.34 to \$6.97 and a gross premium of \$10 a year would be required to provide for a loss ratio of 70 per cent.

For risks covering more than 10 per cent. females the rate would have to be increased accordingly, and while a reliable experience on females has not yet been published the experience of the Metropolitan indicates that substantial increases will be necessary. The general scale is

When the group consists of from 11 per cent. to 20 per cent. females increase of 15 per cent.

When the group consists of from 21 per cent. to 30 per cent. females increase of 25 per cent.

When the group consists of from 31 per cent. to 40 per cent. females increase of 35 per cent.

When the group consists of from 41 per cent. to 50 per cent. females increase of 45 per cent.

When the group consists of from 51 per cent. to 60 per cent. females increase of 55 per cent.

When the group consists of from 61 per cent. to 70 per cent. females increase of 65 per cent.

When the group consists of from 71 per cent. to 80 per cent. females increase of 75 per cent.

When the group consists of from 81 per cent. to 90 per cent. females increase of 85 per cent.

When the group consists of from 91 per cent. to 100 per cent. females increase of 95 per cent.

Period for which Indemnity is Payable Counting from Commencement of Disability.	Annual Premium for Indemnity of \$10.00 a Week.	Period for which Indemnity is Payable Counting from Commencement of Disability.	Annual Premium for Indemnity of \$10.00 a Week.
3 days	\$1.35	24 weeks	\$12.74
5 "	2.20	25 "	12.85
6 "	2.63	26 "	12.94
7 "	3.05	27 "	13.04
8 "	3.45	28 "	13.11
9 "	3.81	29 "	13.20
10 "	4.15	30 "	13.28
11 "	4.46	31 "	13.35
12 "	4.75	32 "	13.43
13 "	5.01	33 "	13.50
2 weeks	5.24	34 "	13.56
3 "	6.91	35 "	13.63
4 "	7.85	36 "	13.69
5 "	8.40	37 "	13.75
6 "	8.85	38 "	13.81
7 "	9.25	39 "	13.86
8 "	9.60	40 "	13.91
9 "	9.92	41 "	13.98
10 "	10.20	42 "	14.03
11 "	10.48	43 "	14.08
12 "	10.73	44 "	14.11
13 "	10.98	45 "	14.16
14 "	11.20	46 "	14.20
15 "	11.41	47 "	14.25
16 "	11.61	48 "	14.29
17 "	11.80	49 "	14.33
18 "	11.96	50 "	14.36
19 "	12.11	51 "	14.40
20 "	12.26	52 "	14.44
21 "	12.39	53 "	14.48
22 "	12.51	54 "	14.51
23 "	12.63		

With a basic rate of \$10 for a benefit of \$10 a week from the 2d to the 27th week inclusive so derived Mr. Cammack proceeded to prepare rates for other periods. To the premium so computed for the last few days of the first week an additional 20 per cent. was added, as there are certain circumstances of a practical nature which enter into a rate covering first week's sickness. It is a grave

question whether or not such full coverage should be granted, as malingering is encouraged and the cost of administration of this sickness will probably be increased out of proportion to the increase that could be made in the premium. The final rates so prepared by Mr. Cammack to cover benefits from 3 days to 54 weeks are presented in the table on page 87.

#### ADDITIONAL RATES WHERE OCCUPATIONAL ACCIDENTS ARE COVERED.

There are some industries that are not considered as sufficiently hazardous to be insured under the Workmen's Compensation Acts. There are also a few states without Workmen's Compensation Acts, and even in states where there are such acts, employers sometimes desire to increase the statutory benefits so that it becomes important to have a rate to cover such benefits. Messrs. Morris and Cammack prepared a manual, classifying into six subdivisions, from A to F inclusive, various industries according to the degree of hazard arising from accidents of occupation, and with their permission this classification is attached hereto.

Mr. Fallows, from data collected through the National Council of Workmen's Compensation Insurance in all the compensation states for the years of issue 1916 and 1917, prepared a differential to be applied to "the foreign to occupation accident and full health rate" for each of the six degrees of occupational hazard. The results of his calculations indicate that increases equal to the following percentages of the standard rate should be made in each of the different groups when benefits for occupational accidents are included in the coverage.

	Per Cent
Hazards indicated under Group A .....	6
Hazards indicated under Group B .....	20
Hazards indicated under Group C .....	40
Hazards indicated under Group D .....	70
Hazards indicated under Group E .....	80
Hazards indicated under Group F .....	140

#### ADJUSTMENT OF RATES IN CERTAIN CASES.

In the practical underwriting of group health policies, an employer frequently desires premium quotations on a percentage of the payroll basis—the conversion to this basis offers no difficulties,

although, as stated above, certain dangers are inherent to this basis. If the average salary is \$20 a week, or \$1,040 a year, and the benefit is 50 per cent. of the weekly salary, or \$10. a week, a basic rate of \$10 a year for \$10 of benefit will call for a premium of \$10 a year, or .96 per cent. of the salary—practically 1 per cent.

With the premiums on a payroll basis, an employer frequently wants some ready method of making allowance for employees on the waiting list. An actual audit of the payroll would eliminate these risks, but it is often more satisfactory to dispense with such an audit by making a reduction in the rate, and some companies therefore make a flat reduction of 5 per cent. if there is a one month's waiting period, 10 per cent. if there is a three months' waiting period, and 15 per cent. if there is a six months' waiting period. Under these reductions the waiting period on employees active at the inception of the policy should be enforced; all employees whose length of service is not sufficient excluded. If the employer desires to insure all of his employees at the time the policy is originally issued, irrespective of whether or not the waiting period has expired, but desires to place all new employees on the waiting period, then the reductions should not be more than one-half of those just stated.

An illustration of the detailed calculation of a premium involving all the different coverages outlined, might prove of interest. Assume a proposal from a laundry employing 40 per cent. of female lives for \$10 of weekly benefit for disability due to sickness and accidental injuries including those arising in the course of employment, with a minimum benefit not to exceed 26 weeks, but not paying indemnity for the first week of disability, and with the premium payable monthly.

	Basic Rate \$5.
Rate for Health Coverage and Non-Occupational Accidents—	
26 weeks .....	\$10.00
Loading on account of 40 per cent. Female Employees.....	3.50
Rate for Occupational Injuries—Laundry Group C 40 per cent. of	
Basic Rate .....	4.00
Total .....	\$17.50
Loading for Monthly Premiums 3 per cent. ....	.53
Total Annual Rate payable monthly .....	\$18.03
Monthly Rate .....	1.50

## COMMISSION.

The question of commission is of peculiar interest to all. It is upon this question, more than any other, that incessant disputes have been waged. Upon it depends to a large extent the loss ratio. It may be claimed that one more directly connected with life insurance and without experience in compensation insurance is hardly familiar enough with the difficulties of the problem to discuss it intelligently, but the question is so big that it has affected life insurance, as well as the other branches, and any one interested in any branch of insurance must be without a sense of responsibility not to have a keen interest in its solution. Furthermore, life insurance has witnessed attempts to eliminate commission in the efforts of the Massachusetts Savings Banks, the Wisconsin Fund and those companies using the mail exclusively.

The service rendered by the agent is certainly appreciated by one connected with a company having thousands, and it is written that the laborer is worthy of his hire. Without attempting to appraise this value, it can be safely stated that fundamental differences in opinion center around it and the strongest argument for its complete elimination exists when remuneration is allowed in excess of what public opinion deems sufficient.

At the present time group health insurance has many of the characteristics of compensation insurance. In one respect, however, it differs radically inasmuch as it is not compulsory. Here it follows life insurance and can only exist through the enlightened attitude of employers. This enlightenment must be brought by the agent. His persuasiveness will be the determining factor in many a case. The whole country is his field and if he can but be made to feel his responsibility, it is easily within the realm of possibilities that a deep conviction will produce a persuasiveness resulting in the working man of the country being insured against sickness without in any wise sacrificing his independence by being brought under the paternal care of any government, either city, state or national. But in assuming this responsibility, does not the field man, as well as the office man, undertake to render real service and endeavor to provide that for which the public has a need and at a cost which will satisfy? What is this cost?

In England, with several years' experience under the National Health Insurance Act before them, the committee appointed to consider the proposed changes in the British Workmen's Compen-



sation law finally recommended that this insurance be carried by private carriers, that the loss ratio should be 70 per cent. of the premiums and that the companies should limit their margins for management, commission and profits, if any, to not more than 30 per cent. of the premium income, and of this not more than 5 per cent. should go for commissions. It has previously been pointed out that 70 per cent. of a \$10 basic rate should be approximately the net cost under certain conditions, and if the commission rate of approximately 5 per cent. can be made effective, the general plan would seem to be in close harmony with the recommendations of this committee. A flat percentage, however, does not seem to strictly compensate for the labor involved. The agent is often entitled to as much remuneration for closing a small case as for a large case, and his greatest task is accomplished when in the first year he persuades the employer of the general advantage of group insurance. If, therefore, a scale of commissions can be prepared under which the ultimate sum payable will not be excessive, but under which relatively larger compensation will be paid for smaller groups than for large ones, and under which larger commissions can be paid in the first year, all parties at interest would receive fair consideration. In accordance with these principles various scales of commissions are now in use by the various companies, the most common being,

(a) FIRST YEAR'S COMMISSIONS.

12½	per cent. for the first \$3000 of premium
7½	per cent. from \$3001 to \$6000
5	per cent. over \$6000

*Renewal Commissions.*

7½	per cent. for first \$2000 of premium
3	per cent. over \$2000

(b) FIRST YEAR'S COMMISSIONS.

17½	per cent. for the first \$5000 of premium
12½	per cent. from \$5001 to \$10,000
7½	per cent. from \$10,001 to \$25,000
2½	per cent. from \$25,001 to \$50,000
1½	per cent. over \$50,000

*Renewal Commissions.*

- 1½ per cent. for first \$50,000 for 9 years  
 1 per cent. over \$50,000 for 9 years

## (c) FIRST YEAR'S COMMISSIONS

- 10 per cent. for first \$5000 of premium  
 7½ per cent. from \$5001 to \$10,000  
 5 per cent. over \$10,000

*Renewal Commissions.*

- 5 per cent. for five years

While these scales allow more than 5 per cent. for the first year the renewals, as a total, are less than this percentage and ultimately the total commission will be but very little in excess thereof. This small excess would seem to be warranted when it is remembered that employers must still be educated and persuaded to apply for insurance and that it must be provided from funds otherwise available for expenses in the total 30 per cent. allowed.

The payment of a larger first year commission offers peculiar opportunity to an unscrupulous agent or broker to continually transfer the business of one employer from one company to another and apparently the only remedy for this is to have the companies refuse to be parties to such practices. The company with which I am connected has generally refused for a long time past to accept an individual risk when it is evident a policy in another company is being cancelled. In such cases it has been the practice to advise the applicant that the loss incident to such a transfer is his and any grievance against the other company can probably be adjusted with advantage to him by making the company acquainted with his feelings. In like manner much good will result if companies in general will refuse to substitute one of their group health policies for one of another company except when convinced that the employer is really desirous of and has good reasons for so doing. When so convinced the Metropolitan will accept a risk formerly carried by another company, but in order to be sure that it is the employer and not the agent who desires the change, refuses to pay any commission therefor. In behalf of the agents of the country it should be stated that but few such attempts are ever made.

CLASSIFICATIONS OF INDUSTRIES FOR GROUP DISABILITY INSURANCE COVERING  
ACCIDENTS OF OCCUPATION ONLY.

*Agriculture.*

Proposed  
Classifi-  
cation

- B Florists and Nurserymen.
- B Fruit Growing.
- E Stock Ranging and Ranching.
- E General Farming and all Other Agriculture.

*Mining.*

- F Coal—Bituminous (Surface Mining).
- F Coal—Bituminous (Underground Mining).
- F Coal—Anthracite.
- E Iron (Surface Mining Only).
- F Iron (Underground Mining).
- E Copper (Surface Mining Only).
- F Copper (Underground Mining).
- E Lead and Zinc Mines (Surface Mining Only).
- F Lead and Zinc Mines (Underground Mining).
- E Other Metal Mines (Surface Mining Only).
- F Other Metal Mines (Underground—Includes Surface and Under-  
ground Workers).
- D Salt Production.
- E Minerals (Clay, Shale, Feldspar, Phosphate, Tale, etc.).
- E Quarries (Slate, Stone and Marble).

*Oil.*

- D Mineral Oil Production, Refining and Distribution.
  - (1) Manufacture of gasoline from casinghead and natural gas.
  - (2) Oil transportation (pipe lines).
  - (3) Drilling wells (oil and water).

*Construction.*

- F Construction (Steel, Including Steel Bridges).
- D Construction (Wood, Brick and Stone).
  - (1) Dam and Dock Construction.
  - (2) Concrete bridges and building construction.
- E Shipbuilding (Iron and Steel).
- D Shipbuilding (Wood).
- D Road Construction (Including Sewers, Bridges, Etc.).
  - (1) Railroad construction of all kinds.
  - (2) Dredging, Excavating, and Grading.
  - (3) Sewers, ditches and caissons.

*Iron and Steel and Other Metal Industries (Except Lead).*

- E Steel Works (Open Hearth, Bessemer, Crucible, Casting Ingots, Puddling or Blooming—with or without Rolling Mills).
  - (1) High speed steel.
- E Steel and Iron Foundries.
  - (1) Stoves, ranges, furnaces and radiators.
  - (2) Car wheels.
  - (3) Brake shoes.
  - (4) Cast stair treads.
  - (5) Rebuilt machinery.
- E Steel Rolling.
  - (1) Galvanized sheet steel.
  - (2) Charcoal iron.
- E Tube, Rod and Pipe Mills.
  - (1) Nuts and Bolts.
- D Malleable Iron Works.
- E Wire Drawing and Wire Products.
- D Smelting (Electric Process) and Refining.
- E Other Smelting and Refining.
- D Non-Ferrous Metal Foundries.

*Metal Products.*

- D Automobiles, Aeroplanes and Agricultural Implements.
  - (1) Automobile wheels (metal or wood).
  - (2) Automobile bodies (metal).
- D Car and Railroad Shops.
- D Sheet Metal Products (Stamping and Pressing).
  - (1) Metal moulding and store fronts.
  - (2) Metal doors, sash and frames.
  - (3) Metal furniture.
  - (4) Oil stoves and heaters.
- D Steel Fabrication (Excluding Erecting).
  - (1) Electric traveling cranes.
- E Drop Forging.
  - (1) Drop forged tools.
  - (2) Blacksmithing.
- D Heavy Machinery and Other Heavy Metal Products (Cranes, Lathes, Safes, Stoves, Etc.).
  - (1) Steel pulleys.
  - (2) Cutting large gears (12" or over dia.).
  - (3) Cream separators.
  - (4) Pneumatic tools and machinery.
  - (5) Farm lighting units.
  - (6) Millwright work.
  - (7) Mechanical conveyors.
  - (8) Steam and electric machinery over 200 lbs.

- C Light Metal Products (Tools, Hardware, Etc.).
- (1) Automatic sprinklers.
  - (2) Ball bearings.
  - (3) Aeroplane hardware.
  - (4) Electric and mechanical appliances under 200 lbs.
  - (5) Small valves.
  - (6) Piston rings.
  - (7) Die sinking.
  - (8) Washing machines.
  - (9) Baby carriages.
  - (10) Cutlery.
  - (11) Band instruments.
  - (12) Auto accessories.
- C Light Machinery and Instruments of Precision (Sewing Machines, Typewriters, Clocks, Watches, Etc.).
- (1) Firearms.
  - (2) Telephone apparatus.
  - (3) Jewelry.
  - (4) Dials.
  - (5) Electrical and mechanical toys.
  - (6) Gas meters and electric meters, and water meters.
  - (7) Vacuum cleaners (portable).
  - (8) Optical instruments.
  - (9) Photographic instruments.
  - (10) Bicycles and motorcycles.
  - (11) Lawn mowers (hand and small power driven under 200 lbs.).
- D Boiler Making, Heavy Tanks, Etc.

*Lead Industry.*

- D Manufacturing White and Red Lead—Foundry Work and Manufacturing Lead Supplies, including Batteries.

*Chemical and Allied Industries.*

- D Fertilizer Production.
- C Paint and Varnish Factories.
- D Aniline Dyes (Coal Tar Dyes).
- F Explosives.
- (1) Aluminum and Bronze powders.
  - (2) Nitrated cotton.
  - (3) Shell charging and loading.
  - (4) Fuse, Detonator and Booster loading.
  - (5) Cap, Primer and Detonator loading.
  - (6) Cartridge manufacturing.
  - (7) Shell, Rocket and Single Light mfg.
  - (8) Fireworks.
- C Soap, Tallow and Glue.

- F Heavy Acids (Sulphuric, Nitric and Hydrofluoric, Etc.).
  - (1) Picric (not picrates)
  - (2) Carbolic acid.
  - (3) Muriatic acid.
  - (4) Phosphoric acid.
  - (5) Prussic acid.
- D Light Acids (Acetic, Citric, Etc.).
  - (1) Lactic acid.
  - (2) Oleic acid.
  - (3) Oxalic acid.
  - (4) Boracic acid.
  - (5) Phthalic acid.
  - (6) Stearic acid.
  - (7) Tannic acid.
- D General Chemical Manufacturing.
  - (1) Alkalis and extracts.
  - (2) Creosote, etc.
  - (3) Synthetic, products of coal tar.

*Clay, Glass and Stone.*

- C Brick, Tile, Terra Cotta and Pottery.
  - (1) Chinaware.
  - (2) Compolite.
- C Glass Factories (Excluding Polished Plate Glass).
  - (1) Cut Glass Ware.
  - (2) Bottles, jars, etc.
- D Polished Plate Glass.
- D Lime, Cement and Gypsum.
- D Marble and Stone Yards.
  - (1) Soda Fountains.
  - (2) Monumental work (Stone).

*Clothing Industries.*

- B Hat Factories (Felt).
  - (1) Manufacture of Felt.
- C Furriers.
- B All Other Clothing.
  - (1) Millinery and hat trimming.
  - (2) Straw Hats.

*Food and Kindred Industries.*

- C Dairy Products.
- C Flour and Grain Mills and Elevators.
- C Canneries (Fish).
- C Canneries (Meat, Fruit and Vegetables).
  - (1) Jellies and preserves.

- D Slaughter and Packing Houses and Stock Yards.
- C Sugar Factories and Refineries.
- C Manufacturing and Bottling Beverages.
- B Cereals, Prepared Food, Bakeries, Confectionery and All Other Food Products.
  - (1) Macaroni.
  - (2) Baking Powder.
  - (3) Coffee—cleaning, roasting, and grinding.

*Leather Industries (Excluding Artificial Leather).*

- C Heavy Leather Goods.
  - (1) Mechanical packings.
  - (2) Shoe soles, etc.
  - (3) Belting (leather).
- B Shoes and Other Light Leather Goods, Tanneries.

*Lumber and Furniture.*

- F Woodsmen and Loggers.
- F Lumber Yards and Saw and Planing Mills.
  - (1) Cooperage.
  - (2) Wood boxes and shooks.
  - (3) Excelsior mfg.
  - (4) Wooden baskets.
- D Furniture and Woodworking (Including Carriage Manufacturing and Musical Instruments)—Pianos, Organs, Etc.
  - (1) Vencer Auto Bodies.
  - (2) Picture frame mfg.
  - (3) Upholstered furniture.
  - (4) Wooden dairy supplies.
  - (5) Bobbins and spools.
  - (6) Pencils, crayons, etc.
  - (7) Incubators and refrigerators.
  - (8) Canes, crutches, and umbrella handles.
  - (9) Wooden toys.

*Paper and Pulp Manufacturing.*

- D Paper and Ground Wood Pulp Mills.
  - (1) Paper pails.
  - (2) Water-proof roofing papers.
  - (3) Building paper.
- D Sulphide Soda Pulp Mills.
- B Paper Boxes.
  - (1) Paper bags.
- C All Other Paper Manufacturing.
  - (1) Envelopes.
  - (2) Writing paper.

- (3) Paper mache.
- (4) Paper novelties (Dennison novelties).

*Printing.*

- B Printing, Bookbinding and Publishing.
  - (1) Lithographing.
  - (2) Engraving.
  - (3) Label mfg.

*Textile Industries.*

- B Bleaching, Dyeing, Printing and Finishing.
- B Hemp, Jute, Rope and Cordage.
  - (1) Oakum.
  - (2) Grass rugs.
  - (3) Asbestos spinning and weaving.
  - (4) Curled hair, wadding and waste.
  - (5) Fibre goods mfg.
  - (6) Bagging.
- B All Other Textiles (Wool, Cotton, Silk, Etc.).
  - (1) Knitting mills.
  - (2) Thread mills.
  - (3) Braids and shoe laces.
  - (4) Shade cloth mfg.
  - (5) Silk throwing.

*Miscellaneous Industries.*

- D Artificial Leather (Using Pyroxylin Composition).
- B Cigars and Tobacco.
- C Electric Cables and Supplies.
  - (1) Electrical installation contractors.
  - (2) Manufacturing of electric insulators (bakelite, rubber, etc.).
- C Rubber.
- C Brooms and Brushes.
- C Buttons (Excluding Metal, Rubber and Composition).
- D Celluloid and Celluloid Articles (Pyroxylin Composition).
- B Drugs (Sundries, Including Perfume, Chewing Gum, Etc.).
  - (1) No soap mfg.
- C Cottonseed Oil Production (and Other Vegetable Oil Production).
- E Ice Manufacturing (Harvesting and Distributing).

*Transportation and Public Service.*

- F Water Transportation (Employees on Vessels other than River Navigation).
- F Water Transportation (Harbor and Dock Employees and Employees on Vessels on Rivers).
- C Electric and Street Railroads.



- D Livery Stables, Auto Service Stations, Bus, Cab, Truck, Transfer, Etc.
  - (1) Automobile distributing.
  - (2) Automobile repairing and selling.
- D Express Companies.
- C Telegraph.
- C Telephone.
- C Subway and Elevated Railroads.
- C Police.
- A School.
- E Firemen.
- O Gas Works.
- D Electric Light and Power.

*Clerical and Professional.*

- A Clerical (Banks, Insurance, Etc., and Other Office Forces).
- B Medical, Nurses, Sanatorium, Hospitals, Etc.
- C Theatrical.
  - (1) Production and distribution of motion picture films.

*Trade and Service.*

- C Wholesale Merchants and Dealers.
  - (1) Jobbers and commission merchants.
- A Retail Merchants and Dealers.
- D Warehouse and Cold Storage Plants.
  - (1) Distribution of Contractors' supplies.
  - (2) Storage of chickens, butter and eggs.
  - (3) Furniture, etc.
- B Hotels and Restaurants.
- B Laundries (Including Dry Cleaning).
- D Coal Delivery.

GROUP HEALTH POLICY

BLANK

No. \_\_\_\_\_ G.H.

\_\_\_\_\_ premium  
\_\_\_\_\_ for each  
dollar of weekly ben-  
efit insured hereunder.

LIFE INSURANCE COMPANY

Incorporated by the State of New York

A Mutual Life Insurance Company

(Hereinafter Called the Company)

Hereby Agrees

on receipt of due notice and proof that any Employee of the

SPECIMEN

(Hereinafter called the employer)

insured hereunder in accordance with the provisions of the Formula herein-  
after contained, is wholly and continuously disabled and prevented from  
performing any and every duty of his or her occupation by non-occupational  
accidental bodily injury sustained or by sickness contracted during the term  
of this Policy and while insured hereunder (accidental, bodily injuries due  
to or arising out of the employee's course of employment, or sickness for  
which the insured is not treated by a licensed practicing physician .....  
..... excepted.)

To Pay to such incapacitated employee the weekly idemnities provided in  
the Formula for the period of such continuous disability or until the In-  
sured is able to engage in some suitable occupation or employment for wage  
or profit, but in no case will indemnity be payable during the first .....  
days of incapacity nor for more than ..... weeks' thereafter.

Premiums.—This Policy is issued for the term of twelve months from  
the ..... day of .....19.. (commencing and ending  
12 o'clock noon standard time at New York City) in consideration of the  
application of the Employer, the addition of new employees, if any, and the  
payment of ..... Dollars and ..... Cents on the delivery of this  
contract and payment on the ..... day of each month thereafter during  
the term of this contract, at the Home Office of the Company in New York  
City, in exchange for an official receipt signed by an officer of the Company,  
of such further ..... premiums at the rate of ..... Dollars  
and ..... Cents per ..... for each \$1.00 of Weekly In-  
demnity insured hereunder as determined by the application of the Formula  
to the Schedule of Employees filed with the Company as hereinafter pro-

vided, subject however, to the provisions for premium adjustment hereinafter contained.

*Formula.*—This insurance shall cover, (a) employees actually working at the effective date of this Policy, (b) employees then absent, after they return to work in good health and (c) new employees; provided however, that in no such case shall any employee be covered unless and until he has completed an aggregate period of service of . . . . . months on full time and for full pay, and is then employed on such basis.

The amount of insurance as to each employee covered hereunder shall be . . . . . for the period of continuous disability (no payment to be made for the first . . . . . days nor after the . . . . . week of disability) payable in accordance with the conditions of the Policy.

Weekly Indemnity for Total Incapacity

Payable for Weeks

Participating.

*Conditions.*

*Insurance on Eligible Employees.*—The employer shall furnish the Company as promptly as practicable, on schedules furnished by the Company for the purpose, the names of all employees as they become eligible to new or additional insurance hereunder, with the necessary data as to each to determine the amount of the premium. For such new or additional insurance, a premium of half the regular monthly premium shall be charged for the particular month within which such insurance commenced, irrespective of the day of the month on which such insurance became effective, and regular premium thereafter.

*Insurance on Discontinued Employees.*—The insurance on each employee shall cease when he or she shall leave the service of the Employer, be dismissed therefrom, pensioned or otherwise discontinued actually working for said Employer.

The Employer shall furnish the Company as promptly as practicable after the . . . . . day of each calendar month the names of all employees whose insurance hereunder is to be reduced, with the amount and date such excess insurance was discontinued, together with the names of all persons ceasing to be in his employment during the preceding month and upon whom insurance hereunder is to be discontinued, with the date each said person left such employment and such insurance hereunder was discontinued. An unearned premium will be returnable on account of discontinuance of insurance on such persons equal to half of the monthly premium payable for such insurance for the particular month during which the insurance was discontinued.

*Premium Adjustment.*—The Company will furnish the Employer a statement of premium adjustment according to the above rates which shall be made monthly, taking into account the changes in coverage by reason of additions, increases, reductions and discontinuances, if any. The Company shall have the right and opportunity to inspect, as often as it may reason-

ably require, the payrolls or other records of the Employer so as to verify or determine the insurance covered hereunder and compute the premium charge therefor.

*Modifications.*—No Agent has authority to change this policy or to waive any of its provisions. No change in this Policy shall be valid, unless approved by an executive officer of the Company and such approval shall be endorsed thereon.

*Limitations.*—This insurance shall not cover injuries sustained or sickness contracted or suffered outside of the continental limits of the United States in North America, or Canada, or in any part of either, north of the 60th degree of north latitude, or if occasioned by war or any act of war, or while participating in or in consequence of having participated in aeronautics.

*Claim Payments.*—Immediate notice of an accident to or sickness of an employee shall be given by the Employer to the Company and formal proofs thereof shall be made by the Employer. Such notice and proofs shall be upon blanks furnished by the Company and such proofs shall be delivered to the Company at its Home Office in New York City within thirty days after such notice.

Subsequent proofs of claim shall be submitted by the Employer at such intervals (not oftener than weekly) as the Company may require and such proofs of claim shall be signed by a licensed practising physician or physicians actually attending the employee on account of whom proofs are submitted. The Company shall have the right and opportunity to examine the person of any employee when and so often as it may reasonably require while benefit is claimed on account of such employee.

*Assignment.*—No assignment of this Policy or of any benefit payable hereunder shall be effectual against the Company, unless it is filed at the Home Office of the Company while the insurance is in force. The Company assumes no responsibility for the validity of any assignment.

*Policy Paid.*<sup>6</sup>—If any premium be not paid when due, this Policy shall be void.

It is agreed that the foregoing provision which voids this Policy in case any premium shall be overdue, shall not be considered in any respect waived by any act of grace by the Company in the acceptance of overdue premiums upon this or any other policy.

*Renewal Privileges.*—This Policy may be renewed from year to year for a further term of one year by and with the consent of the Company at such premium rates as may be determined by the Company.

*Participation.*—This Policy is a participating contract and the Company will annually ascertain and apportion any divisible surplus accruing under policies of this class. Such distribution shall be paid to the Employer in cash.

*Contract.*—This Policy, together with the application of the Employer and all schedules furnished, shall constitute the entire contract between the parties.

In Witness Whereof, the Blank Life Insurance Company has caused this Policy to be executed this ..... day of .....

District .....

Number .....G.H.

BLANK  
LIFE INSURANCE COMPANY  
NEW YORK

Participating  
GROUP  
HEALTH POLICY

Providing Indemnity by Weekly Benefits against Total Incapacity for Work resulting from Sickness or Accidental Injury as herein Limited and Provided

Insurance on the Lives of Employees of

.....

of.....

Date of Policy

.....19....

NOTICE TO HOLDER

Payments are invalid unless made in exchange for an official Home Office receipt signed by an Executive Officer (President, Vice-President, Secretary or Actuary) of the Company and countersigned by the Company's Cashier at the Home Office or by a District Superintendent.

The Company's agents have no authority to waive forfeiture, alter or amend the contract, to accept premiums in arrears or to extend due date of such premiums.

In the event of the total incapacity for work of any of the Insured, the holder should promptly advise the Home Office, in New York, or the District Office through which premium payments have been made.

## LEGAL NOTES.

BY

RICHARD FONDILLER  
(OF THE NEW YORK BAR).

## ACCIDENT AND HEALTH.

UNNECESSARY EXPOSURE TO DANGER:—(Davis vs. Great Eastern Casualty Company, Supreme Court of Michigan, 176 N.W. Rep. 446.) The deceased was insured under an accident policy containing the following clauses:

“Section C-1. While traveling as a passenger in a place regularly provided for passengers, within any common carrier’s public passenger conveyance (animals, aerial machines or conveyances excepted); or

C-2. While a passenger within an elevator provided for passenger service only; or . . .

Under “Additional Provisions,” it is provided:

(b) This insurance does not cover . . . loss . . . from injuries fatal or otherwise resulting wholly or in part directly or indirectly from . . . unnecessary exposure to obvious danger. . . .

(e) This insurance does not cover loss from injuries, fatal or otherwise, received by the insured while entering or leaving, or attempting to enter or leave, or while upon the step or steps, or platform or running board of any conveyance except under section D, E or F.”

The insured was killed while attempting to step out of an elevator in a hotel. Proofs of loss were filed with the defendant. Suit was brought upon the defendant denying liability.

The court reviews the evidence given by the elevator operator, who was the only witness of the accident. There were contradictions in his testimony, which led the jury to conclude that the operator was negligent in starting the elevator before closing the doors. The court held that under these circumstances the insured did not unnecessarily expose himself to obvious danger, which was the first ground of defense, under “b” above.

The second ground of defense, under “e” above, was that an

elevator was a public conveyance. The court calls attention to the distinction made in the policy between a public conveyance and an elevator, and held as a matter of law that the defendant company was liable for the face of the policy.

An extract from the opinion follows:

"The deceased was to be indemnified if injured: First, while traveling as a passenger in any public passenger conveyance; and second, while a passenger within an elevator provided for passenger service only. It is apparent that an elevator was not deemed or considered as a 'public passenger conveyance,' else the specific provision as to it would not have been added. The insured was indemnified against two different and unconnected risks. One was while riding in a conveyance, and the other while a passenger in an elevator. To this his attention was called in plain and unmistakable language.

"Let us now turn to paragraph (e), in which the limitation of liability relied on is found. In it, the defendant is relieved if the injury to the insured is received 'while entering or leaving, or attempting to enter or leave, or while upon the step or steps, or platform or running board of any conveyance.' We believe the understanding of any person accepting such a policy would be that the words 'any conveyance' so used referred to the 'public passenger conveyance' specified in section C-1 and had no connection with the word 'elevator' in section C-2. We feel strengthened in this conviction by a consideration of the entire paragraph. There is greater danger of accident 'when entering or leaving, or attempting to enter or leave, or while upon the step or steps, or platform or running board,' than when riding in such a conveyance. From this extra hazard, the defendant sought to relieve itself to the extent to which its liability was lessened under other provisions as to payments. Should the death of deceased be held to have occurred while alighting, etc., from such a conveyance, its liability would be but \$50. Elevators have no platforms, steps, or running boards. The use of these terms in connection with the word 'conveyance' is persuasive that it was intended and understood by the contracting parties to mean a vessel, vehicle, or car so equipped, and employed in the general conveyance of passengers."

REPRESENTATIONS:—(Ivanosovich vs. North American Life & Casualty Co., Supreme Court of Minnesota, 176 N.W. Rep. 502.) This suit was upon an accident insurance policy. Through an accidental injury, the insured received a hernia, which required a surgical operation.

The insured stated in his application that he had never suffered from hernia. The defendant claimed that the falsity of this state-

ment avoided the policy. Medical experts for plaintiff and the defendant company differed as to whether plaintiff had been operated on for hernia prior to his application. The jury decided in favor of the plaintiff on this point, that there was no misrepresentation.

The policy had a health provision which only became effective after the policy had been in force ninety days. The defendant claimed that the hernia could only be indemnified under the health provision. As the operation was performed a month after the policy came into force, this would serve to defeat the plaintiff's claim. However, the court accepted the jury's version that the hernia was of accidental origin, since there was uncontradicted evidence that plaintiff met with a serious accident shortly after the insurance became effective.

Under the state insurance law, the "falsity of any statement in the application for insurance shall not bar a recovery unless the false statement was made with actual intent to deceive or unless it materially affected either the acceptance of the risk or the hazard assumed by the insurer." The burden of proof rests upon the insurance company and the question is submitted to the jury. In affirming judgment for the plaintiff, the court wrote:

"Under this state of the evidence the learned trial court did not err in submitting the question to the jury. We have not held that because one has at some time had a hernia it, as a matter of law, affects his insurable risk or hazard. . . . The fact that hernia is found in various stages and of different sorts naturally leads to the conclusion that it does not always affect the risk in all insurance contracts. Under statutes similar to ours, limiting the effect of representations including the issuance of insurance, other courts have held it a jury question whether the existence of hernia materially affects the risk or hazard."

TEMPORARY DIVERSION:—(Tracey vs. Standard Accident Insurance Co., Supreme Judicial Court of Maine, 109 Atl. Rep. 490.) The plaintiff held an accident and health policy in the defendant company, and was classified as an office manager. While he was riding on a motorcycle, as a diversion, he ran through a swarm of insects. One of them struck his eye so severely that he was compelled to give up his usual occupation. First his eyesight became impaired and finally the eye became blind. The injury was undoubtedly accidental.

The plaintiff told the agent, who in error furnished him with a blank for making claim for health benefits. This was not dis-



covered until it was too late to seasonably file a notice on the accident blank. The court held that the defendant was estopped by the act of its agent from claiming that notice had not been given in time, as provided in the policy; a later notice, on the correct form, had been filed.

The court held that when the defendant retained the various affidavits filed by the insured and failed to request additional information, that the defendant waived further proof.

The principal defense was that the plaintiff's policy specified that riding a motorcycle was an occupation, even though temporary; this would change the classification and reduce the amount payable. The policy provided, in compliance with the statute, that the rate manual should be filed with the insurance commissioner. The rate manual was included in a "Red Book," which also contained instructions to agents that were not required to be filed with the commissioner. The instructions stated that riders of motorcycles would not be insured unless a rider were attached to the policy. Since no rider was attached, also the insured did not use a motorcycle when insured and was not required to inform the company when he did so for recreation, the court held that nothing contained in the rate manual could defeat the claim. The provision in the policy that a motorcycle could not be used in a speed contest manifestly allowed the insured to use it in any other manner. The insured's temporary diversion from his employment did not constitute his engaging in a more hazardous employment.

The policy provided for a stipulated indemnity in the event of the "entire loss of sight" of an eye. The plaintiff could distinguish between light and darkness, but not between two objects. The court reviewed the evidence, which satisfied it that the loss of sight had been "entire" and also that "sight" had been entirely lost. The court affirmed the plaintiff's judgment, concluding its opinion with a quotation from another decision:

"An accident policy, providing for payment for the loss of the entire sight of an eye, if irrevocably lost, should be reasonably interpreted; and the sight of an eye will be deemed lost, where there is no ability to distinguish and recognize objects, though light from darkness can be distinguished. . . .

"If his ability is so far destroyed that what remains will not to practical and useful extent confer any of this benefit, entire sight, within the construction of analogous terms in insurance law, is lost. So would it be in popular phrase or sense. The interpreta-

tion must be reasonable and relative, not literal. The ability to perceive light and objects but no ability to distinguish and recognize objects, is not sight, but blindness.

“We are of the opinion that the plaintiff lost the ‘entire sight of his eye’ within a rational and practical interpretation of the language of the policy.”

**HOMICIDE:**—(Standard Accident Insurance Co. *vs.* Walker, Supreme Court of Appeals of Virginia, 102 S.E. Rep. 585.) The insured was killed by his son, while being mistaken for a burglar. The court below declined to receive evidence that father and son were hostile and that the killing was the culmination of the ill-feeling between them. The supreme court holds that such a homicide is covered under the accident insurance policy in suit, there being no exception in the policy to relieve the insurer from liability.

The insurer alleged that the widow (beneficiary) of the deceased had guilty knowledge of the son’s intention to murder his father. No mention of this defense had been made in the court below, the official investigation showed death had been accidental, and this court held the evidence entirely insufficient to defeat the widow’s claim for the amount insured.

The insured stated in his application that he was a contractor, and he came under the preferred class rating of “Proprietor, supervising only.” The evidence showed some departure, in that he occasionally would instruct his bricklayers by doing some work himself. The tendency of the courts to pass upon underwriting questions and to resolve them against the insurer, is well shown in the following extract from the opinion:

“In considering a question of this sort, it must be borne in mind that it has long been determined by the courts, and we believe without dissent, that such contracts being prepared by the insurer, the company, the conditions therein being conditions intended to cause a forfeiture of the policy, are construed most strongly against the company. So construed in this case, in connection with the testimony offered by the plaintiff (though there is some conflict), it is perfectly clear that the occupation of the assured was that of a contractor, whose chief duty was to supervise the work of his servants in brick construction, and although in the performance of his duties as a contractor, in the way in which contractors generally perform their duties, he actually laid bricks, in connection with his supervision, that this was merely incidental and customary and could not have changed his classification. It is also apparent

that he made no false representation as to his occupation which induced the company to give him a preferred classification. He was, in fact, a preferred risk, and received the classification to which he was entitled. That one holding a policy under a preferred classification might nevertheless be injured in an occupation classed by the company as more hazardous is foreseen and provided for in article 9 of this policy, which provides that if such a one is injured in some more hazardous occupation, the company's liability shall be reduced to such proportion of the principal sum as the premium paid will purchase at the rate fixed by the company for such increased hazard. If the assured here had lost his life in the pursuit of some more hazardous business, then perhaps the company could have taken advantage of the clause above referred to; but inasmuch as his death was not caused by the pursuit of any more hazardous occupation, the clause has no application."

In his application, the insured gave the amount of weekly indemnity under three policies carried in stock, assessment or fraternal associations. He failed to name a social club which paid a small sick indemnity; and his wife took out a similar policy covering him, several years later. The defendant claimed that these were a bar to recovery, because they were material to the risk. The state statute reads:

"No answer to any interrogatories made by an applicant for a policy of insurance shall bar the right to recover upon any policy issued upon such application, by reason of any warranty in said application or policy contained, unless it be clearly proved that such answer was willfully false or fraudulently made or that it was material."

The court held that there was no intent to defraud the insurer. Having decided all the questions raised on the appeal in favor of the beneficiary, the court affirmed the judgment in her favor. It concludes its opinion as follows:

"A fair test of the materiality of a fact is found in the answer to the question whether reasonably careful and intelligent men would have regarded the fact communicated at the time of effecting the insurance as substantially increasing the chances of the loss insured against, so as to bring about a rejection of the risk or charging an increased premium.

"Considering the facts of this case, and giving the assured the benefit of all fair doubts, it seems to us perfectly clear that this man was a desirable risk, and that the company would have so regarded him, even if the disclosures had been made with the strictest accuracy. The reason the company desired to know the

amount of the weekly benefits which the assured would receive was to determine whether it would be to his advantage to feign sickness rather than to keep on with his work. This consideration has no relation whatever to the danger of death from accident. It might have led to some reduction of the weekly benefit to be paid by this company, or to some special waiver with reference thereto, but that it had the slightest effect upon the desire of the company to assume the risk of insuring this man against accidental death is hardly probable."

**TICKET POLICIES:**—(Wilson *vs.* Travelers Insurance Co., Supreme Court of California, 190 Pac. Rep. 366.) The plaintiff purchased a ticket policy for twenty-five cents on the afternoon of a certain day and another one about twenty-four hours later, from a railroad ticket agent. About an hour thereafter, while he was in a passenger car standing at the railroad station, an explosion in the station wrecked the car. Since each of the ticket policies expired at midnight on the day after purchase, both were in force at the time of the accident. He sustained injuries, for which he claimed indemnity under both policies, and was successful in the court below. The insurer appealed to this court.

A clause in the policy excepted liability for injury from explosives, which the insurer maintained was a complete defense. The court agreed with this contention, no matter whether the exposure to explosives was voluntary or involuntary.

However, the real question at issue was whether the injuries were the result of "explosives" or of "wreckage." Clause (*d*) reads:

"If the insured be a male, and such injuries shall be caused by the wreckage or burning of a railway passenger car or vessel licensed for the transportation of passengers, provided in either case by a common carrier and propelled by mechanical power, while the insured is a passenger and actually within the car or on board the vessel, then the company will pay double the amount otherwise payable under clause (*a*), (*b*) or (*c*) of this policy."

The effect of carrying the explosive exception into clause (*d*) would be to cancel the coverage, which the court declined to do. An extract from the opinion upon this point follows:

"The wreckage of the car intervened between the explosion and the plaintiff. The defendant has chosen to use the phrase 'wreckage of the car' as a cause of injury for which they hold themselves responsible. Although the explosion was the proximate cause of the injury, it was by the peculiar terms of the policy, made a re-

mote cause, or secondary cause where the wreckage of the car intervened. No doubt if an explosive bomb had been placed in the plaintiff's lap and there exploded, killing him and wrecking the car, the wreckage of the car would not be a 'cause' of the accident within the meaning of the policy. But where it was necessary for the explosive to first destroy or wreck the car to reach the passenger, or where parts of the wrecked car striking the passenger cause the injury, the terms of the policy would warrant a recovery. The defendant is privileged to frame its contracts of insurance in any terms it may choose, and in the absence of ambiguity the courts enforce such contracts as written. But they are offered to the public, and are intended to be sufficiently attractive to secure purchasers. The established rule of construction of such contracts require us to settle the ambiguity arising from the inapt phraseology 'caused by the wreckage or burning of a railway passenger car' against the insurance company, and therefore to hold that where the injury is caused by the 'wreckage' of the car which is in turn caused by the explosion of an explosive, the insured can recover under clause (d), for the reason that such 'wreckage' is itself a 'cause' of injury within the meaning of the latter clause."

The insurer also appealed from the decision of the court below, holding it liable on both policies, in view of the following clause which appeared in both policies:

"Insurance on any person under ticket policies is limited to the principal sum of \$2,500.00 indemnity for injuries resulting in death, and to males \$1,250.00 for dismemberment, \$12.50 weekly indemnity for wholly disabling injuries and the extra insurance provided for in clause (d); the company will return on demand to the insured or to his or her executors, administrators or assigns, premiums paid for ticket policies in excess thereof."

The court held that this provision was effective to limit the insurer's liability to one policy, since it engaged itself to return the premium on other ticket policies. The policies were in force more than twenty-four hours, and the injury occurred during those hours that the insurances overlapped. The court consequently modified the judgment of the court below, and allowed recovery for \$1300 (double indemnity) on one policy and the return of twenty-five cents premium paid on the other policy.

**TAXICAB A PUBLIC CONVEYANCE:**—(Anderson *vs.* Fidelity & Casualty Co., Court of Appeals of New York, 127 N.E. Rep. 584.) The plaintiff's accident policy provided for double indemnity if injury occurred "while in or on a public conveyance . . . provided by a common carrier for passenger service." The plaintiff

hired a taxicab for himself and friend, which was standing in the street waiting for fares. At the end of his trip he was injured while stepping out of the machine.

The court held that the taxicab company was a common carrier, taking judicial notice of the changes in transportation methods that had taken place in the advance of modern science.

The conclusion that in the instant case the taxicab was a public conveyance is well stated in the following passage from the opinion :

“It is clear that a taxicab equipped with a taximeter ‘cruising’ along the streets of a city offering its services to the first comer, looking for ‘fares’ to any place within the city limits at a fixed price to be controlled by the distance and recorded by a taximeter, is a public conveyance within the usual concept of the term and also legally. Its character does not change by reason of some passer-by accepting the offer publicly made of its services. It was a public offer of conveyance which he accepted, and the instrument of conveyance must remain as to him a public conveyance to his journey’s end or his dismissal of the cab.

“There does not seem to be much reason in the argument that, if all seats were occupied, the conveyance was a public one, but that, if only two or three of the four available seats were occupied, it was a private conveyance. The fact that, by custom, when engaged by a ‘fare,’ taxicabs proceed under the direction of that ‘fare’ to the destination desired by him and accept no other passengers, does not change the means or character of the conveyance. The custom is the result of business convenience, inherent in the successful conduct of the taxicab business. Those employing taxicabs desire greater speed and convenience in transacting their business or journey than is furnished by the ordinary street car or jitney bus. This means of speed and convenience is offered by the taxicab, and that is what warrants its higher rate of charge.”

The court affirmed the judgment for double indemnity.

In the concurring opinion of one of the justices, he stated that a taxicab that was ordered from the garage by special call as by telephone, would not be a common carrier but would be a liveryman. This is merely *obiter dicta* and was not essential to the decision in the case at bar.

#### WORKMEN’S COMPENSATION.

ARISING OUT OF AND IN THE COURSE OF EMPLOYMENT:—(American Smelting & Refining Co., *vs.* Cassil, Supreme Court of Nebraska, 175 N.W. Rep. 1021.) Cassil was killed by a fellow em-

ployee on the employer's premises. The employer admitted that the death occurred during the course of employment but maintained that it did not arise out of the employment because it was the conclusion of a quarrel between the two men.

The court called attention to the elemental principle that the Workmen's Compensation Law is a part of the contract of employment. Because acts may be purely personal, they are not necessarily outside of the scope of the employment; it is necessary to weigh the facts of each case, to determine whether the Law applies. The court proceeds to do so in the case herein and held that the homicide also arose out of the employment, and the widow was entitled to compensation.

The employer paid the premiums and carried life insurance on the employee's life, for the benefit of the widow. No deduction from the employee's wages was made to cover the premium. The amount of this insurance had previously been paid to the widow. The court held that the amount of life insurance should be applied as a credit toward the amount of compensation awarded to the widow.

**EMPLOYER LIABLE PRIMARILY:**—(American Fuel Co. *vs.* Industrial Commission, Supreme Court of Utah, 187 Pac. Rep. 633.) The employer took out a workmen's compensation policy in a casualty company. While the policy was in force, an employee become entitled to compensation, part of which had been paid by the casualty company before it became insolvent. Thereupon, the Industrial Commission entered an award against the employer to pay to the employee the balance of the compensation which was unpaid. The employer declined for the reason that it had insured its liability in the casualty company.

The statute had the usual provisions as to modes of insurance, filing of claims and jurisdiction of both the employer and insurance carrier. The court directed the employer to pay claimant the balance. The opinion concludes:

“Reading the statute as a whole, and considering all of its provisions, the plain and unmistakable import of the language of the act compels the conclusion that the right to compensation arises out of the relation existing between employer and employee; that compensation is a tax upon industry or upon the employer's business, a tax that is added to the price of the product and is ultimately paid by the consumer; that the employer is primarily liable for compensation to the employee; that both employer and insurance carrier are liable for the payment of compensation to the

injured employee; and that the default of either will not excuse payment by the other.”

**HEAT STROKE AN ACCIDENT:**—(City of Joliet vs. Industrial Commission, Supreme Court of Illinois, 126 N.E. Rep. 618.) The deceased employee was an engineer at a municipal pumping station. He was working on a very hot day in front of machinery which generated a great deal of heat, and was overcome by a heat stroke from which he died.

The court wrote:

“The commission made findings that the deceased, while in the performance of his duties, suffered a heat stroke, as a result of which he died, and that the heat stroke was superinduced by the excessive amount of heat in the room in which he was working, and there was evidence to sustain its findings. The heat stroke occurred in the course of the employment, and there was evidence from which the commission might reasonably conclude that it arose out of the employment. The man was overcome by the heat. In his employment, and because of it, he was exposed to a degree of heat beyond the ordinary temperature of the day. While it cannot be demonstrated that he would not have been overcome if he had not been at work, the fact is that he was overcome under circumstances which furnish an adequate cause for that result, and neither the commission nor the court will indulge in conjecture as to what might have happened under other circumstances. He might have died from the heat of the day if he had stayed at home, but he did not, and he did die from the heat of the day and the additional effect of his work and the artificial heat of the engine room.”

It has been held in several jurisdictions that where a workman is overcome by excessive heat, that it is an accident within the compensation law. (See *Proceedings*, IV, 345, State vs. District Court.) The award of compensation was affirmed.

**INTRASTATE COMMERCE:**—(Di Donato vs. Philadelphia & R. Ry. Co., Supreme Court of Pennsylvania, 109 Atl. Rep. 627.) The deceased was employed by the defendant railroad as a watchman at a grade crossing on a public road. While so engaged, he was killed by a train on tracks used for both interstate and intrastate commerce.

During the course of its opinion, the court summarized the decisions as follows:



"If the deceased lost his life while employed in interstate commerce, the case is within the Federal Employers' Liability Act of 1908 and there can be no recovery here . . . and the flagging of an interstate train is in such commerce. But we cannot adopt defendant's contention that a watchman at such crossing is engaged in interstate commerce when flagging an intrastate train. The nature of the employment is determined by the work in hand at the immediate time of the accident, . . . and, as such work often shifts rapidly from one class of employment to the other, each case must be decided in the light of its particular facts, and is governed by the purpose of the operation. If the work in hand is interstate, or so closely related thereto as to be practically a part of it, then it falls within the act of Congress, as it also does where the work has a direct application to both intra- and inter-state commerce. . . . But a crossing flagman is in the nature of a traffic officer who protects the public and pilots each train over the crossing; and how can it be said that he is engaged in through traffic when so conducting a local train? He is assisting that train, and his act is not essentially different from that of a conductor or brakeman thereon; for each is working for the safety of the train. Yet an employee upon an intrastate train is not engaged in interstate commerce."

The plaintiff (widow) made out her case by proving that the duties and accident took place within the state. The defendant claimed the case fell under the provisions of the Federal Employers' Liability Act, but neglected to prove whether the train causing the accident was in interstate or in intrastate commerce. The court therefore declined to make the presumption desired by the defendant, that the deceased was employed in interstate commerce at the time of the accident. That was a matter for the defendant to prove, since the evidence was peculiarly in the railroad's possession, and failure to do so deprived it of the Federal Act as a defense. The court affirmed the award of compensation under the Pennsylvania law.

SUBROGATION :—(Golden & Boter Transfer Co. *vs.* Brown & Sehler Co., Supreme Court of Michigan, 177 N.W. Rep. 202.) The plaintiff (transfer company) sent a team in charge of a teamster to do work for the defendants, who were the owners and contractors of a burned building. The teamster was killed by a falling wall and his widow was awarded compensation, which was paid by the plaintiff's insurance carrier. This suit was brought by the plaintiff (for the benefit of his insurance carrier) to recover the amount of compensation paid to the widow. The plaintiff claimed

that the accident was caused by the negligence of the defendants to provide a safe place to work, which was denied by the defendants.

The court held that an employer is entitled to recover the compensation he has paid, from the third party who was guilty of the negligence causing the employee's death. Even though the employee was working for the contractors, he was nevertheless the employee of the transfer company, who paid his wages and merely sent him to perform work, by arrangement, on the contractors' premises. The doctrine of assumption of risk, which was urged by the defendants, could not apply where the relationship of master and servant existed between the transfer company and the deceased, so as to defeat the right of subrogation of the master. The judgment in the plaintiff's favor was upheld.

MARITIME EMPLOYEE:—(Knickerbocker Ice Co. *vs.* Stewart, United States Supreme Court, 40 S.C. Rep. 438.) This case was reviewed in the *Proceedings*, VI, 88, where the highest court of New York State affirmed an award of compensation. That court construed the Johnson Bill of Oct. 6, 1917 (see *Proceedings*, IV, 351) as enabling legislation passed by Congress to cover such cases. The employer appealed from the award against it.

The United States Supreme Court, by a vote of five to four, reversed the decision of the New York State court. The following doctrine was laid down by the court:

“The Constitution itself adopted and established, as part of the laws of the United States, approved rules of the general maritime law and empowered Congress to legislate in respect of them and other matters within the admiralty and maritime jurisdiction. Moreover, it took from the States all power, by legislation or judicial decision, to contravene the essential purposes of, or to work material injury to characteristic features of such laws or to interfere with its proper harmony and uniformity in its international and interstate relations. To preserve adequate harmony and appropriate uniform rules relating to maritime matters and bring them within control of the Federal Government was the fundamental purpose; and to such definite end Congress was empowered to legislate within that sphere.”

The Constitution and laws adopted thereunder are the supreme court of the land, and the duty of State courts is to apply Federal laws, except when prohibited. The Federal law granted to Federal courts “exclusive original cognizance of all civil causes of admiralty and maritime jurisdiction . . . saving to suitors, in all cases, the

right of a common law remedy, where the common law is competent to give it" to which was added, by the Johnson Bill "*and to claimants the rights and remedies under the Workmen's Compensation Law of any State.*" It was under the apparent authority of the italicized clause that the New York Court of Appeals made an award in the case at bar. The Supreme Court held that Congress had no authority to enact this last clause, because this created under every workmen's compensation law new rights and remedies. From the extract above, "Congress was empowered to legislate within the sphere" of conferring upon State courts partially concurrent jurisdiction in admiralty cases (theretofore Federal courts having been vested with exclusive jurisdiction) but Congress exceeded its powers when it added the clause in italics above.

Congress could not delegate to the various states the enforcement of rights and liabilities arising in admiralty, since that would destroy the uniformity established by the Constitution.

#### MISCELLANEOUS.

CIRCUMSTANTIAL EVIDENCE IN BURGLARY INSURANCE:—(Emery *vs.* Ocean Accident & Guarantee Corp., Supreme Court of Michigan, 176 N.W. Rep. 566.) The plaintiff's husband held a burglary policy covering the joint and several property of the plaintiff, her husband and two members of his family. A diamond pin that was plaintiff's sole property, was stolen from her residence. The defendant company claimed that the proofs were insufficient in this respect, and that the pin was merely missing.

The policy partly read:

"The Ocean Accident & Guarantee Corporation . . . hereinafter called 'the corporation,' in consideration of the payment of the premiums specified herein, and of the statements in the schedule forming a part hereof . . . agrees to indemnify the assured for direct loss by burglary, theft or larceny of any property of the assured described in the schedule hereinafter given and stated to be insured hereunder occasioned by its felonious abstraction from the interior of the house, building, apartment or rooms actually occupied by the assured, and described in said schedule and hereinafter called 'the premises,' by any domestic servant or employe of the insured, or by any other person or persons excepting any person whose property is insured hereunder and for direct loss by damage to said property and to the said premises caused by burglars or thieves.

"It is understood and agreed that for the purpose of this insurance, property belonging to any permanent member of the household of the assured who does not pay board or rent, except domestic servants or other employes, or property belonging to a relative of the assured permanently residing with him, is deemed to be the property of the assured. In the event of claim for loss of such property the release of either assured or the actual owner of the property shall relieve the corporation from all further liability."

As a first defense, the defendant urged that no recovery could be had because the plaintiff sued alone, instead of joining the other three assured with her. The court held this was unnecessary because plaintiff was the sole owner of the property and the clause quoted above expressly provides that "the release of . . . the actual owner of the property shall relieve the corporation from all further liability." While the policy was drawn up as a joint one, it covered the several property of the various assured, in addition to their joint property.

The principal point in this case was whether circumstantial evidence was sufficient to support a recovery. The credibility of the witnesses was one for the jury, and their decision was in favor of the plaintiff. The court declined to disturb the verdict and concluded its opinion as follows:

"To furnish direct proof that an article of the character involved here has been stolen is usually attended with much difficulty. Nothing has been called to our attention in the policy which would prevent the fact being shown by circumstantial evidence. If it were competent for plaintiff to establish the fact that it had been stolen by circumstantial evidence, we think the testimony was sufficient to support an inference that the pin had been stolen."

PAYROLL IN LIABILITY INSURANCE:—(Ocean Accident & Guarantee Corporation *vs.* Piedmont Railway & Electric Co., Supreme Court of North Carolina, 102 S.E. Rep. 636.) The plaintiff (insurance company) issued to defendant a public liability policy, covering the "electric light and power companies, operation, maintenance and extension of lines, and making service connections." The street railway and the railway power lines were specifically excluded.

The defendant paid the entire premium except that which was claimed on the payroll of the power plant of the electric light and power companies. The plaintiff claimed that the coverage extended also to this payroll, consequently the premium was due thereon. The court below found in favor of the defendant.

The plaintiff carried the case to this court upon appeal. This court referred to the contract and found but one exception:

“No work of any nature, not herein disclosed, is done by the assured at the places covered hereby, except the operation of street railway which is not covered hereunder.”

Otherwise the policy covered every kind of risk, which consequently entitled the plaintiff to compute the premium on the entire payroll, including the power plants in controversy.

The court construed the word “operation” to mean “operation of the lines,” as a distinct item of the work, apart from “maintenance” or “extension.” This would serve to confirm the understanding of the parties that everything in connection with the power plants was included. The court quoted the following from the text books:

“Where one accepts a paper which he knows contains the terms of an offer, he will be bound by it and cannot be heard to say that he did not read it, or did not know what it contained. This principle finds frequent application in bills of lading, express receipts, and the like. So, where a person receives an insurance policy pursuant to an application, it is his duty to examine it and see those things in respect thereto which are open to ordinary observation by a person of ordinary intelligence, and if he neglects to do so, taking it for granted that what he has received is what he applied for, or intended to apply for, such conduct on his part amounts to an acceptance of the policy received, regardless of whether it corresponds to the policy applied for, or intended to have been applied for, or not, and if it does not so correspond he cannot be heard to complain.”

This court reversed the court below and granted a new trial.

**DATE OF TERMINATION OF SURETY'S LIABILITY:**—(First National Bank of East Islip *vs.* National Surety Co., Court of Appeals of New York, 127 N.E. Rep. 479.) The plaintiff insured itself against the dishonesty of a certain employee for two years, ending on February 5, 1914. The employee embezzled funds during the insured period, which came to plaintiff's knowledge almost two years after the expiry of the insurance. Notice was promptly given to the defendant company, which denied liability on the ground that the claim had not been presented within six months after the cancellation of the insurance.

The court first defines the “bond” issued by the defendant as a contract or policy of insurance.

The case centered about the meaning of the following clause in the policy:

“Any claim against the surety hereunder must be duly presented to the surety within six months after the date of the termination of the surety’s liability hereunder for any reason.”

The court rejected the plaintiff’s contention that the time for bringing suit was that provided in the statute of limitations. It upheld the view entertained by insurance offices that the end of the six months following cancellation, marks the termination of the insurer’s liability. The court dismissed the complaint.

An extract from the opinion follows:

“The word ‘liability’ in the language under consideration has, clearly and necessarily, its other meaning, which it ordinarily and commonly has in instruments and statutes of contingent obligation, namely, the condition of being exposed to the upspringing of an obligation to discharge or make good an undertaking of another or a loss or deficit; ‘the being exposed or subject to a given contingency, risk, or casualty, which is more or less probable’ (citing cases). Of such a nature is the liability of those who are in the relation of stockholders, trustees, sureties, guarantors, indorsers, insurers. Of such a nature, and of such a nature only, must have been the liability the termination of which set running the six months beyond which the plaintiff could not with effect present claims. During the insured period, or within the term of the policy, the defendant was exposed to the inception of the obligation to make good any defalcation. At the end of that period, the exposure terminated, came to a limit in time, and the liability, which was that exposure, necessarily terminated. The end of that period was February 5, 1914. The defendant was not obligated to pay the losses which were not claimed before the expiration of the next following six months.

“If argument in support of our conclusion were needed, it is found in the universal character of policies of indemnity insurance, and in public policy. . . .

“The effect of such a provision in a bond is helpful rather than hurtful. Knowing that no recovery can be had for losses not discovered within the time fixed by the bond, the bond itself is an incentive to the officers of the bank to do their duty by making frequent and careful examinations of the accounts of its employees. Similar provisions to the one in question have been upheld by the courts, and it is well settled that, where the liability of the insurer is limited to losses discovered within a specified time, there is no liability unless the fraud, dishonesty, or negligence causing the loss not only occurred, but was discovered, within the time limit.”

ABSTRACT OF THE DISCUSSION OF THE PAPERS READ AT  
THE PREVIOUS MEETING.

NOTES OF POISSON'S EXPONENTIAL AND CHARLIER'S CURVE—  
A. H. MOWBRAY.

VOL. VI, PAGE 197.

WRITTEN DISCUSSION.

MR. H. C. CARVER:

Mr. Mowbray's "Notes on Poisson's Exponential and Charlier's Curves" are both interesting and significant: interesting because of the neat development of Poisson's Exponential Binomial Limit which is now available in the Proceedings for the students in this Society, and significant since we may infer that those who are closest to our fundamental actuarial problems desire a practical mathematical criterion to use in connection with "researches as to the stability of statistical series and the nature of disturbing forces which affect their value for rate making."

Numerous probability functions have been used in the treatment of statistical data. Among them are the following:

I. Pearson's Hypergeometric Series

$$F(x) = \frac{{}_p n C_x {}_q n C_{r-x}}{{}_n C_x}.$$

II. The Point Binomial

$$F(x) = {}_r C_x p^{r-x} q^x.$$

III. The Poisson Exponential Binomial Limit which Mr. Mowbray treats in the paper under discussion

$$F(x) = \frac{e^{-m} m^x}{x!}.$$

IV. The Normal Curve of Error

$$F(x) = \frac{1}{\sigma \sqrt{2\pi}} e^{-(x^2/2\sigma^2)}.$$

V. Charlier's Type A curve

$$F(x) = A_0 \phi_x + A_3 \phi_x^{\text{III}} + A_4 \phi_x^{\text{IV}} + \dots,$$

where

$$\phi_x = \frac{1}{\pi} \int_0^{\infty} e^{-(\sigma^2 \omega^2/2)} \cos x\omega d\omega.$$

### VI. Charlier's Type B curve

$$F(x) = B_0\psi_{(x)} + B_1\Delta\psi_{(x)} + B_2\Delta^2\psi_x + \dots,$$

where

$$\psi_{(x)} = \frac{e^{-\lambda}}{\pi} \int_0^{\pi} e^{\lambda \cos \omega} \cos [\lambda \sin \omega - x\omega] d\omega.$$

Of the first four, Pearson's Hypergeometric Series are the most powerful since the other three may be regarded as special cases.

Thus (denoting as usual the  $n$ th moment about the mean by  $\nu_n$ ) if

$$\nu_4 = 3\nu_2^2 + \frac{3\nu_3^2}{2\nu_2} - \frac{\nu_2}{2}.$$

I reduces to II.

Again, if  $\nu_2 = \nu_3$ , II reduces to III, while if  $\nu_3 = 0$  and  $n$  be large, II approaches IV.

On the other hand, III, IV, V and VI are closely related, for if  $\sigma$  be large the expression for  $\psi_x$  in VI is represented approximately by the curve of error IV, while if  $\lambda$  be a positive integer or zero the value of  $\psi_{(x)}$  in VI reduces to Poisson's Exponential Binomial Limit.

As Mr. Mowbray suggests the coefficients  $A_3, A_4$  of V and the coefficients  $B_1, B_2$ , etc., may serve as a criterion of the perturbation of the basic probabilities: in other words we may be able to develop coefficients which will indicate to what extent and in what manner an observed frequency differs from the "normal" law or the "law of small numbers."

It occurs to me, however, that such coefficients would not be of the greatest value to us since our greatest interest centers around the function

$$nC_x p^{r-x} q^x,$$

which may be expressed, as Charlier has shown, by means of the series

$$F(x) = \phi_{(x)} + \frac{\sigma^2(p-q)}{L^3} \phi_{(x)}^{\text{III}} + \frac{\sigma^2(1-6pq)}{L^4} \phi_{(x)}^{\text{IV}} \\ + \frac{\sigma^2(p-q)(1-12pq)}{L^5} \phi_{(x)}^{\text{V}} + \dots,$$

where, if  $\sigma$  be not small,

$$\phi_{(x)} = \frac{1}{\sigma \sqrt{2\pi}} e^{-(x^2/2\sigma^2)}.$$



From the preceding it appears that if any law of distribution were Bernoullian, and not affected by any perturbations, the coefficients  $A_3, A_4$  might still have significant values.

For this reason I believe that Charlier's Coefficient of Disturbance or the criterion

$$\delta = \nu_4 - 3\nu_2^2 - \frac{3\nu_3^2}{2\nu_2} - \frac{\nu_2}{2}$$

might better serve the purpose.

It occurs to me, however, that interesting results might be obtained by writing the general law of error as

$$F(x) = B_0\psi(x) + B_1\Delta\psi(x) + B_2\Delta^2\psi(x) + \dots,$$

where  $\psi(x) = nC_x p^{r-x} q^x$ , and then investigating the practicability of using the value of  $B_1, B_2, B_3$ , etc., as a criterion.

MR. R. HENDERSON:

Perhaps the best way in which I can discuss this paper is by giving the results of an investigation into which I was led by it and by the remark of Mr. Elderton in his book that Charlier's fitting of his Type B curve was arbitrary. The subject of the investigation was the systematic fitting of curves of the type  $y = \psi(x)f(x)$ , where  $\psi(x)$  is any standard function of which the moments are known and  $f(x) = b_0 + b_1x + b_2x^2 + b_3x^3 + \dots$ .

Let  $s_n$  denote  $\int x^n \phi(x) dx$

and let  $t_n$  denote  $\int x^n \psi(x) f(x) dx$ ,

both integrals being taken over the complete range of  $\psi(x)$ . Then since  $x^n \psi(x) f(x) = \psi(x) (b_0 x^n + b_1 x^{n+1} + b_2 x^{n+2} + \dots)$  we have

$$t_n = b_0 s_n + b_1 s_{n+1} + b_2 s_{n+2} + \dots$$

If then we are given values of  $t_n$  equal in number to the arbitrary constants in  $f(x)$  we have a series of simple equations to determine those constants.

For example if  $f(x)$  is assumed to be of the  $n$ th degree in  $x$  the  $n+1$  arbitrary constants may be determined if we are given the values of  $t_r$  for values of  $r$  from 0 to  $n$  inclusive. The equations which determine  $f(x)$  are

$$f(x) = b_0 + b_1x + b_2x^2 + b_3x^3 + b_4x^4 + \dots,$$

$$t_0 = b_0s_0 + b_1s_1 + b_2s_2 + b_3s_3 + b_4s_4 + \dots,$$

$$t_1 = b_0s_1 + b_1s_2 + b_2s_3 + b_3s_4 + b_4s_5 + \dots,$$

$$t_2 = b_0s_2 + b_1s_3 + b_2s_4 + b_3s_5 + b_4s_6 + \dots,$$

$$t_3 = b_0s_3 + b_1s_4 + b_2s_5 + b_3s_6 + b_4s_7 + \dots,$$

$$t_4 = b_0s_4 + b_1s_5 + b_2s_6 + b_3s_7 + b_4s_8 + \dots$$

Those familiar with the theory of determinants will see that the result of eliminating the arbitrary constants from this set of equations may be expressed compactly by equating to zero a determinant the form of which is quite evident. This furnishes the most direct formal solution of the general problem and it may be applied to any particular case of  $\psi(x)$ , by inserting the corresponding values of  $s_n$ .

For certain purposes however a different method of stating the solution, which shows the effect of taking into account successively the higher moments, is more useful and instructive. For this purpose we will designate by  $b_{m:n}$  the addition made to  $b_m$  when the  $n$ th moment is taken into account so that we have

$$b_m = b_{m:m} + b_{m:m+1} + b_{m:m+2} + \dots$$

Also let  $f(nx)$  be the addition to the value of  $f(x)$  when the  $n$ th moment is taken in so that

$$f(x) = f(0x) + f(1x) + f(2x) + \dots$$

Then we have

$$t_0 = b_{0:0}s_0 \quad \text{or} \quad b_{0:0} = t_0/s_0,$$

$$f(0x) = b_{0:0} = t_0/s_0.$$

Also

$$f(1x) = b_{0:1} + b_{1:1}x, \quad 0 = b_{0:1}s_0 + b_{1:1}s_1,$$

$$t_1 - \frac{t_0s_1}{s_0} = \frac{\begin{vmatrix} s_0 & s_1 \\ t_0 & t_1 \end{vmatrix}}{s_0} = b_{0:1}s_1 + b_{1:1}s_2.$$

The solution of this is

$$b_{0:1} = -\frac{s_1}{s_0}b_{1:1}; \quad b_{1:1} = \left| \begin{array}{c} s_0, s_1 \\ t_0, t_1 \end{array} \right| \div \left| \begin{array}{c} s_0, s_1 \\ s_1, s_2 \end{array} \right|,$$

$$f(1x) = \frac{\begin{vmatrix} s_0, s_1 \\ t_0, t_1 \end{vmatrix}}{\begin{vmatrix} s_0, s_1 \\ s_1, s_2 \end{vmatrix}} \left( x - \frac{s_1}{s_0} \right) = \frac{\begin{vmatrix} s_0, s_1 \\ t_0, t_1 \end{vmatrix} \times \begin{vmatrix} s_0, s_1 \\ 1, x \end{vmatrix}}{s_0 \cdot \begin{vmatrix} s_0, s_1 \\ s_1, s_2 \end{vmatrix}}.$$

Again

$$f(2x) = b_{0:2} + b_{1:2}x + b_{2:2}x^2,$$

$$0 = b_{0:2}s_0 + b_{1:2}s_1 + b_{2:2}s_2,$$

$$0 = b_{0:2}s_1 + b_{1:2}s_2 + b_{2:2}s_3,$$

$$\begin{vmatrix} s_0, s_1, s_2 \\ s_1, s_2, s_3 \\ t_0, t_1, t_2 \end{vmatrix} \div \begin{vmatrix} s_0, s_1 \\ s_1, s_2 \end{vmatrix} = b_{0:2} + b_{1:2}s_3 + b_{2:2}s_4.$$

The result of eliminating the constants from these equations is

$$f(2x) = \frac{\begin{vmatrix} s_0, s_1, s_2 \\ s_1, s_2, s_3 \\ t_0, t_1, t_2 \end{vmatrix} \times \begin{vmatrix} s_0, s_1, s_2 \\ s_1, s_2, s_3 \\ 1, x, x^2 \end{vmatrix}}{\begin{vmatrix} s_0, s_1 \\ s_1, s_2 \end{vmatrix} \times \begin{vmatrix} s_0, s_1, s_2 \\ s_1, s_2, s_3 \\ s_2, s_3, s_4 \end{vmatrix}}.$$

We have now reached the point where it is possible to detect the law of formation of the series, the final result being

$$f(x) = \frac{t_0}{s_0} + \frac{\begin{vmatrix} s_0, s_1 \\ t_0, t_1 \end{vmatrix} \times \begin{vmatrix} s_0, s_1 \\ 1, x \end{vmatrix}}{s_0 \cdot \begin{vmatrix} s_0, s_1 \\ s_1, s_2 \end{vmatrix}} + \frac{\begin{vmatrix} s_0, s_1, s_2 \\ s_1, s_2, s_3 \\ t_0, t_1, t_2 \end{vmatrix} \times \begin{vmatrix} s_0, s_1, s_2 \\ s_1, s_2, s_3 \\ 1, x, x^2 \end{vmatrix}}{\begin{vmatrix} s_0, s_1 \\ s_1, s_2 \end{vmatrix} \times \begin{vmatrix} s_0, s_1, s_2 \\ s_1, s_2, s_3 \\ s_2, s_3, s_4 \end{vmatrix}} + \dots$$

Let us now apply this method of reasoning to Charlier's Type A curve. It is customary to consider the total area or number of cases involved as a separate factor. We may therefore put  $s_0 = t_0 = 1$ . It is also customary to make the mean value of  $\psi(x)$  coincide with the mean value of the data and to take that value as origin so that we have  $s_1 = t_1 = 0$ . It is also customary to make the second moment in  $\psi(x)$  for this type agree with the final value so that  $t_2 = s_2 = \sigma^2$ , where

$$\phi(x) = \frac{1}{\sigma \sqrt{2\pi}} e^{-(x^2/2\sigma^2)}.$$

Also since  $\psi(x)$  is symmetrical we have

$s_n = 0$  if  $n$  is an odd number. We have also

$$s_4 = 3\sigma^4,$$

$$s_6 = 15\sigma^6,$$

$$s_8 = 105\sigma^8.$$

We might substitute these values in the general expression already arrived at and thus obtain the solution but it is in this case easy to go back to the original equations, make the substitution there and apply the method to the resulting equations. If we do so and put  $\mu_n$  for  $t_n$  since the mean value has been taken as origin we obtain

$$f(x) = 1 + \frac{1}{6} \cdot \frac{\mu_3}{\sigma^3} \left( \frac{x^3}{\sigma^3} - \frac{3x}{\sigma} \right) + \frac{1}{24} \left( \frac{\mu_4}{\sigma^4} - 3 \right) \left( \frac{x^4}{\sigma^4} - \frac{6x^2}{\sigma^2} + 3 \right).$$

This is the familiar expression for the Type A curve.

Turning now to the Type B curve where instead of  $\psi(x)$  we use

$$\psi(\alpha) = \frac{e^{m\alpha}}{\alpha}$$

or transferring to the mean value as origin

$$\psi(x) = \frac{e^{-mx+m}}{x+m},$$

we have here  $s_0 = 1$  and  $s_1 = 0$  as before, also

$$s_2 = m,$$

$$s_3 = m,$$

$$s_4 = m + 3m^2,$$

$$s_5 = m + 10m^2,$$

$$s_6 = m + 25m^2 + 15m^3,$$

$$s_7 = m + 56m^2 + 105m^3,$$

$$s^8 = m + 119m^2 + 490m^3 + 105m^4.$$

Substituting these values in the equations and solving as before we have

$$\begin{aligned} f(x) = & 1 + \frac{1}{2m^2}(\mu_2 - m)(x^2 - x - m) \\ & + \frac{1}{6m^3}(\mu_3 - 3\mu_2 + 2m)\{x^3 - 3x^2 - (3m - 2)x + 2m\} \\ & + \frac{1}{24m^4}\{\mu_4 - 6\mu_3 - (6m - 11)\mu_2 + 3m^2 - 6m\}\{x^4 - 6x^3 \\ & - (6m - 11)x^2 + (14m - 6)x + 3m^2 - 6m\} + \dots, \end{aligned}$$

#### AUTHOR'S REVIEW OF DISCUSSIONS.

MR. A. H. MOWBRAY:

As its title implies it was my expectation that these notes when presented would appear under the caption "Actuarial Notes," rather than with the full dignity of a formal paper. It did not seem to me these brief observations warranted the importance of such a form of presentation. However, I am very glad they have been so published as otherwise the very able discussions presented, especially that by Mr. Henderson, would probably not have found a place in our proceedings.

Both the critics of the paper are so much abler mathematicians than I that I hardly feel I should attempt any reply in detail to the points they have raised.

THE TECHNIQUE OF RATE MAKING AS ILLUSTRATED BY THE 1920  
NATIONAL REVISION OF WORKMEN'S COMPENSATION  
INSURANCE RATES—G. F. MICHELbacher.

VOL. VI, PAGE 201.

WRITTEN DISCUSSION.

MR. A. H. MOWBRAY:

Mr. Michelbacher's paper and my own are so closely related and we worked together so much in preparing them that it is rather difficult for me to prepare much of a discussion of this paper. There are, however, a few points, comment upon which may assist students in understanding the paper.

On page 2, Mr. Michelbacher says, "The procedure of revision is typical and differs only in detail from that which might be adopted for any revision of rates." I am a little doubtful whether this is not a bit too strong a statement. The peculiarities of Workmen's Compensation business have required the development of a very elaborate technique and I doubt whether in many other lines the technique is so highly developed.

In the same paragraph he refers to the methods used in the 1920 revision as "those which have been *established* after years of experimentation." Here again I think it is possible to take this statement as stronger than Mr. Michelbacher really intended. The methods have been established for present use, but I doubt whether they could be considered established indefinitely for the future.

On page 205 discussing the problem of classification Mr. Michelbacher says, "There should be as few classifications as possible." In this statement I heartily agree with him, if due consideration is given to the limitation "as possible." It is true that a substantial volume of experience is necessary to form a statistical basis of rate making but it is equally important that the experience be homogeneous, if it is to yield a dependable indication. Not only that but if the public is to be satisfied there must be no patent inclusion within the classification of risks which might reasonably otherwise be separately classified and which are distinctly better or distinctly worse than the general average of the classification. For example, if an attempt were made to reduce the number of classifications, probably one of the first steps would be to include all of the classifications in Group 461 (Exhibit V) in the same classification as the present classification 3632 (Exhibit IV). Yet a comparison of these two exhibits will show that the pure premiums for

the average of Group 461 are two or three cents less in practically every state, than the experience of classification 3632, which of itself contributes about 90 per cent. of the experience in Group 461, indicating that the classifications forming the other 10 per cent. are distinctly better than classification 3632.

On page 212, Mr. Michelbacher refers to Schedule "W" as "an underwriting 'gain and loss' exhibit" and implies rather than directly states that the sole value of Schedule "W" is the determination of expense loading in matters of this nature. The standard Schedule "W" now also contains a loss analysis feature that was very useful in connection with the projection theory. (See my paper—page 273).

Describing the classification groups on page 217, Mr. Michelbacher says, "The nature of the operations performed is the basis of classification rather than the relative proportion of permanent partial disability and of temporary total disability losses." This is true as to the method of procedure in selecting the classifications which should be included in the group, but as appears earlier in the paper and is more fully dealt with in my own, the reason for making this grouping was because of an expected difference in this respect between the classifications falling into the first group and those of either of the other two. In connection with the foot note on this page attention may be called to the discussion of the same matter in my paper on pages 258 and 259.

On the same page Mr. Michelbacher refers to the Committee having decided to group the experience in accordance with "Manual Classification Code." In my paper I have not referred to this decision primarily because the principle had been in vogue for so long and the actual grouping was not developed by the Actuarial Committee.

On page 218, Mr. Michelbacher refers to the decision to present the material by states and regional sections as well as by the country as a whole. I find that I did not present the reasons for this in my paper; this was an oversight. At previous rate revisions there have been contentions for differentiation between states and regions on the basis of a difference in accident frequency, but no attempt was made to recognize this because statistical data was not available to either prove or disprove this contention. Such data being presently available it was decided to present it in such form as to bring this feature out.

On page 228, Mr. Michelbacher says, as to basic pure premiums, "These pure premiums have no significance in themselves." It is true they have not, yet they are the key to the basic manual and are the "basic set of key rates" referred to on page 251 of my paper. This is well known to Mr. Michelbacher, and most of us closely in touch with the work, but the significance may not always be grasped by the readers not so thoroughly familiar with the way the work has been done.

At the time this paper was prepared as well as my own, the rate revision had not been completed and naturally things that came up after the last meeting of the society could not be fully covered. Probably the two most important were:

1. That in certain states we could not get enough data to use the projection method. It therefore became necessary to use theoretical law differentials as heretofore, but we used them not as flat differentials upon aggregate premiums, but as partial differentials upon partial premiums. We further introduced a certain element of projection by valuing limits of the New York law to which the basic pure premium referred, by the use of a wage distribution from New York state experience on the issues of 1917 and valuing the limits of the law of the other state upon the basis of a wage distribution of the year 1919, in that or a neighboring state.

2. We obtained evidence that medical costs were continuing to increase beyond the latest date to which our experience, even using the projection factor, could bring them. For several states therefore a percentage loading was applied to the medical pure premium to represent this further increase not yet represented in our experience used in the projection data. The amount of this loading was ascertained by comparing the realized increase in the state in question and in New York, on the theory that the increase of New York was representative of the country and that its not being realized in another state was due to slower spread of the movement among the doctors elsewhere.

MR. E. S. COGSWELL:

Mr. Michelbacher has performed a valuable service for the Society in giving us a complete description of the methods followed by the National Council in the rate revision which is still in process. As he states in his paper, this is a very large task, and it is still going on. The work of the revision began in November, 1919, and yet the General Rating Committee still has four or five more states to pass upon before the work will be completed.

In attending many of the sessions of the General Rating Committee it came forcibly to my attention that in spite of the fact that the Council had before it in its work, experience representing nearly Twelve Billion Dollars of payroll and over One Hundred and Sixteen Million Dollars of incurred losses, yet there are many classifications where the rate is based either on insufficient experience or determined largely by judgment. The Council has performed a valuable service in eliminating a number of classifications from the Manual so that the Manual now contains only 953 classifications in place of the 1319 classifications in the former Manual. In this revision only two years experience was used, namely, policy years 1916 and 1917. I think the Council acted wisely in excluding the experience of earlier years as conditions were different from

those prevailing in 1916 and 1917, and considerably different from those prevailing today. If conditions remain stable, however, the experience of three or more years should be used in future revisions as two years experience for a number of classifications does not give a wide enough spread of exposure and a better average is obtained by taking the experience of three or more years.

In attending sessions of the committee I was greatly impressed with the desire on the part of the members of the committee to make their decisions upon the basis of the statistics presented to the committee, rather than on the basis of judgment. The committee on several occasions spent several hours trying to find a statistical basis upon which to make a decision, although any one of the members could have decided the matter by underwriting judgment within a short period of time.

One of the new steps in rate making was the use of the projection method and the comparison of the 1916-1917 loss ratio with the 1919 loss ratio. Mr. Mowbray performed a valuable service by bringing this method to the committee's attention. It is very desirable, however, that careful check be made in the future to see if the actual state loss ratios of the year 1919, after the policies have been audited and the incurred losses determined with a reasonable degree of certainty, are within measurable distance of the loss ratios used by the committee. It is necessary in this connection not only to check the final loss ratios of the combined experience of the companies which furnished preliminary statistics to the committee, but also to determine the final loss ratios of the combined experience of all companies. It is necessary to see if the companies which reported preliminary experience are representative of the business as a whole.

Mr. Michelbacher is correct in saying that the problem of rate making is now exceedingly complex and there is danger of its being over-balanced on that account. The problem of making rates for a state is far more complicated than it was in the old Manual. As the basic pure premium is now divided into three parts it is necessary to translate these three parts to state sectional pure premiums. The translation of the D. & P. T. D. pure premiums requires reference to the Schedule in which the classification is placed as a different factor is used for each Schedule for each state. It is necessary to refer to one of three conversion groups in order to obtain the proper factor to translate the basic D. & P. T. D., All Other, and Medical pure premiums, to state pure premiums. After the state pure premiums are determined, a separate multiplier must be applied to each of the three sections of the pure premium and care must be taken to use the correct set of multipliers for one set is to be used for regular classifications, and another set for classifications subject to schedule rating. Then the sectional rates must be totaled and one cent added for catastrophe to obtain the final manual rate.

Under the old method of procedure where the pure premium was



not divided into sections, one multiplication and the addition of the one cent for catastrophe was all that was necessary to transform a basic pure premium into a state rate. Under the present method of rate making, six multiplications are necessary and the totaling of four figures. This applies to states where rates are based in large measure upon state experience. The problem is a little simpler for a state which has only a small volume of experience and whose rates are made on a theoretical basis.

The Council was very fortunate in having the services of Mr. Michelbacher throughout the work of revision, and the Society is fortunate in having him present his paper which gives a complete history of the methods used.

MR. A. L. KIRKPATRICK:

Until recently, the student of Workmen's Compensation Insurance has had very little available literature with which to study beyond the range of his own daily experience. There are a number of books available which treat largely with workmen's compensation as a social development rather than from the standpoint of the insurance business. The Proceedings of this Society contain numerous papers on various problems of compensation insurance but none has heretofore covered the problem of rate making in its entirety. The printed proceedings of the 1915 conference give little insight into the problem. The proceedings of the Augmented Standing Committee in 1917 as published by the National Workmen's Compensation Service Bureau are a little more complete, but to a person not in immediate touch with such work leave numerous questions unanswered. In Mr. Michelbacher's paper, anyone can follow the recent revision from start to finish and can find an explanation for all of his questions. Further than that it provides a permanent record of the present stage of development of rating procedure and rate making methods.

It is not difficult to understand the vast amount of work involved in such a revision and to appreciate the many problems which arise. Dr. Downey has criticized the method of reducing state experience to the New York level and proposes the revaluation of individual claims on the basis of New York benefits. Perhaps the results would have been more accurate than under the method used. Certainly the work involved would have been increased several fold. As the volume of compensation experience increases, an ever increasing amount of data becomes available and more and more refinement is permitted in the methods used. The question may naturally be raised as to how far these refinements may go before the amount of work and the expense involved become more than the business will permit.

There are two main problems involved in rate making. The first

is to establish the proper relativity between rates for classifications of different hazard so that each industry bears its fair share of the cost. The second is to obtain the correct level of rates in each state thus determining the aggregate premium income from all industries in the state. The necessity for a revision arises out of the fact that both of these elements are constantly changing.

It may be a known fact that one industry is twice as hazardous as another in 1920 and accordingly given double the pure premium, but processes and methods of manufacturing are constantly changing so that in 1922 the relation of 2 to 1 may be entirely incorrect. These changes are much slower, however, than those affecting the levels of loss cost. There are numerous known factors and perhaps others that are not known. Movement in the business circle is constantly changing wage levels, accident frequency and speed with which injured laborers return to work. Changes in the compensation benefits and changes in the procedure of administrative bodies are frequent occurrences. All have a direct bearing on the loss cost and require revision of rate level.

Excepting changes in the compensation law, none of these variables can be measured, until the experience of the carriers is available. Schedule "Z" experience is two years old before it can be used. Loss Ratio experience is not stable for about the same period. In the recent revision, pure premiums were established on the level of 1917 policy year experience. The Actuarial Committee developed an ultimate loss ratio for 1919 policy year using the experience of that year developed to December 31, 1919, and later to June 30, 1920. By this means the gap from 1917 to 1919 policy years was bridged. But that experience is already nearly a half a year old and the rates have been put out in only a few states. Obviously there is need for a method of keeping rates on the current level.

Any policy year experience furnished by the companies is valueless until at least twelve months of the year have passed in order that all deposit premiums and some payroll audits may be recorded and a fairly dependable volume of paid losses accumulated. But it is desirable to get closer to the present state of affairs if that is possible. A calendar year experience is of too doubtful accuracy to be depended upon for rate making purposes. There is no dependable index of loss cost or of premium income except on a policy year basis, and that lags considerably behind present-day conditions.

There are certain indices of general business conditions such as gross railroad earnings, bank clearings, etc. It has been suggested that perhaps there are also indices in the compensation business which could be combined into an index number to measure current cost and income. This line of thought has not been developed very far but it may be pointed out that this method is used only as a qualitative indication and not as an exact measure such as rate making requires.

There have been methods proposed of reporting experience by the companies so that the experience may disclose at once just what is happening in the compensation business. The Actuarial Committee of the National Council is at present working on the problem and it is quite possible that the next general revision of rates will see a more refined method of keeping up with current cost than has been used up to the present time.

“THE ACTUARIAL PROBLEMS OF THE 1920 NATIONAL REVISION OF WORKMEN’S COMPENSATION INSURANCE RATES AND THE SOLUTIONS DEVELOPED BY THE ACTUARIAL COMMITTEE OF THE NATIONAL COUNCIL”—A. H. MOWBRAY.

VOL. VI, PAGE 250.

WRITTEN DISCUSSION.

MR. S. B. PERKINS:

When a participant in committee work attempts to discuss a record of the problems that it has had to solve, such as the record which Mr. Mowbray has submitted of the work of the Actuarial Committee, and particularly where the practice has been to handle each problem in a manner which would meet with unanimous approval, it might be possible to approach the task in an unfriendly and adversely critical way, but it certainly would not be normal. The few comments which follow will accordingly be more in the nature of suggestions of certain elaborations which, in the opinion of the writer, would lend additional value to Mr. Mowbray’s paper, with an occasional recommendation as to the form of presentation.

As one of the objects to be attained in revising the manual, Mr. Mowbray has pointed to the general agreement between the Actuarial and General Rating Committees that there should be: “Right rates in each state—rates accurately measuring the compensation insurance cost of its industries under its law and industrial conditions, or in other words conforming to the closest reasonable degree with its own experience.” Surely there can be no criticism of the effort *per se* to establish right rates in each state. But what are right rates? If one should define them as rates which would over the entire period of workmen’s compensation insurance return to the carriers an amount of premium equivalent to the losses and legitimate expenses incurred, this would seem to be a fair statement. Very probably this is the fundamental idea in the minds of all who attempt to define right rates, but different points of view produce widely divergent results in the form of definitions.

It has been suggested that a period of years, immediately preceding the date as of which rates are to be established, be accepted as the basis to rate-making, with the idea that the comparison of losses and expenses incurred, with the payroll exposed, would produce proper rates. On the assumption that: (1) the relation of losses to exposure depends upon the particular position of current business in a trade cycle; (2) trade cycles are of equal duration

and the correspondent departures from normal are of equal violence; (3) the period over which experience is to be collected, corresponds exactly with the length of a trade cycle, and that, (4) all employers carry insurance continuously, rates established on this basis would undoubtedly comply with the requirements set forth in the original definition. It does not require a second thought, however, to realize the weakness of some of the assumptions.

In the first place there are many trade cycles in operation simultaneously, each the result of a separate set of economic forces. Since 1871 there have been thirteen complete upward and as many downward swings of prices. These have been modified by seasonal fluctuations and in turn have themselves modified cycles of more extended duration which have a little oftener than once a decade resulted in panicky conditions, with resultant complete financial readjustments. We are told that these again are but playing their part in cycles with a period of approximately forty years. It is evident therefore that trade conditions of any particular time are influenced by its relative position in all of these cycles.

Assuming for the moment that for the purpose of rate calculation no cycle of more than a five year period be considered as affecting the immediate problem, on the basis that the addition of a unit of a year's experience, whenever it became available with a corresponding rejection of the experience of the oldest year, would correct with sufficient promptitude the change of rate levels necessitated by the more slowly progressing cycles, there are certain requirements to be demanded of those of shorter periods.

Since compensation is based upon weekly earnings and since each Workman's Compensation Act specifies certain maximum benefits which may be allowed for each kind of injury, one requisite is that at a given phase of each cycle wages shall have returned to the same level. This, however, has not been the case in the past and there are no indications that it will be realized in the future.

For the sake of completing the thought, however, let us suppose that all of the conditions set forth as necessary did exist, and that rates had been established on this basis. We can imagine such a possibility, but can we imagine the state of mind of the large purchaser of insurance who just following a substantial wage increase, is informed that he is entitled to no rate adjustment because it is anticipated that within four or five years the matter will be adjusted by a practical application of economics. Little good will it do to assure him that when conditions were reversed the insurance carriers were accepting their loss with the same promise of future relief. Such might have been the case—would have been under this system of rate-making—but there is grave doubt in the mind of the writer as to how thoroughly the purchaser would be convinced, and further—to the practical point as to how long he would remain a purchaser.

Rate-making for the life actuary must be a pleasure with the mortality experience running along in the even tenor of its way with only the occasional epidemic to furnish the necessary uncertainty. In compensation the "epidemic" is the rule—the "even tenor" non-existent. The whole complexion of compensation business changes with extreme rapidity. A wage increase or decrease effective on a certain date influences the adequacy of the rates in force from the very instant the change is made effective, to the monetary advantage of the carrier or assured depending upon whether the change is upward or downward. In neither case is complete justice done. On the other hand if for any reason a rate is changed, unless it be made effective on all business in force, the effect is not felt in its entirety until every policy then in force shall have expired or shall have had its rates adjusted.

The National Council has recognized this condition and the General Rating Committee has taken a corrective step by adopting a resolution reading in part as follows:

*"Resolved, That the Rating Committee approve in its entirety the plan for the projection of rates from basic pure premiums with the following provisions: 1st—that the Actuarial Committee be instructed to develop the method by which the current level of rates may be promptly modified in the event of changes or other conditions affecting such rates; . . ."*

Workmen's compensation rate-making has passed from the period of flat differentials to partial differentials, from the basis of comparative rate levels to that of individual state pure premiums determined from experience and from the era of conjectural factors to one of statistical analysis.

It is not impossible that a Compensation Cost Barometer may be established, set ahead to forecast conditions during which a given set of rates are to be operative. Very probably indications might differ from industry to industry; possibly even from classification to classification. This is for the future to determine. Certainly if such a Barometer could be successfully established, not only would the conditions of the basic definition be realized, but the burden of the premium would be so distributed for the employer as to more nearly meet temporary economic demands.

Under the caption "The Defect of Former Differential Methods" Mr. Mowbray has outlined the greatest weakness of the "flat differential," and under the caption "The Remedy Proposed" he has apparently presented very briefly the method by which the Actuarial Committee decided to surmount the difficulty, namely, by the use of "partial pure premiums, as for death benefits, for permanent disability compensation, for temporary disability compensation, and for medical and hospital service." This is apt to fix in the mind of the reader the impression that partial pure premiums were actually established for each of these subdivisions, whereas actually only three partial pure premiums were used. If

it did seem necessary to introduce the defects of former methods at this particular point in the paper, the next section might well have been captioned "The Remedy" or, possibly, the whole presentation of the "Subdivision of the Pure Premium" could have been dealt with once and for all.

In closing his presentation of the "Subdivision of the Pure Premium," Mr. Mowbray has quoted from a resolution of the Actuarial Committee in which it states its reasons for treating permanent partial disability losses and temporary losses as a single element of the pure premium. It is significant, however, that in drafting a uniform Schedule "Z" blank for future reportings there was inserted a line for permanent partial (major) and one for permanent partial (minor). The permanent partial (major) has been defined for the purpose of such reporting as

(a) Every permanent injury, not constituting permanent total disability, which involves the loss of sight of an eye or the loss of a hand, foot, arm, or leg;

(b) Every permanent injury involving the impairment to the extent of 50 per cent. or more of a hand, foot, arm, or leg;

(c) Any permanent injury, whether enumerated above or not, which is compensated on the basis of 25 per cent. or more of permanent total disability (or 25 per cent. or more of the full benefit for permanent total disability allowed under the Act applicable thereto).

There is little question but that by far the greater number of permanent partial losses can always be combined with the temporary losses and a conversion factor calculated for the resulting group with a satisfactory degree of accuracy. It seems equally clear that there are a number of permanent partial or even temporary cases of extended duration which, by virtue of the fact that they are individually costly, distort the present "all other" partial pure premium for certain classifications. The remedy would seem to be to accord such cases treatment similar to that accorded death and permanent total cases, namely, in principle, to spread their cost over groups or schedules of more or less homogeneous classifications.

The same criticism may be offered of the section "Conversion by Groups Considered Advisable" as was offered in regard to "The Remedy Proposed," namely, that emphasis has seemingly been laid upon the unmaturing judgment of the Committee. In glancing at the section referred to attention is drawn to the four groups listed numerically, while in the following paragraph there appears a sentence—"It was found, however, that the differences between the factors produced for the commercial and light manufacturing were so slight as to warrant combining these two groups, and this was done reducing the number from four to three." The tentative four groups might have been presented in a less imposing manner and the final three groups given the prominence.

The length of this discussion will not permit a comprehensive review of Mr. Mowbray's treatment of Mr. Greene's formula but, in the estimation of the writer, the technical aspects of the problem might well have been presented as one of two appendices to the paper, the second of which will be referred to later. This would have permitted a descriptive rather than an analytic method of presentation. In the text of the paper might have been included a statement of the underlying assumptions, the limits of usefulness of the formula, the dangers of its misuse, together with some simple examples showing the effect which payrolls and losses independently have on the relation between  $R$  and  $E$  and the actual values of each.

It is obvious that the two errors which appear in Formula (5) on page 266 were typographical where Formula (5) appeared as

$$C_j^m = 1 - \frac{D \frac{\sum L_j}{\sum L_m}}{1 + D} \quad \text{when} \quad (1 + D) = \frac{\sum \left( J \frac{L_j + L_m}{j + M} \right)}{\sum L_j}. \quad (5)$$

It should have been written as

$$C_j^m = \frac{1 - D \frac{\sum L_j}{\sum L_m}}{1 + D} \quad \text{when} \quad (1 + D) = \frac{\sum \left( J \frac{L_j + L_m}{J + M} \right)}{\sum L_j}. \quad (5)$$

The second appendix, mentioned earlier in the discussion, might have been presented in connection with the subject of Projection of Losses. Every carrier is interested in determining as soon as possible, and with the greatest possible accuracy, the loss ratio for the current policy year. As Mr. Mowbray has suggested in the closing paragraph of this section, it would make the paper too voluminous to go into all of the detail involved in arriving at a projected loss ratio for the current year; but, as has been suggested, an appendix outlining the whole procedure, including the method of correction for amendments and rate changes on the losses and premiums reported together with the method of subdividing the projection factor, might be of considerable value to some carriers to whom the process might come as an innovation.

It is somewhat difficult to determine upon reading the two captions "Projection to Present Conditions" and "Projection to Current Level" exactly what phase of the general problem is to be treated in each section. The "Projection to Current Level" might have been extended, using the subject matter under "Projection to Present Conditions" in a modified form as an introduction and with the "Change in Wage Levels," the "Increase in the Medical Service Costs" and "Other Conditions Produced Changed Cost" as subdivisions of the projection problem.

Two outstanding features of the Committee's work were in Mr.



Mr. Mowbray's opinion listed in his concluding paragraphs. In addition to these, the decision to allow each state to determine its own rate level on the basis of its own experience is in my estimation one of the most important features of the whole revision. Mr. Mowbray may have considered this a decision of the General Rating Committee or it may not have appeared to him to be properly listed under the Committee's work. Very probably, it could be considered as being covered in his first item—"The Change in Method of Combining Experience and Translating the Selected Basic Pure Premiums into State Pure Premiums," but it seems of sufficient importance to have been given prominence of "honorable mention."

Reference to the American Accident Table calls to mind that the recent National Council Rate Revision has been the first general rate revision which has been made entirely on the basis of American experience. Another milestone has been passed in the development of workmen's compensation insurance and rating procedure.

#### AUTHOR'S REVIEW OF THE DISCUSSION.

##### A. H. MOWBRAY:

The first part of Mr. Perkin's discussion of my paper is a defense of the present methods of rate making and probably calls for no reply from me. It strikes me that he has put quite clearly the difficulties of long term rate making, desirable as such rate making is in many ways.

Mr. Perkins criticizes the method of presentation of one or two items as tending to mislead the reader as to just what was done. Should this result it would indeed be unfortunate and very far from my intention. The paper, however, was written as a companion paper to that of Mr. Michelbacher's which precedes it in the same number of the *Proceedings* and it was intended to be read jointly with his. Both papers in a measure tell *what* was done in the revision. Mr. Michelbacher's paper was intended to tell, and I think does tell *how* it was done; my paper was intended to tell and I think does tell *why* it was done.

From this point of view it is more important, it seems to me, to give the full theoretical reasoning than the exact process in the few cases where a modification was used as a means of adapting the theory to limited material or short cut the work where trials with the full theoretical process had indicated that differences were insignificant.

Mr. Perkins makes the suggestion that the details of the projection method be more fully dealt with and the suggestion seems good. At the time the paper was written the theory was not sufficiently developed so that all of the important details of application had been brought out. It was therefore deemed best at that time to do no more than outline the theory for the simpler cases.

In preparing the factor for New York we had relatively clear sailing. Aside from sporadic changes of individual classification rates, the rates in New York had remained the same since January 1, 1918. Also the law had remained unchanged during the same period or substantially so. To get the projection loss ratio on 1919 issues, therefore, it was only necessary to make reasonably sure of the ratio of paid to incurred by a study of the record of earlier years and then to select in the light of record of earlier years a ratio of premiums written as recorded at the end of the calendar year of issue to the ultimate earned premiums. This done we could apply the factors directly to the figures as of December 31, 1919, on the issues of 1919 without modification and obtain a reasonable estimate of the ultimate incurred losses and ultimate incurred premiums giving the ultimate loss ratio.

In many states, however, the case was not so simple, the laws had been amended during the calendar year of 1919, affecting the losses under the unexpired portions of policies issued in 1918 and of policies issued in 1919 prior to the date of the amendment and affecting the cost throughout under 1919 policies issued subsequent to the day of amendment. The affect of the amendment therefore had to be allowed for (1) in getting the ratio of paid to incurred losses for the issues of 1918 in order that they might be compared with the earlier years (2) in adjusting the 1919 losses paid to a proper basis for comparison.

As the amendments did not uniformly affect all parts of the pure premium but bore more heavily on some parts than on others it was the judgment of the Committee that the projection factor, which cannot readily be analyzed, should be so determined as to exclude any of the affect of amendment and that the full amendment factor should be used in all states, in other words that the basis for modifying the 1919 paid losses should be to bring them to the basis of a uniform condition throughout the year on the level of the law used at the beginning rather than the end of the year.

In some cases also the level of rates had been changed during the period under review for determination of the projection factor and it is necessary to ascertain what the change in rate level had been and modify the earned or written premiums as the case might be to make them the equivalent of the December 31, 1919, manual rates. The reasons for, and ways of making this adjustment are perhaps sufficiently obvious and require no further comment. The methods of making an adjustment for amendments are more complicated and require a more elaborate statement.

As all losses occurring after the effective date of the amendment are compensated under the new law the first step is to determine the proportion of losses incurred after that date. As the basis for this determination the Committee made two assumptions:

- (1) That the business written was uniformly distributed over the calendar year.
- (2) That the losses incurred were always proportional to the exposure, that is to the volume of business in force during the time these losses are incurred.

To determine the ratio of paid to incurred for the 1918 issues when there was an amendment to the law in 1919 we first found the proportion of the exposure of 1918 issues after the date the amendment became effective and we considered this portion of the losses to be compensated at the higher rates. If we consider the level of the act in effect in 1918 to be represented by unity, the average value of the amendment as "a" and the portion of 1918 exposed after it came into effect as "m," then the incurred losses as reported are  $(1 + am)$  times what they would have been had the law remained unchanged. Therefore we divided the 1918 incurred losses as reported by  $(1 + am)$  to get them to a basis comparable with the payments in 1918. That is under the old law it will be apparent that in working out the ratio of paid to incurred we must always have the same law in mind in dealing both with the paid and the incurred.

In case of amendment within the calendar year with whose issues we are dealing we have

Total losses paid out in calendar year = Losses paid on the basis of the old act—payments on account of losses subsequent to the date of amendment, that is the payments as affected by the amendment.

We may write symbolically

$$Pt = Pt_1 + Pt_2(1 + a_2),$$

where

$Pt$  = Total payments within the calendar year on account of losses issued in such year.

$Pt_1$  = Payments on account of accidents prior to the effective date of amendment.

$Pt_2$  = Payments on the basis of the old act on account of accidents subsequent to the effective date of amendment.

$a_2$  = Average effective value of amendment for period of its effective date to the end of calendar year.

The amendments which had to be considered generally increased the limits on the rate of compensation. An amendment which increased the term of compensation would increase the ultimate incurred loss but not immediately reflect itself in the payments and this would be a difficult matter to adjust. Fortunately we had no such case to deal with and this greatly simplified the work since we would not have to answer the question of the effective value of

the amendment for the period to which it applied, but could take quite readily the actual amendment factor and write our formula

$$Pt = Pt_1 + Pt_2(1 + a).$$

If we now divide through by the payments for the year on the basis of the old act we have

$$\frac{\text{Actual payments}}{\text{Payments basis old act}} = \frac{Pt_1}{Pt_1 + Pt_2} + \frac{Pt_2}{Pt_1 + Pt_2} (1 + a) = W_1 + W_2(1 + a),$$

where  $W_1$  and  $W_2$  are weights proportional to the payments in the two periods on the basis of the old act and  $W_1 + W_2 = 1$ . Hence we get

$$\text{Payments on the basis of the old act} = \frac{\text{Actual Payments}}{W_1 + W_2(1 + a)}.$$

It was found by study and test that under a uniform law in effect through the entire period the distribution of payments throughout the year is independent of the precise terms of the law within the limits of variation found in American practice.

This may seem startling at first, but upon reflection the phenomenon seems reasonable. The variations in American Compensation laws are sometimes in the rate of compensation, that is 50, 60, 65 or 66½ per cent. of wages but so long as it is uniformly either 50, 60 or some other percentage, the distribution of payments throughout the year is not affected by the percentage rate of compensation. The maximum and minimum limits of actual compensation are another feature as to which the laws vary considerably from state to state but so long as the limits remain the same throughout the year these variations will not affect the distribution of payments throughout the year. Our laws also vary with respect to the length of time compensation is extended for serious disabilities. This will affect in the second and subsequent years the distribution of paid losses to ultimate incurred but all laws compensate total disability for more than fifty-two weeks and rarely if at all does the specific compensation for permanent partial disability so vary that it will reflect itself within the first calendar year after the date of the accident and this is the maximum term which needs to be considered when we are considering the question of the proportion of payments on the basis of a uniform act in the calendar year of issue due to accidents occurring before or after a given date therein. Therefore for practical purposes this ratio is independent of the terms of the compensation act, and it will be readily apparent that this fact facilitates the work.

In general the Committee did not find it necessary or desirable to break up the projection factor. But in certain states where the

evidence of increase in cost of medical services collected by the Committee indicated that this increase had not been so rapid as the increase in payrolls, if the projection factor were unity or greater than unity, then the Committee felt it was desirable and necessary to break it up. In these cases the Committee used as the projection factor, applicable to the medical pure premium, the ratio of the respective percentages which the 1919 medical cost and wages bore to the 1917. The projection factor for each of the other elements was calculated by using the weights of the elements in the pure premium so as to bring the average projection factor to the value calculated as outlined above.

In such states a loading on the medical pure premiums was also recommended in anticipation of medical costs rising as they had in other states at least in the same proportion as wages in general. The loading recommended was based upon a comparison of the increase in medical cost in the local state shown by the Committee's investigation and the increase in New York and other states.

In certain states the data was too scanty to furnish a dependable basis for projection factor calculation and in a few others there was a peculiar condition about the experience which made the Committee mistrust the projection factor as calculated. In these states no projection factor was used but it was decided to use a law differential method, calculating, however, separate differentials for each of the partial pure premium divisions, and using a New York wage distribution corresponding to 1917 issues for valuing the limits under the New York law as it stood in 1917, and a wage distribution based upon local conditions of the year of issue 1919 for valuing the limits under the local law. In this way the wage change, at least as well as the statutory differences were brought under consideration. Because they embodied both the elements of translation from New York statute to state statute and at least the wage change part of the projection to present conditions we have referred to these different factors as "Projection-Translation Factors."

The Committee voted to put no loading into the rates for the effect of experience rating because the experience rating plan theoretically should be made to balance and the insertion of a loading to correct for lack of balance in the plan places a charge upon the risks which are not subject to experience rating. In this connection the Committee reviewed the experience rating plan and decided that the premiums be split for application of the plan in accordance with the way the rates were actually made, rather than in general rate groups as heretofore and that the modification factors should be developed on the same principles as employed in the rate making. The Committee felt that this procedure would tend to produce a balanced plan or at least one more nearly so than has been the case heretofore. Such reports as we have received up to the present date of the operation of the plan in New York, seems to indicate this is so.

Mr. Perkins points out a certain confusion in the headings "Projection to Current Level" on page 272, and "Projection to Present Condition" on page 270. The choice was unfortunate; it was in my mind that the head "Projection to Present Conditions" was a general heading for all that followed and I should have seen to it that it was so set up in type as to convey this impression.

Mr. Perkins refers to allowing each state to determine its own level as one of the outstanding features of the present work which he thinks I have not sufficiently emphasized. It has been my impression that notwithstanding the defects of flat law differential system it has been the custom, by means of loss ratios more or less to true up the level of rates for a given state with its own experience, but in the present revision we have gone beyond this and allowed the states own experience to determine the relativity between classifications at least so far as that experience was adequate to do so. This was the result of "The change in method of combining experience and translating the selected basic pure premiums into state pure premiums" which I characterized as the first of the outstanding features of the present revision.

## REVIEWS OF PUBLICATIONS.

RALPH H. BLANCHARD, BOOK REVIEW EDITOR.

*Report to the Right Honourable, the Secretary of State for the Home Department. By the Departmental Committee appointed to inquire into the system of compensation for injuries to workmen, presented to Parliament by command of His Majesty. Published in London, at His Majesty's stationery office, 1920. Pp. 86.*

This Committee was appointed "to inquire into the working of the present system of the payment of compensation to workmen for injuries sustained in the course of employment and to consider and report whether it would be desirable to establish a system of accident assurance under the control or supervision of the state; and to report further what alterations of the law will be required to remedy defects which experience has disclosed or to give effect to their recommendations."

The report consists of an introduction and several main divisions, or "parts," with numerous subdivisions. The first part is historical and deals with the development of the law relating to workmen's compensation and its place among legal remedies for personal injury. Part II deals with the system of insurance which is discussed in three phases, namely: state insurance, the existing system, and conclusions and recommendations. Parts III to XV, inclusive, relate to technical aspects of compensation benefits including the scope of the act, persons entitled to receive compensation, the scale of benefits, methods of settlement and accident prevention. There are also memoranda by several members of the Committee dissenting in one or more particulars from the main recommendations. As an appendix there is given a digest of a working arrangement agreed upon by the Committee and the Accident Offices Association.

The social aspects of the report look toward greater liberality of benefits and improved procedure for effecting settlements.

The report states that 65 joint stock insurance companies do workmen's compensation business with employers having a wage roll exceeding 600,000,000 pounds a year and that their annual premium income in respect of workmen's compensation risk is well

over 5,000,000 pounds. Also that there are about 50 mutual indemnity associations which insure their members against workmen's compensation risk and which pay about 2,000,000 pounds a year in compensation. The majority of employers in several of the most important industries in the country cover their risk by this means.

Of greatest interest to members of this society is Part II which deals with the system of insurance, and it is with this part that the present review deals. The point of view is expressed in the opening sentence as follows: "An important practical problem is how to administer workmen's compensation, so as to insure financial certainty, prompt payment of claims and the avoidance of friction at a reasonable cost." Attention is called to the fact that the system adopted in Great Britain has been that of voluntary organization based on private enterprise, it being assumed that employers will fulfill all the obligations imposed upon them, so that there has been little or no state intervention to secure to the workmen or their dependents the benefits provided by the act. It has also been assumed that employers desiring to insure against their risk will be able to do so on reasonable terms. The agencies from which workmen's compensation benefits are forthcoming are stated to be—

1. Insurance companies doing business on a commercial basis.
2. Mutual associations privately organized and managed.
3. Self-Insurers.

The Committee calls attention to the fact that it is under obligation to consider the desirability of a system of accident assurance, under the control or supervision of the state, namely:

1. (a) The establishment of a state fund, either with a monopoly of workmen's compensation insurance, or in competition with private enterprise, or  
(b) The organization of a state system of mutual insurance.
2. State control of the rates, expenses and profits of insurance companies and of the financial stability of mutual associations and of self-insurers.

#### PART II. SECTION 1. STATE INSURANCE.

It is evident from this section, that the Committee made an extensive study of state fund operations in the United States and Canada, and that both the competitive and exclusive types of fund received serious consideration. The report indicates also that the



systems in effect in Germany, Austria, Switzerland, Italy and other countries were the subject of study. A sharp contrast is drawn between monopolistic state systems and the existing British system. In the words of the Committee "To set up a state system in this country would be the substitution of one system for another. It would not be a mere amendment of an existing system."

With this reasoning as a point of departure, the Committee proceeds to consider whether it is necessary, in order to alleviate the burden of workmen's compensation on industry and at the same time to secure the benefits to which the workman is entitled, to replace the present system with a monopolistic state system or introduce into the existing system a competitive state fund. After hearing many witnesses and considering other evidence on the subject, the Committee concludes that the witnesses representing the trade unions were generally favorable to the monopolistic state fund, chiefly on the ground that the money which goes in profits to the insurance companies would be available for benefits to the workmen. The employers and their representatives, on the other hand, were unanimously against a monopolistic state fund, and urged that it would be more expensive than the existing system, and would work less efficiently and less satisfactorily. The employers, however, did not see the same objections to a competitive state fund. It was suggested that it might rather have the effect of keeping down rates of premium. The Committee argues that the relative cheapness of the state fund results largely from the absence of agents and brokers, whose commission is so large an item in the expenses of private companies. If, on the other hand, the state fund should not employ agents and should passively wait for business, it is the opinion of the Committee that the fund would suffer from the effects of adverse selection.

In deciding tentatively against the establishment of any state system of insurance, the Committee finds it necessary to consider in detail the working of the present system in order to ascertain whether there may be defects which require radical change.

## PART II. SECTION 2. EXISTING SYSTEM.

The first sub-section takes up insurance companies, which are classified as either tariff or non-tariff companies. There are 48 of the leading companies which are members of the Accident Offices

Association and work on the basis of an agreed tariff. There are 17 non-tariff companies which work in active competition with the members of the Accident Offices Association. In addition, there are also certain underwriting members of Lloyd's who transact workmen's compensation business. The report mentions that the only control now exercised over insurance companies doing this class of business is that conferred upon the Board of Trade by the Assurance Companies Act, 1909. This was passed to provide a check upon the promotion of undesirable companies for the transaction of liability and compensation business and, by requiring annual returns, to secure information relative to the financial condition of existing companies. The witness who represented the Board of Trade believed that the powers conferred upon it by the Act of 1909 might well be strengthened in the direction of giving extended powers of supervision and criticism, so that the whole administration of the workmen's compensation business of any particular company might be investigated.

The report lays emphasis on the fact that the financial stability of the principal companies (which do most of the business) is not questioned, nor does it appear that the dealings of the insurance companies with the public have been anything but prompt and satisfactory. The report goes on to state, however, that the revenue accounts of the insurance companies covering the years 1911-1918 disclose substantial profits from this class of business and that employers have had to pay 100 pounds in premium for every 48 pounds paid out in benefits to injured workmen. The report says on this point, "in our view this is wasteful and unsatisfactory. Where a liability created by Parliament makes it imperative for the outstanding majority of employers to cover their risks by insurance, we consider that it is the duty of the state to insure that the business shall be conducted on a reasonable and economical basis." Attention is called to the fact that the premiums are based upon wages, whereas the benefits are subject to limits, so that the companies have derived a profit from the increase in wages to an extent that was not anticipated.

The next sub-section deals with mutual assurance and indemnity associations. These apparently are not conducted along the same lines as in the United States, but it is the opinion of the Committee that the insurance afforded by these associations is the most economical. Membership of associations is composed of employers who are

members of a particular trade association or of firms engaged in a defined trade. Apparently only one association is open to all classes of employers. The manner in which rates of contribution are determined varies considerably. In many cases calls are made upon the basis of the claim experience of the previous year. In others, a premium is charged as in ordinary insurance companies. Another method is to make levies at fixed periods to cover total cost each year. The basis of these assessments is interesting; some being based on wages, others on the number of employes, and, in the case of textiles, upon the number of looms. As a rule, where there are levies there is no classification; where there are premiums different rates are fixed for different processes. The usual practice among the associations is to raise only sufficient money each year to cover the payments to be made during the year. That is to say, they are conducted on the current cost plan. Only a few provide for liabilities outstanding at the end of the year. Any surplus of income over expenditure is carried forward to the next year. The Assurance Companies Act of 1909 does not apply to mutual employers' associations, apparently for the reason that it was not anticipated that these associations would become such an important factor in the insurance of the workmen's compensation risk. In this connection it should be remembered that the act does not provide for compulsory insurance. While the Committee specifically states that no case of default by a mutual association came to its notice, nevertheless it makes a strong point of the principle that these associations should be required to collect *each year* sufficient money to take care of the incurred liabilities.

Sub-section 3 is a discussion of self-insurance. The Committee finds that, in general, the larger employers either carry insurance or are financially responsible for the payment of compensation benefits. The evidence before the Committee leads it to conclude that some form of compulsion is necessary in the case of smaller employers. In this connection, however, it is pointed out that considerably over 500,000 pounds a year is spent on agents' commission by companies doing this class of business. It is reasoned, therefore, that if the insurance were made compulsory much of this expense could be saved. On the other hand, the Committee recognizes the objection which would arise if the employer should be compelled to insure with a company that is making a profit out of the business, and meets the objection by suggesting the exercise of supervision over the rates of the companies.

## PART II. SECTION 3. CONCLUSIONS AND RECOMMENDATIONS.

The chief defects in the present system are found to be: the absence of protection against excessive rates of premium; the failure on the part of mutual associations to set aside adequate reserves for outstanding liabilities; the danger of financial failure of employers who without restriction carry their own risk. To remedy these defects, the Committee is of the opinion that state insurance is not necessary, but that there should be a certain measure of state control. To this end, the following detailed recommendations were made:

1. State supervision of rates with a view to limitation of expenses and profits.
2. Fixing the percentage of premium which may be used for expenses, profits and agents' commissions at 30 per cent.
3. Establishment of maximum rates for triennial periods with permission to grant special rates for exceptional experience, both favorable and unfavorable.
4. The first rates to be formulated by the Accident Offices Association subject to approval by the Commissioner [see No. 11]; thereafter rates to be fixed by the Commissioner himself with the advice of an advisory committee composed 50 per cent. of his own appointees and 50 per cent. of members chosen by the Accident Offices Association.
5. Rates to be based upon the detailed experience of the companies belonging to the Accident Offices Association but the views of non-tariff offices to be taken into account.
6. Triennial revision of rates for the purpose of recovering from or restoring to insurers in particular trade groups the difference between the proposed 70 per cent. loss ratio and that actually experienced.
7. Commissions to be graded upon a basis which will average not over 5 per cent.
8. Mutual associations to be placed under the same obligations as insurance companies as to furnishing information and setting aside reserves for outstanding liabilities.
9. Self-insurance restricted to employers having an annual payroll averaging over 20,000 pounds for three years subject to other restrictions in the discretion of the Commissioner.
10. Insurance compulsory for all other employers subject to the act.
11. Appointment of a commissioner for the control of rates and the supervision of mutual associations and self-insurers; also to have certain other functions.

From the American point of view, the report of this British Committee is of more than ordinary interest because it touches upon problems which are vital to our own system of workmen's compen-

sation. With such matters as state funds, mutual associations, rate regulation, periodical rate revisions, self-insurers, limitations of expenses, and graded commissions, we are not unacquainted. Quite evident it is, and natural, that the findings of the Committee have been to no small degree influenced by the problems encountered under the American competitive system. The question very naturally arises: to what extent may future legislation in the United States be influenced in turn by this highly intelligent study of a situation not greatly dissimilar to our own? That it will have an influence, and an important one, we cannot well doubt.

Great Britain has pursued in relation to insurance such a consistent policy of *laissez faire*, that the proposals of the Departmental Committee must be a matter of general surprise on this side of the Atlantic. The reasoning of the Committee is, however, quite convincing and the new policy to which it would commit the Government is, after all, directed only to a specific class of insurance, and then because of its peculiar character.

In particular, it is to be observed that insurance in some form is regarded by the Committee as a prime essential to the successful operation of workmen's compensation. But in the plan to compel the carrying of insurance the State is to assume a logical responsibility. In the first place, it will see that expenses and profits are maintained at a reasonable level. To this end, there is proposed a maximum expense limitation and a special limitation of the portion of expense which represents remuneration of agents. This has a familiar sound and recalls efforts which have been made from time to time to invoke legislative aid in this country for the accomplishment of a like purpose. Graded commissions which shall average 5 per cent. of premiums are prescribed as a reasonable return to the agent. Just what this would mean in terms of the American agency system, it would be difficult to say. But even allowing for considerable difference in methods of agency organization and production, as between the two countries, does not 17½ per cent., which is the customary allowance in the United States for so-called acquisition expense, compare rather unfavorably with the British suggestion?

Another of the problems presented in the insurance of workmen's compensation, viz., the treatment of the larger employers, is specifically recognized by the Committee in two ways: first, by the scheme for graded commissions, and second, by permission to

qualify for self-insurance. The interesting thing about the latter is that risks which in this country would not (from the standpoint of annual payroll) be regarded as particularly large are permitted, under certain restrictions, to become self-insurers. The line is drawn at the point where the annual payroll averages 20,000 pounds for three years, or less than \$80,000.00 at present exchange rates.

One cannot help wondering how, in practice, the triennial revision of rates will operate retroactively upon those employers whose rates may prove to have been inadequate for the triennial period. Doubtless this feature will require to be covered by a contractual arrangement between employer and insurer. Even so, there would seem to be practical difficulties ahead as to those employers who in the interim may fail or retire from business.

The report gives evidence of painstaking investigation, and its conclusions must be regarded as, in the main, sound and logical. On no economic phase of the problem do the recommendations misplace the emphasis. The beneficiaries of the Act are given first consideration by provisions designed to make insurance compulsory, and to keep it safe. The employers are then protected against excessive cost, and finally the insurance companies, themselves, are given opportunity for rendering their services under conditions which should vouchsafe to them a reasonable degree of prosperity.

HARWOOD E. RYAN.

*Marine Insurance.* WILLIAM D. WINTER. McGraw-Hill Book Co., Inc., New York, 1919. Pp. xix + 426.

*Marine Insurance.* SOLOMON S. HUEBNER. D. Appleton & Company, New York, 1920. Pp. xiv + 257.

With the revival of the American Merchant Marine has come a natural revival of interest in marine insurance. We, therefore, have these two new books upon the market dealing with the subject.

Mr. Winter is Third Vice-President of the Atlantic Mutual Insurance Company of New York (exclusively marine insurance) and has been a special lecturer on marine insurance in New York University. In his Preface he says that the book is a publication of material contained in lectures delivered at New York University.

Mr. Huebner is Professor of Insurance and Commerce in the University of Pennsylvania and an expert in insurance for the U. S. Shipping Board and other governmental bodies. His book is the second volume of a series of manuals dealing with the business of

ocean shipping and transportation prepared in accordance with the general program outlined under the auspices of the Federal Board for Vocational Education and the U. S. Shipping Board.

On first consideration there would appear to be little reason why casualty actuaries should concern themselves with marine insurance, and therefore this review may seem out of place. This is hardly a long-range view. Marine insurance has a large historical interest as the branch of the insurance business first undertaken and has a claim upon our attention from this point of view, if from no other. But it has other claims. In some respects—underlying as it does the credit structure of international commerce—it is the most important, commercially, of all branches of insurance. Considering the types of coverage and the conditions insured against, it is probably the most complex. In the entrance of the personal equation it has considerable resemblance to bonding and other lines which come distinctly within the field of the casualty actuary. The business is highly—in fact internationally—competitive. It has suffered from the effects of rate wars, yet Professor Huebner gives some excellent reasons why it might be dangerous to attempt rate regulation. Accurate statistics of certain kinds are kept, yet rate-making statistics of the type we have, for example, in workmen's compensation, appear to be almost entirely lacking. In the necessity of recognizing differences in practices of shippers with regard to packing, etc., it is necessary to resort to something closely resembling merit rating although, as all through marine insurance ratemaking, this is a matter of personal judgment with the underwriter rather than a supervised application of a carefully formulated plan.

Both works are excellent textbooks for one undertaking the study of marine insurance. Read together there is a rather sharp difference in point of view which appears at once. Professor Huebner is an economist, publicist and teacher. His book is written from this point of view—that of an onlooker from the outside. He approaches the subject by first considering the nature and functions of marine insurance in general economic life. He then considers the types of underwriters and types of policies, proceeding through that to an analysis of the policy contract and a discussion of the methods of conducting the business, closing with a chapter on ratemaking, in which the various hazards which create perils insured against are conconsidered. In the appendices are types of policy forms and

various other documents which will assist the student, and at the close of each chapter there is a schedule of references for supplementary reading.

Mr. Winter approaches the subject from the standpoint of an underwriter engaged in the actual practice of marine insurance. After a brief but very interesting historical introduction, in the course of which he points out the rise and fall of American marine insurance in the past and the reasons for it, he goes on to a consideration of physical and commercial geography in their relation to marine insurance; then discusses the various types of ships as such; then the ship as a cargo carrier, indicating as he goes the various points to be considered by an underwriter in dealing with the assessment of premiums and selection of risks. Following this he discusses the policy contract and then the various types of special forms of contract and other matters relating to the practice of insurance. As in the case of Professor Huebner's book, there are full appendices containing the various forms referred to in the text.

The specialized point of view of each writer makes the books, although covering the same ground, in some respects complementary to each other, and either is well worth the time expended if one is interested in studying this phase of the insurance business.

A. H. MOWBRAY.

*Metron*. Padova, Italy, July 1, 1920. Pp. 190.

*Metron* is a new quarterly international review of statistics. The first number bears the date of July 1, 1920. It is published in Italy but articles are accepted and printed that are written in either Italian, English, French or German.

The program presented in the first number states the purpose of the magazine to be the making available to statistical students generally of statistical methods and significant results in whatever field and country they may appear. *Metron* is essentially a magazine of statistical method; it does not purpose to gather results for their immediately practical importance but as illustrating the development of statistical method.

This is a legitimate and valuable field for cultivation. Diverse as may be the subject matter to which statistics are applied the methods will largely be the same. A method that has proved valuable in the treatment of a molecular problem may be equally valu-



able when applied to the field of biology or actuarial science. The problem of correlation for instance involves essentially the same principles in whatever field it may occur.

While to a considerable extent this purpose is also the purpose of all statistical journals, the explicitness of its purpose and its international character give *Metron* a particularly valid reason for being.

Of the ten articles in the first number five are in Italian, two in English, two in French and one in German; three are directly concerned with statistical method, one with entomology, one with eugenics, one with population, one with economics, one with physics, one with horse-racing and one is a biographical note.

Articles and reviews are solicited. The editor is Professor Corrado Gini, Department of Statistics, University of Padova, Italy. Articles may also be sent to the member of the Editorial Committee representing the writer's country; the American member is Dr. Raymond Pearl of Johns Hopkins University, Baltimore, Md.

Subscriptions should be addressed to the *Industrie Grafiche Italiane, Rovigo (Veneto)*, Italy.

ALBERT W. WHITNEY.

*Second Report of the Committee on Foreign Inquiry.* National Civic Federation: Social Insurance Department. New York, 1920. Pp. 164.

In 1914, this Committee submitted its first report,\* and in it explained in detail the various features of the British National Health Insurance Act and the methods of administering the insurance. The Committee criticised the financial scheme of the act, the actuarial calculations upon which it was based, the character and administration of the medical benefit, the provisions for sanatorium and maternity benefits, the provisions for casual and itinerant laborers, the position of deposit contributors, the failure of the plan for voluntary contributions, and in other particulars. The Committee then concluded that final judgment would have to be suspended pending further experience, that its impression was most unfavorable and that the prospects were gloomy both for the taxpayers and the insured.

\* "Report of the Committee on Preliminary Foreign Inquiry, Social Insurance Department," National Civic Federation, November, 1914.

In this second report the Committee concludes, with respect to the British health insurance system, that "since our investigation in 1914 some features of the administration of the health insurance have been improved, but its methods of administering the benefits have been found essentially defective and unsatisfactory, so that it is necessary, in some way not yet determined, entirely to reorganize and in effect to start all over again, experimenting as at the beginning. The original income provided has been shown to have been insufficient to obtain the medical and sanatorium benefits promised, and the recent abnormal rise in prices has thrown the cash benefits out of scale, so that an entire reorganization of the financial plan is necessary; and in proposals for such reorganization there are indications of a disposition to abandon any settled plan of finance and to muddle along experimentally, incidentally calling upon the taxpayers for more and more aid, thereby more and more confounding the insurance with poor relief. As to many details, such as malingering, the problem of the casual laborer, expulsions, etc., the abnormal conditions during the war have prevented the accumulation of any conclusive experience. . . . Under the circumstances, it seems to this Committee that the test in Great Britain of the expediency of compulsory health insurance is just about where it was six years ago, and that the most favorable conclusion possible is a further suspense of judgment."

Subsequent to the preparation of this Report the National Health Insurance Act of May 20, 1920, was enacted.\* In the opinion of the Committee the Health Insurance Act of 1920 "does not reframe the whole insurance system with a view to remedying its many faults and imperfections, but is merely a piece of temporary tinkering on a few points only" (p. 36).

In addition to this report on British Health Insurance, the publication contains chapters on: Brief Review of European Social Insurance Experience; Low Level of European Compulsory Insurance; Social Insurance and the American Wagerworker; Proportions of the Indigent Class in the Old World and New; Study of

\* For a summary of the Act see "First Annual Report of the Ministry of Health," 1919-1920, Part IV—Administration of National Health Insurance, 1920 (cmd. 913) and "*Monthly Labor Review*," United States Bureau of Labor Statistics, Sept., 1920, pp. 1-11. The British Unemployment Insurance Act of August 9, 1920, was discussed in "*Monthly Labor Review*," September, 1920, pp. 165-169.

Unemployment Insurance, with Particular Reference to British Experience; Proposed Swedish Sickness Insurance.

In the chapter on "Social Insurance and the American Wage-worker," Mr. J. W. Sullivan states that the opposition of the American trades-unionist to compulsory health insurance is "that the worker should have free choice as to the form, amount and methods of his insurance. No abridgment of the free exercise of the right of the wageworker to look after his own affairs should be permitted. Working men are not to be made the wards of any other social element, nor of all others combined." Mr. P. Tecumseh Sherman's description of the British Unemployment Insurance Law will be of interest to members of our society who have given thought to the subject of unemployment insurance in America. With regard to the actual working of the Act up to the time the report was prepared, Mr. Sherman says: "On the financial side, the income has largely exceeded the outgo, leaving a tremendous surplus for periods of depression. But unemployment has been abnormally low in all the trades covered ever since the law took effect, except for a very short period just after the outbreak of the war, and therefore the experiment cannot yet be deemed to have passed its financial test." In his review of the proposed Swedish Sickness Insurance Law, Mr. Hoffman outlines the plans of the Swedish Government Committee appointed to inquire into the advisability of a system of compulsory insurance. This Committee said:

"1. Compulsory sickness insurance must include the larger part of the population and not be limited to a special class, such as wage-earners or laborers. All such persons as are included must be 16 years of age or over, and the protection is to extend to members of the families of the insured, and not, as in England, to be limited only to the wage-earner himself.

"2. The entire cost of the insurance, unless otherwise provided for, is to be paid by the insured, plus a grant from the State. Employers are to pay contributions only in the case of occupations involving some hazard above the normal, or in occupations clearly identified as being health injurious.

"3. The country is to be districted for administrative purposes; each district is to have its own Fund.

"4. The benefits are to be cash payments during sickness, and medical attendance, including medicines, for every member of the family. A maternity benefit, including medical attendance, cash payments and a provision for nursing, or a money payment in lieu thereof. No provision is made for funeral benefits, as under the English law."

In closing his comment upon the Swedish law, Mr. Hoffman says: "The report fails in clearly realizing the many administrative difficulties of a largely artificial state of affairs created by a law not in conformity to a rational social and economic development, but enacted in response to visionary theories of social reform. . . . The Swedish Committee probably represents as high an order of official intelligence as could be brought to bear upon the question under consideration. But so long as the premises are false and misleading, the results cannot be satisfactory. The vice inherent in all legislation of this kind is ignorance of or indifference to the fact that the real objective of the proposed legislation is an insidious modification of the poor law or the establishment of a system of relief in the disguise of insurance."

So much for an outline of the contents of the report. It is doubtful whether any of our members will want to read any of the chapters except the one on Unemployment Insurance and the discussion of the Swedish Sickness Insurance Proposal. Most of what is said in the report, outside of the matter descriptive of the recent working of European social insurance, has been said before. There is an enormous literature of health insurance controversy, and this is most unfortunate. To one who has followed as closely as possible health insurance discussions of the past fifteen years, it does seem that the introduction of legislation for compulsory health insurance is rather premature, considering the lack of reliable information on the prevalence and gravity of illness, on existing measures of medical and surgical attendance, nursing, hospital facilities and medication, and on the economic and social effects of sickness. So far, the great volume of health insurance debate has been merely an elaboration of opinions from two points of view. First, we have had more or less colorful statements of the purposes and accomplishments of compulsory health insurance, chiefly in Germany; second, we have had counter-opinions by a group of economists and insurance technicians who are opposed in principle to the introduction of anything savoring of the German system. Neither of these groups has had any consideration for the time of insurance students who have tried to keep up with the flood of propaganda and counter-propaganda on this question. Occasionally a student here or there would advocate a compromise or middle ground position. But nowhere in the literature is there a collection of authoritative data on sickness and its consequences

which would really throw light on the issues of social necessity and policy involved.

Some of the state commissions appointed to investigate health insurance have published fairly good superficial statistics on sickness and its consequences, but even these assembled data are not adequate. The health insurance problem should be examined by an impartial committee of persons skilled in social inquiry and analysis. Such a group should be representative of the several societies interested technically in one aspect or another of the sickness problem. A statement of the committee should be drawn and offered to the state commissions on Health Insurance. Such a statement should comprise, first, a schedule covering current activities of governmental and private agencies within the state at work upon problems of the prevention, treatment, care and social consequences of illness. Such information will enable legislators to place a true value upon the sciences of preventive medicine and social amelioration, and will prevent tampering by mere dilettante propagandists with well-grounded governmental activities and with existing voluntary thrift enterprises.

The second schedule should bring out data on the prevalence of serious sickness so as to show the incidence and gravity of disability in the several classes of the population and possibly indicate the extent to which the individual, industry or the community are responsible for sickness and its consequences.

A third schedule could deal critically with prevailing facilities listed on the first schedule for treatment, medical attendance, economic assistance, institutional or domiciliary care, nursing and medication.

A fourth schedule ought to show the facts for the economic consequences of serious sickness, the effect of wage-earners' disability upon family life and upon the national economy. It is suggested that perhaps our Society should be requested to take the lead in drafting such schedules of social information, in order that the administrative and actuarial structure of health insurance may rest upon a sound foundation of fact, and that the mistakes of policy and administration found in European systems may be avoided. One result of the practical application of these four schedules would be to eliminate the mass of mere opinion which today finds its way into the periodical literature and into the waste basket of the insurance student.

E. W. KOPF.

*Health and Accident Insurance Policies Under the Standard Provision Law.* THOMAS P. NELSON. Blued Printing Co., Madison, Wisc., 1920. Pp. 105.

The book is divided into two parts, Part I giving the argument of the author for the form prepared as a Standard Health and Accident Policy Form, and Part II being a discussion of the criticisms and objections made to the Standard Form by insurers. Obviously the views of the people who are engaged in drawing policy forms do not agree with those of the author in regard to the many points which are discussed.

The Standard Provisions Bill is a result of the work of various committees appointed by the National Convention of Insurance Commissioners to make a study of the situation as will be seen from the following extract from the report: "The final report of the committee of the Commissioners' Convention was made in 1912. Conformably with a resolution adopted unanimously at the time the committee made its partial report, directing the committee to 'continue its investigation both into the facts and of proposed remedies and when such investigation is, in its judgment, substantially completed, such committee prepare the draft of a proposed uniform bill that will carry out its conclusions,' the committee presented a Standard Provisions Bill, governing health and accident insurance companies, perfected through the efforts of the special committee, a subcommittee, and the active cooperation and assistance of the committee of the companies operating in this field. The report was unanimously approved by the Commissioners' Convention and has been enacted in more than thirty of the states as the Standard Provisions Law."

Part I of the report contains a discussion of the various benefits provided under the Accident and Health Contracts as now issued by the various companies.

The author has the following to say in regard to the classification of risks: "The urgent need in the health and accident insurance business to-day is some well planned method of collecting and collating the data to obtain the cost of insurance. It is obvious that the present methods of conducting the business with no common basis for ascertaining such data cannot furnish them." The Standard Plan of compiling Health Statistics which has been adopted by the Bureau of Personal Accident and Health Underwriters is an important step in this direction.

E. S. FALLOW.

*Third Party Insurance.* MARTIN P. CORNELIUS. Insurance Field, Louisville, 1920. Pp. 297.

Third Party Insurance "means the insurance against liability imposed by law upon an individual, firm or corporation by reason of injuries to person or property sustained by a third person on account of a specified activity of the assured" (p. 9). This book will be of chief use to members of the Society and to students who desire a brief, accurate statement of the coverage afforded by the various contracts written to insure against the hazards indicated in the definition, and of the units upon the basis of which rates are quoted. It may also be found valuable for its concise treatment of the underwriting and claim work incidental to handling such business. It would have been highly desirable for the author to have confined himself to these subjects for he is apparently less familiar with other fields. He also has the disadvantage, common to writers on workmen's compensation insurance, of describing at length a rate structure no longer in use.

Objection might well be raised to the inclusion of the material in the first chapter, most of which is irrelevant to the subject of the book; and likewise to the discussion of Collision Insurance which is not a third party coverage at all.

Attention should be called to several inaccuracies. It has been pointed out at a meeting of this Society that "law of average" is not an accepted term, but it has been used rather widely as synonymous with the "theorem of large numbers" and certainly has been given no such content as that implied in several sections of the present work where the term is used to indicate certain "laws" determined by the examination of classification experience, different "laws" being applicable under varying conditions. It is stated (p. 16) that "in both marine and fire insurance, it is customary to issue what is known as a valued policy." Valued marine policies are often issued and valued fire policies are written on automobiles and in certain other specialized uses but by far the major part of the fire insurance business is done under the non-valued form. Again (p. 45) "the insurance contract . . . is unilateral, that is to say, its form is in practice determined solely by one of the parties." Williston in "The Law of Contracts," Vol. I, § 13, defines the unilateral contract as one "where only one party promises performance, the consideration from the promisee being actually given." In a footnote the same authority says that the

term, as defined, is "now in common use in the reports." On page 149 it is stated that "all of the compensation acts require the employer to give some sort of guarantee of his ability to make payments of the indemnities provided for." This is not true of the acts of Alabama, Alaska, Arizona, Kansas, Louisiana, and Minnesota. The author says (p. 150) that in states having monopolistic state funds "the employer must either give evidence of his financial responsibility or insure with the state fund." This is true of Ohio and West Virginia but in the other five monopolistic states, insurance in the state fund is compulsory in all cases. It might be inferred from the statements (p. 214) concerning merit rating that it is applied generally to third party risks, although this is, of course, not true. Following the statement (p. 219) that "no one would think of fixing life insurance rates upon the basis of mortality incurred in a single state no matter how large that mortality experience might be" it is implied that compensation rates should not be predicated on the basis of experience from a single state where national experience on the same classification is available. Exception may be taken both to the statement and to the implication. It is stated (p. 225) that "schedule rating . . . gives no effect whatsoever to moral or intangible factors." Perhaps it *should* not, but it does.

The arrangement of the text is such as to require frequent reference, in reading the later chapters, to earlier statements. This might have been obviated, in large part, by discussing the law of liability and of workmen's compensation before treating the contracts covering liability arising under the law. The addition of a comprehensive index covering the entire book would be of assistance.

RALPH H. BLANCHARD.



## CURRENT NOTES.

C. G. SMITH, CURRENT NOTES EDITOR.

(The Editor wishes to acknowledge the cooperation of the following persons who have contributed material to this Department: G. D. Moore, B. D. Flynn, H. E. Ryan, L. S. Senior, S. B. Ackerman, R. H. Blanchard, A. H. Mowbray and Ambrose Ryder.)

## WHAT IS HAPPENING IN THE CASUALTY INSURANCE FIELD.

*Group Life Insurance:*

The report of the Insurance Commissioner of Massachusetts covering the calendar year 1919 presents the following exhibit of group insurance in force on December 31, 1919:

Companies operating in Massachusetts.	Outstanding Dec. 31, 1919.	Per Cent of In- crease over 1918.
Aetna .....	\$239,280,026	67.65
Connecticut General .....	44,185,027	153.07
Equitable .....	325,956,875	53.47
Metropolitan .....	136,262,976	131.24
Prudential .....	31,159,390	75.88
Travelers .....	301,783,870	119.97
Total .....	\$1,078,627,764	83.94

*Personal Accident and Health Insurance:*

## (1) Uniform Statistical Plan.

The need for a uniform plan of keeping personal accident and health statistics has been apparent for years, but was perhaps brought more forcibly to the companies' notice during the epidemic of influenza—the epidemic having occasioned a sharp rise in the health loss ratio. This, among other reasons, accounted for a persistent demand by a number of the members of the Bureau of Personal Accident and Health Underwriters for an endeavor to arrive at a table of adequate rates based upon statistical knowledge. As a call for the experience proved the utter lack of information or lack of uniformity in keeping the statistical data, the Committee of Five on Statistics of the Bureau was authorized to draw up a plan and submit it forthwith.

The plan for the health section has been completed and will be-

come applicable to new and renewal policies issued and effective on or after January 1, 1921. It provides for the use of either written or punch cards, and codes in complete form are included in the plan as follows: State, Occupation, Class (Accident Hazard), Policy Form, and Disease. Considerable time was spent by the committee in regrouping the classifications of occupations. Analogous occupations were combined in order to obtain as large an exposure as possible for each group. In making the code the committee kept in mind both accident and health insurance so that the one code might be used in compiling statistics for both branches of insurance. The disease code has been revised and grouped according to the part of the body affected.

The Writings card will contain the policy year, State, age, occupation, class (accident hazard), policy form, original principal sum, original weekly indemnity, term in months, premium and sex. The Loss card will contain the following data: policy year, State, age, occupation, policy form, month illness began, disease, total indemnity (*a*, days, *b*, amount paid), partial indemnity (*a*, days, *b*, amount paid), medical expense (hospital, surgical, nurse, medical treatment), original weekly indemnity.

With the information compiled from these cards the Committee is confident that any rating problems arising in the field of personal health insurance can be readily solved.

The Committee has already made rates for the elimination of from one to thirteen weeks disability in both personal accident and health insurance based upon claim frequency tables by days of disability. This only served to demonstrate to the Committee the value of the statistics for the purpose of underwriting. The accident table is based on an analysis of 97,793 accident claims reported to the Committee by the Bureau members and the health table on 76,588 health claims similarly reported.

As time goes on it is to be hoped that considerable progress will be made in arriving at the underlying factors of this very interesting form of insurance. The next problem before the Committee will undoubtedly be the completion of a uniform personal accident statistical plan.

## (2) Non-Cancellable Insurance.

Although the above form of insurance has for a number of years been written by insurance companies in Great Britain, it is only

within the past year or two that it has gained any prominence as a branch of accident underwriting in this country.

The active solicitation of this business by several companies in the past year and the resulting interest by the agents of all companies has brought the attention of all accident company managers to the question as to whether or not they should take up this comparatively new form of underwriting.

Because of the many and apparent dangers of precipitous entry of companies into this new field, the Bureau of Personal Accident and Health Underwriters has undertaken a thorough study of the many problems involved. An Underwriters Committee and an Actuarial Committee have been appointed by the Bureau to take up this work. Only one or two meetings have been held thus far, but the attendance at these meetings has shown the great amount of interest which the subject has in the minds of accident underwriters at the present time.

It is expected that in the course of a few months, the above committees will be able to report recommendations with regard to safeguards in underwriting, and also bases of premium rates and reserves. It is expected, also, that the accident companies will gladly adopt these recommendations, in view of their appreciation of the dangers involved if this new line of business is not placed upon a sound and scientific basis.

*Rate Revision—Group Accident and Health Insurance—(Non-occupational Accident):*

New rates, based upon the experience of the companies writing the above form of insurance, have been promulgated effective at the beginning of 1921.

The experience of the companies in 1920 has shown the necessity for higher rates. While the increased cost of insurance may have been due somewhat to the recurrence of the influenza epidemic in the early part of 1920, the experience accumulated showed clearly that this had but a minor effect, taken as a whole.

Group Accident and Health experience indicated, just as sickness experience in Commercial lines has indicated, that the estimate of the cost of this form of protection had been placed too low. The most important change has been in the rate for women employees. The cost of this form of insurance for women will now be practically double that for men employees. It has been found that

not only the number of claims by women are much larger than by men, but the average term of disability is longer. The indication of increased insurance cost for women employees thus confirms the results of other experiences—as for instance, the Leipsic Community Fund experience.

It is felt by all companies writing this form of insurance that the development of this comparatively new form of underwriting must be undertaken with great caution. The experience of the past year has disclosed many important factors bearing upon underwriting practice and insurance cost. It is hoped that by the end of the year, further analysis of combined experience will throw greater light upon the many complex problems still unsolved, and that a surer basis can then be established for safer development of this line which many underwriters believe will assume an important place in future years.

#### *Aircraft Insurance:*

The National Aircraft Underwriters Association at its recent annual meeting made an arrangement under which the Underwriters Laboratories is prepared to classify airplanes as regards their engineering and structural features, with particular reference to the conditions under which insurance may be granted. The National Aircraft Underwriters Association has five active members consisting of companies actually writing aircraft insurance and seventeen associate members consisting of companies which contribute to its support and receive the information it compiles. Most of these are companies which may eventually write aircraft insurance and want the experience of other companies on the line, but a few are leading life insurance companies which want the pilot records and the fatality and accident experience for use in their business.

#### *Workmen's Compensation Insurance:*

##### (1) Some General Remarks.

Recent developments in this branch of insurance include the completion of the general revision of rates by the National Council on Workmen's Compensation Insurance, the endorsement by insurance carriers of all classes of both the principle and the form of future legislation for the regulation of rates and the advancement of a proposal for rate administration through regional rating

and inspection bureaus under non-partisan control and under state supervision.

These matters are of interest here both because they deal with one of the principal insurance lines falling within the scope of the Society's purposes and because so many of our members are connected with insurance organizations that are directly affected.

So much has already been said concerning the 1920 rate revision, that it would serve no good purpose to consider it in detail here. It is the opinion of Mr. Albert H. Mowbray, under whose direction the actuarial work of the revision was conducted, that the four chief problems which confront the technical men of the workmen's compensation business are the revamping of the classification system, the development of some method which will enable readjustments of the rate level to be promptly made, the simplification of ratemaking, and the placing of schedule rating on a sound theoretical basis.

It is of interest that there is at this time practically no expressed opposition to state regulation. On the contrary, there seems to be unanimous agreement so far as supervision as to adequacy is concerned. At a recent meeting of the National Convention of Insurance Commissioners a measure was proposed for general introduction in those states which have not already adopted rate supervision. The proposed bill provides for the usual filing of rates with the Insurance Commissioner and requires his approval with regard to adequacy. This provision applies to the basic rate and to any merit rating system proposed for use within the particular jurisdiction. The bill further provides that merit rating in the case of specific risks may be applied only by a regional rating bureau approved by the Commissioner "for the uniform and impartial application thereof."

This is probably the first time that the regional bureau idea has been recognized in a proposed legislative measure, although it has been much talked about during the past year. What it contemplates is the consolidation of rating and inspection functions in such a way that several states may be brought under the administration of a single bureau. It is expected by this means to avoid the necessity of establishing independent rating bureaus in every one of the states; the underlying motive is to secure greater economy and better administrative control. It is not expected that any of the older compensation states which are sufficiently important, industrially,

to support an independent rating organization, will be brought under the regional plan. Rather, the proposal applies more especially to the newer and smaller compensation states, although if the plan materializes there will doubtless be some readjustment of the rating arrangements in a few of the other states.

The proposed legislation for rate supervision and the plan for regional bureaus were both subjects of discussion at the annual meeting of the National Council, which was held in New York on December 10. The meeting was attended by insurance carriers of all types from various parts of the United States, as well as by the managers of various rating organizations affiliated with the Council and by supervising insurance officials.

(2) Voluntary compensation for maritime risks.

"Elective" and "compulsory" are familiar terms to the student of workmen's compensation laws and practices. It is well-known that the "elective" form has been invented by legislatures to overcome the conservatism of courts and their reluctance to accept as constitutional the theory of compensation when applied to accidents in industry without fault on the part of the employer. In effect, under an "elective" law the employer, when faced by the alternative of either accepting the law and insuring thereunder or being deprived of the common law defenses, finds himself "between the devil and the deep sea" and the so-called election becomes a "legal fiction" good enough to satisfy the minds of the constitutional jurist.

More recently, however, it has fallen to the lot of the compensation underwriter to devise a new form of cover described as "voluntary compensation" which differs from the "elective" form in that it presents a real and not a fictitious choice to the employer. This form of cover has come into being as the result of the U. S. Supreme Court decision in the case of *Stewart vs. Knickerbocker Ice Company*, which decision denies the benefits of state workmen's compensation laws to maritime employees. An employer who, notwithstanding this denial, desires to extend to his employees the benefits of the state workmen's compensation law may do so by accepting an endorsement to the standard form of workmen's compensation policy under the provisions of which the company obligates itself to settle all cases on the basis of the scale provided by the state compensation law whenever the injured employee or

his dependent is willing to accept such settlement. Under the provisions of this endorsement the employee or his dependents have a choice of remedies, viz., recovery under employers' liability acts, under admiralty law, or as a beneficiary under the provisions of the "voluntary compensation" endorsement referred to.

This cover at present has been made applicable to stevedoring and vessel risks and it remains to be seen whether in practice employers will really avail themselves of this opportunity to exercise the choice of accepting compensation where they are not forced to accept it by the usual legislative club.

The rates for this form of cover have been pitched slightly higher than for the regular legal compensation cover for the reason that in the opinion of underwriters the fact that the employee has a choice of remedies after the event will make the loss cost higher than under "compulsory compensation" where only one remedy is afforded to the employee. It would be well if the actuarial departments of the companies would devise a method for ascertaining definitely the truth or falsity of this theory, provided, of course, that the number of risks covered under "voluntary compensation" will be sufficiently large to afford a proper field for the investigation.

### (3) Excess coverage for self-insurers in New York State.

The practice of granting so-called catastrophe cover to self-insurers has caused considerable alarm in certain quarters and has led some to question the legality of the practice and the jurisdiction of the state insurance department in the matter of rates. Some authorities hold that catastrophe cover to self-insurers, being only partial cover against workmen's compensation losses, is not permissible under the provisions of the workmen's compensation law. Others maintain that the self-insurer is a recognized insurance carrier under the law and that any insurance company has the right to extend to such carrier re-insurance in the form of catastrophe or excess cover without being subjected to any regulation by the state department.

The agents of stock insurance companies are naturally opposed to this form of underwriting by their home offices, and the mutual companies appear to be likewise disturbed over the prospect of the possible extension of self-insurance. The fact that there is no exact definition as to what constitutes catastrophe cover, and

the absence of legal regulation, makes it theoretically possible for the self-insurer to transfer the largest part of his responsibility to a reinsuring company, retaining only a negligible amount, somewhat akin to the limited responsibility retained by an assured under the deductible average clause of the collision feature in an automobile policy. The extension of the practice may, of course, produce the effect of avoiding the state laws created for the purpose of maintaining rate adequacy.

If the state is to maintain its authority over compensation insurance rates the need for limiting the practice to a legitimate field is apparent. The cover should be restricted in its application to protection against the hazard of catastrophe losses, and the term "catastrophe" should be reduced to an exact definition. Also, the re-insuring company assuming the catastrophe hazard of a self-insurer should be in a position to quote rates based upon statistical information.

(4) Report 1920 Revision of Workmen's Compensation Insurance Rates.

The National Council on Workmen's Compensation Insurance, 16 East 40th street, New York City, has published a report of its recent revision of rates. This is a booklet of seventy-six pages. The report is available in paper binding at a cost of forty cents a copy and in cloth binding at seventy cents a copy.

(5) Revision of the Industrial Compensation Rating Schedule—1918.

At the time the 1920 National Rate Revision was first undertaken it was felt that the Schedule Rating Plan as well as the constants and factors in the Experience Rating Plan should be revised to correspond with the basis of the new rates, but it was felt that to undertake the entire job at one time would be too large a burden, and therefore action with respect to the Schedule was postponed for the time being.

On December 17 when the work of the 1920 Revision had been completed a joint meeting of the Actuarial and Engineering Committees of the National Council on Workmen's Compensation Insurance was held and the matter discussed quite fully. That meeting recommended the organization of a special committee representing both the actuarial and engineering point of view to make a thorough investigation of the fundamental problem of the correct theoretical structure of a Rating Schedule.



A Committee has been organized in accordance with this resolution and is proceeding with the work of studying the fundamental theory of Schedule Rating with a view to developing the correct structural form. When this work is completed it is planned to obtain statistical records and through the work of actuaries, statisticians and engineers develop a plan theoretically correct in structure and based upon actual statistics of accident cost and cause for its item values.

*Water Damage Conference:*

This is a new association consisting of the three companies which are now writing this form of indemnity.

This form of insurance follows generally the lines of sprinkler leakage insurance and insures against leakage from plumbing systems, plumbing tanks, steam and hot water heating systems, elevator tanks and cylinders, roofs, leaders, and spouting, broken or open windows or skylights, leakage from refrigerating system, street water mains and fire hydrants. This latter coverage has lately been added to the list of coverages given by companies writing the class.

*Burglary Insurance:*

The Burglary Insurance Underwriters' Association has arranged to have the National Workmen's Compensation Service Bureau, under its reorganization scheme, undertake the compilation of burglary insurance statistics.

*Automobile Insurance:*

The annual revision of automobile insurance rates and underwriting rules was accomplished somewhat earlier than usual this year. The publication of the Manual in the midst of the busy season last year created more or less confusion, so it was decided to get the new rules and rates out this year as near January 1, 1921, as possible.

The automobile rating committees of the National Workmen's Compensation Service Bureau and of the National Automobile Underwriters' Conference issued calls for experience to the member companies early in the summer. The experience submitted was compiled and tabulated and the Committee sessions began in September. The Automobile Public Liability rates were made by the Automobile Committee of the National Workmen's Compensation

Service Bureau, and the Automobile Fire and Theft rates were made by the National Automobile Underwriters' Conference. The Property Damage and Collision rates were arrived at through joint meetings of the committees of the two organizations.

The rating data (rates, territories and rules) has been assembled into one Manual this year, instead of being split up into three books. The "List of Automobiles" has not been reprinted, but a great many of its pages have been reprinted during the last few months, owing to the many recent price changes in cars.

The physical construction of the car has an important bearing on the P.L. and P.D. hazard. Each car was symbolized individually for P.L. and P.D. in the "List of Automobiles" that was published a year ago. This basis of rating is continued in 1921, as it appears to have overcome many of the difficulties formerly experienced under the list price and horsepower bases.

The 1921 rates for Private Passenger automobiles remain at about the same average level country-wide. Rates have been increased in the larger cities and decreased in the smaller cities and in the rural territories. The three forms of Public Liability and Property Damage coverage on Private Passenger cars and the three sets of rates have been continued. They have now been extended to cover all territories, whereas formerly, the two restricted forms of coverage were limited to the city territories.

Particular attention was given to Collision insurance in the 1921 revision of rates. The experience submitted by the member companies did not indicate that any material change was necessary in the rating methods. It was decided, however, that there should be five "age groups," instead of three. These new age definitions agree with the five that have been used in the past for fire and theft insurance. On the average, private passenger collision rates have been changed but little. The rates on the cheaper cars are slightly lower than last year, and they are slightly higher on the more expensive cars.

The method of writing collision insurance on commercial cars has been changed to conform with the method used in rating private passenger automobiles, *i.e.*, according to the five age groups. For cars engaged in emergency or rush work, the rates have been sharply advanced. With these exceptions the commercial collision rates have changed but little.

An innovation in collision insurance is the establishment of a

separate territorial schedule. Heretofore, one schedule has applied to public liability, property damage, and collision. Now each territory is given one territory number for public liability and property damage, and another territory number for collision.

Under the 1921 Manual, commercial cars will continue to be written for P.L. and P.D. insurance, according to the business in which the assured is engaged and also in accordance with the load capacity of the car (heavy, medium or light). Practically no changes have been made in the classification of commercial cars. The rates themselves have been increased in the larger cities and decreased in the smaller cities and rural territories.

P.L. and P.D. rates have not been changed very materially for livery cars, taxicabs, jitneys and busses. Taxicab rates have been reduced in the smaller cities and the rural territories. Certain new definitions have also been established for livery cars so as to more accurately describe the hazards involved. Heretofore, no distinction has been made between the Livery car which is rented solely by the hour or day for shopping, visiting or excursion trips and the Livery car which is on call for short trip or "hacking" work. In the 1921 Manual the former class of cars has been defined as "Private Livery" automobiles and the other group is known as "Public Livery" automobiles. The Public Livery automobile takes the higher rate; in fact, the rate is the same as the taxicab rate.

There has been a change in the rating of hired cars. Formerly they were insured either on an hourly basis or on a specified car basis. Under the 1921 Manual, hired cars are rated on a charges incurred basis, at so much per \$100 of cost of hire.

Most of the garages are rated on a payroll basis for public liability and property damage insurance. Up to the time the new Manual was published, rates were only shown for payrolls up to \$25,000 at each branch. All garages with total annual payrolls in excess of \$25,000 were referred for rating. Under the new Manual, rates are also shown for payrolls in excess of \$25,000. Risks involving payrolls in excess of \$25,000 are still to be referred for rating, however, the understanding being that the rates printed in the Manual are only to be used pending promulgation of individual rates. Storage garages—*i.e.*, garages engaged in washing and cleaning automobiles and that do not sell or repair cars—have been given a preferential treatment with rates at about half the regular garage rate.

All automobile rates depend on territories. The rates in New York City are from two to eight times as high as the rates in other territories. Each year the experience is carefully reviewed to see whether each territory should continue in the same schedule that it has been placed in. A few of the territories were switched around from one schedule to another this last year. Providence was moved down into a lower rated schedule. So were Detroit and Newark. Albany was moved up into a higher schedule and so were the cities of Los Angeles, Portland, Seattle, and San Francisco. Many of the medium-sized smaller cities in the south and west were moved down into lower rated schedules. Much of the congested territory in the eastern states, particularly that territory contiguous to the large cities of Boston, New York, Philadelphia, etc., was moved up into a higher rated schedule.

Heretofore an additional charge of 50 per cent. of the private passenger rate has been required if a private passenger car was used for commercial delivery. This charge has been removed in the new Manual and private passenger cars may be used for commercial delivery provided there is no change in the body or chassis.

A most encouraging sign in the automobile insurance field is the development of ways and means of preventing automobile accidents and automobile losses. Insurance companies are naturally very much interested in this work, and they are encouraging municipalities and individual assureds in many ways. Whenever a safety campaign has resulted in an improved accident record, the cities' rates are adjusted accordingly. Individual risks are experience rated, those with good experience receiving rates below Manual, and those with poor experience receiving rates above Manual. Credits are allowed for the installation of approved locking devices, of fire extinguishers and of approved front bumpers. The companies are distributing safety-first leaflets and circulars. Drivers are encouraged to drive carefully and obey the traffic regulations. Hundreds of safety devices have been examined by the Underwriters' Laboratories.

In conclusion, it may well be said that conditions in the automobile insurance field are quite satisfactory. It is expected that the premium income for 1921 will pass all records. The premium writings will not fall off to any marked extent because of the temporary lull in the manufacture of automobiles. The great majority of the cars already manufactured are not completely insured, so there is plenty of room for development.

## SURVEY OF INSURANCE EDUCATIONAL WORK.

Courses of instruction in the business of insurance in institutions of collegiate grade may roughly be divided into two classes, general and specialized. The general course is one in which the aim is to develop an appreciation of the place of insurance in economic life, of the methods used in the insurance business and of the underlying theory common to all lines of insurance. Practices and problems incident to particular lines are not made the subject of extensive inquiry. The specialized courses are of a more professional type and are concerned with the application of insurance principles in particular fields. A general course might profitably be taken by students interested in any sort of business activity, while the specialized course is intended to appeal primarily to those students who expect to enter the insurance business.

In order to ascertain the extent to which the principal colleges and universities in the United States and Canada were offering such courses, one hundred and sixty-eight letters of inquiry were sent out during the past year by the department of insurance at Columbia University. Replies were received to one hundred and twenty of these letters, indicating that seventy institutions had courses or were planning to offer them, while fifty had neither courses nor plans. Forty-nine had courses actually in operation, seventeen offering general courses only, twenty-one specialized courses only, and eleven both general and specialized courses. In tabular form:

Institutions offering courses .....	49
General only .....	17
Specialized only .....	21
General and specialized .....	11
Institutions having no courses but planning to offer them .....	21
Institutions having neither courses nor plans .....	50
Total .....	<u>120</u>

There has been a marked increase in activity along educational lines during the past few months. Some of the courses which are being given or projected are mentioned below:

Three courses on fire insurance by the Insurance Institute of America.

A course in accident and health insurance to be given by the Insurance Society of New York.

A course in suretyship given by Vice-President Radcliff of the Fidelity and Deposit Company at Johns Hopkins University.

A course for brokers and agents given by the Aetna Life and affiliated companies covering various features of accident and health insurance, as well as other casualty lines.

S. B. Ackerman is conducting a course in Workmen's Compensation at New York University. The course aims to give practical knowledge of workmen's compensation insurance.

Some of the topics to be studied are: benefits under the New York Compensation Law; representing a carrier before the Industrial Commission; computing annuities; estimating undetermined cases; rehabilitation; rate making; experience and schedule rating; uniform accounting system; Schedule "Z"; Schedule "W"; model office forms.

#### INSURANCE ACCOUNTANTS ASSOCIATION.

The Insurance Accountants Association has been organized with membership limited to employees of fire and marine companies. The objects of the association are: to determine and outline correct practices and promote uniformity in accounting methods of insurance companies, to encourage consistency in the preparation of tax, tariff and local board assessment returns and all statements for public purposes, to provide ways and means for accountants to discuss in conference subjects of interest, to serve associations in the interest of insurance companies.

The President of the association is D. R. Ackerman of the Great American Insurance Company.

#### PERSONAL NOTES.

Winfield W. Greene is now Underwriter with the Employers Mutual Insurance Company of New York.

James D. Maddrill is Actuary of the Pennsylvania Manufacturers Association Casualty Insurance Company.

S. Herbert Wolfe has been elected Commander of the New York Chapter, Military Order of the World War.

Samuel Deutschberger has been appointed Chief Examiner of Fire Insurance Companies for the New York Insurance Department.

A. L. Kirkpatrick has been promoted to Chief Statistician of the Globe Indemnity Company.

I. M. Rubinow has returned to Palestine as Director of the American Zionist Medical Unit.

Joseph H. Woodward is now associated with the Equitable Life Assurance Society as Assistant Actuary.

Saul B. Ackerman is Assistant Actuary in the Workmen's Compensation Bureau of the New York Insurance Department.

Samuel Milligan is Assistant Actuary of the Metropolitan Life Insurance Company.


Rainard B. Robbins has been appointed Assistant Actuary of the New York Insurance Department in the actuarial bureau at Albany.

C. N. Young is Actuary of the Insurance Committee of the United States Chamber of Commerce.

T. Bertrand Graham is Assistant Manager of the Pacific Coast Head Office of the Metropolitan Life Insurance Company.

C. S. Forbes is Actuary and Underwriter of the Service Mutual Liability Insurance Company of Boston.

George Graham is Vice-President of the Central States Life Insurance Company of Missouri.

  
OBITUARY.

HARRY LUBIN.

Born, May 17, 1884.


Died, December 20, 1920.

Harry Lubin, a Fellow of this Society, was born in Russia, May 17, 1884, and died from an accident in New York on December 20, 1920.

Mr. Lubin came to this country at the age of eighteen and thereafter entered upon an academic course at Cornell University, receiving the degree of Bachelor of Arts. His statistical experience in insurance was secured in the Ocean Accident and Guaranty Corporation during 1911 and 1912. He then returned to Cornell where he pursued post graduate studies in statistics and economics. Subsequently he spent a year in Paris studying at the Sorbonne.

He entered the employ of the New York State Industrial Commission, Actuary's Department, in November, 1914. He remained there for a period of three years. After a year with the New York Public Service Commission, Statistical Department, he returned to the Industrial Commission and was appointed Assistant Actuary.

Mr. Lubin was a man of studious habits and was unremitting in the pursuit of knowledge in the fields in which he was interested. His pleasant personality and sterling character will be missed by many of the members who met him at the meetings of the Society. It is to be much regretted that his career has been cut short just when his attainment to his last position gave promise of increased usefulness in the public service.





# THE CASUALTY ACTUARIAL AND STATISTICAL SOCIETY OF AMERICA

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W. W. GREENE .....November, 1921  
EDMUND E. CAMMACK .....November, 1922  
EDMUND S. COGSWELL .....November, 1922

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A. W. WAITE.

## MEMBERSHIP OF THE SOCIETY, NOVEMBER 17, 1920.

## FELLOWS.

Those marked (†) were Charter Members at date of organization, November 7, 1914.

Those marked (\*) have been admitted as Fellows upon examination by the Society.

Date Admitted	
†	Amerine, W. M., Assistant Secretary, Georgia Casualty Co., Macon, Ga.
†	Benjamin, Roland, Comptroller, Fidelity & Deposit Co., Baltimore, Md.
†	Black, S. Bruce, Vice-President and Actuary, Liberty Mutual Ins. Co., 210 Lincoln St., Boston, Mass.
Apr. 20, 1917	Blanchard, Ralph H., Department of Insurance, School of Business, Columbia University, New York.
May 19, 1915	Bradshaw, Thomas, Treasurer, Massey-Harris Co., Ltd., 915 King St., Toronto, Canada.
†	Breiby, William, Partner in firm of Fackler & Fackler, Consulting Actuaries, 35 Nassau St., New York.
*Oct. 31, 1917	Brockway, U. Hayden, Travelers Ins. Co., Hartford, Conn.
†	Brodin, Richard, Actuary, United Life and Accident Ins. Co., Concord, N. H.
Oct. 22, 1915	Brown, Herbert D., Chief of U. S. Efficiency Bureau, Washington, D. C.
Oct. 22, 1915	Brown, William H., Second Vice-President and Secretary, Columbian National Life Ins. Co., Boston, Mass.
†	Buck, George B., Actuary, Teachers' Retirement System, City of New York, Municipal Building, New York.
May 26, 1916	Bucklin, Walter S., President, Liberty Mutual Ins. Co., 210 Lincoln St., Boston, Mass.
†	Budlong, W. A., Superintendent of Claims, Commercial Travelers Mutual Accident Assn., Utica, N. Y.
Apr. 20, 1917	Burhop, W. H., Asst. Secy. and Actuary, Employers Mutual Liability Ins. Co., Wasau, Wis.

- Feb. 19, 1915 Burns, F. Highlands, President, Maryland Casualty Co., Baltimore, Md.
- † Cammack, Edmund E., Associate Actuary, Aetna Life Ins. Co., Hartford, Conn.
- † Carpenter, Raymond V., Assistant Actuary, Metropolitan Life Ins. Co., 1 Madison Ave., New York.
- \*Nov. 21, 1919 Carver, Harry C., Assistant Professor of Mathematics and Insurance, University of Michigan, Ann Arbor, Mich.
- Feb. 25, 1916 Close, Charles L., Manager, Bureau of Safety, U. S. Steel Corporation, 71 Broadway, New York.
- \*Nov. 15, 1918 Coates, Barrett N., Assistant Secretary and Actuary, Western States Life Ins. Co., San Francisco, California.
- Oct. 27, 1916 Cogswell, Edmund S., General Manager, National Association of Mutual Casualty Companies, 23 W. 43d St., New York.
- † Cole, Richard H., Secretary, Connecticut General Life Ins. Co., Hartford, Conn.
- Feb. 19, 1915 Collins, Henry, Assistant Manager, Ocean Accident & Guarantee Corporation, 114 Fifth Avenue, New York.
- † Conway, Charles T., Vice-President, Liberty Mutual Ins. Co., 185 Devonshire St., Boston, Mass.
- † Copeland, John A., Consulting Actuary, 124 Hurt Building, Atlanta, Ga.
- † Cowles, W. G., Vice-President, Travelers Ins. Co., Hartford, Conn.
- † Craig, Arthur H., Fredk. C. Smith Co., 1 Liberty St., New York.
- † Craig, James D., Assistant Actuary, Metropolitan Life Ins. Co., 1 Madison Ave., New York.
- † Craig, James M., Actuary, Metropolitan Life Ins. Co., 1 Madison Ave., New York.
- May 26, 1916 Crum, Frederick S., Assistant Statistician, Prudential Ins. Co., Newark, N. J.
- Nov. 15, 1918 Davis, Mervyn, Assistant Actuary, Equitable Life Assurance Society, 120 Broadway, New York.
- † Dawson, Alfred B., Miles M. Dawson & Son, 26 W. 44th St., New York.
- † Dawson, Miles M., Counsellor at Law and Consulting Actuary, 26 W. 44th St., New York.
- † De Kay, Eckford C., President, De Kay and Co., 51 Maiden Lane, New York.
- † Dearth, Elmer H., President, General Casualty & Surety Co., 606 Woodward Ave., Detroit, Mich.
- May 19, 1915 Deutschberger, Samuel, Chief Examiner of Fire Companies, New York Ins. Dept., 165 Broadway, New York.

- \*Nov. 17, 1920 Dorweiler, Paul, Aetna Life Insurance Co., Hartford, Conn.
- † Downey, E. H., Compensation Actuary, Insurance Department, Harrisburg, Pa.
- † Dublin, Louis I., Statistician, Metropolitan Life Ins. Co., 1 Madison Ave., New York.
- May 19, 1915 Dunlap, Earl O., Metropolitan Life Ins. Co., 1 Madison Ave., New York.
- † Egbert, Lester D., Office of Willcox, Peck, Brown & Crosby, Insurance Brokers, 3 S. William St., New York.
- † Epsteen, Saul, La Jara, Col.
- † Fackler, David Parks, Consulting Actuary, 35 Nassau St., New York.
- † Fackler, Edward B., Consulting Actuary, 35 Nassau St., New York.
- † Fallow, Everett S., Actuary, Accident Dept., Travelers Ins. Co., Hartford, Conn.
- † Farrer, Henry, Actuary, Hartford Accident & Indemnity Co., Hartford, Conn.
- Feb. 19, 1915 Fellows, C. W., Manager, State Compensation Ins. Fund, 525 Market St., San Francisco, Cal.
- † Fitch, Frank M., Auditor, Hartford Steam Boiler Inspection & Ins. Co., Hartford, Conn.
- Feb. 19, 1915 Flanigan, James E., Actuary, Bankers Life Co., Des Moines, Iowa.
- † Flynn, Benedict D., Assistant Secretary, Travelers Ins. Co., Hartford, Conn.
- Feb. 15, 1915 Fondiller, Richard, Equitable Life Assurance Society, 120 Broadway, New York.
- † Forbes, Charles S., Consulting Actuary, 68 William St., New York.
- May 26, 1916 Frankel, Lee K., Third Vice-President, Metropolitan Life Ins. Co., 1 Madison Ave., New York.
- † Franklin, C. H., 815 Kensington Ave., Plainfield, N. J.
- Feb. 25, 1916 Froggatt, Joseph, President, Joseph Froggatt & Co., Insurance Accountants, 25 Church St., New York.
- † Furze, Harry, Treasurer, Globe Indemnity Co., Washington Place, Newark, N. J.
- Feb. 19, 1915 Garrison, Fred S., Assistant Secretary, Travelers Indemnity Co., Hartford, Conn.
- † Gaty, Theodore E., Vice-President and Secretary, Fidelity & Casualty Co., 92 Liberty St., New York.
- May 19, 1915 Glover, James W., Professor of Mathematics and Insurance, University of Michigan, 620 Oxford Road, Ann Arbor, Mich.

- † Goodwin, Edward S., Goodwin-Beach & Co., Bankers, 36 Pearl St., Hartford, Conn.
- † Gould, William H., Consulting Actuary, 256 Broadway, New York.
- Oct. 22, 1915 Graham, George, Vice-President, Central States Life Ins. Co., St. Louis, Mo.
- Oct. 22, 1915 Graham, Thompson B., Asst. Mgr., Pacific Coast Dept., Metropolitan Life Ins. Co., San Francisco, Cal.
- † Graham, William J., Second Vice-President, Equitable Life Assurance Society, 120 Broadway, New York.
- † Greene, Winfield W., Underwriter, Employers Mutual Ins. Co., 61 Broadway, New York.
- † Hamilton, R. C. L., Comptroller, Hartford Accident & Indemnity Co., Hartford, Conn.
- † Hammond, H. Pierson, Assistant Actuary, Life Dept., Travelers Ins. Co., Hartford, Conn.
- † Hansen, Carl M., Vice-President, American Re-Insurance Co., Huntingdon, Pa.
- Oct. 27, 1916 Hardy, Edward R., Assistant Manager, New York Fire Ins. Exchange, 123 William St., New York.
- Oct. 22, 1915 Hatch, Leonard W., Manager, State Insurance Fund, 124 E. 28th St., New York.
- Nov. 17, 1920 Heath, Charles E., Acting Chief Examiner of Casualty Companies, New York Ins. Dept., 165 Broadway, New York.
- Nov. 21, 1919 Henderson, Robert, Second Vice-President and Actuary, Equitable Life Assurance Society, 120 Broadway, New York.
- Oct. 22, 1915 Hess, Herbert, Joseph Froggatt & Co., Insurance Accountants, 25 Church St., New York.
- † Hillas, Robert J., President, Fidelity & Casualty Co., 92 Liberty St., New York.
- Nov. 15, 1918 Hinsdale, F. W., Secretary, Workmen's Compensation Board, Vancouver, B. C., Canada.
- Oct. 22, 1915 Hodgkins, L. G., Secretary, Masonic Protective Assn., Worcester, Mass.
- † Hoffman, Frederick L., Third Vice-President and Statistician, Prudential Ins. Co., Newark, N. J.
- Oct. 22, 1915 Holland, Charles H., President and General Manager, Royal Indemnity Co., 84 William St., New York.
- † Holmes, Mrs. Dorothy M., 24 W. 45th St., New York.
- Nov. 21, 1919 Hookstadt, Carl, Expert, U. S. Bureau of Labor Statistics, Washington, D. C.
- † Hughes, Charles, Auditor and Actuary, New York Ins. Dept., 165 Broadway, New York.

- † Hunt, Burritt A., Actuary, Casualty Dept. Aetna Life Ins. Co., Hartford, Conn.
- † Hunter, Arthur, Chief Actuary, New York Life Ins. Co., 346 Broadway, New York.
- Feb. 25, 1916 Jackson, Charles W., Actuary, Postal Life Ins. Co., 511 Fifth Ave., New York.
- May 19, 1915 Johnson, William C., Vice-President, Masonic Protective Assn., Worcester, Mass.
- May 23, 1919 Kelly, Gregory C., General Manager, Pennsylvania Compensation Rating & Inspection Bureau, 507 Morris Bldg., Philadelphia, Pa.
- † King, Walter I., Secretary, Group Insurance Dept., Connecticut General Life Ins. Co., Hartford, Conn.
- \*Nov. 21, 1919 Kirkpatrick, A. L., Chief Statistician, Globe Indemnity Co., Washington Place, Newark, N. J.
- † Kopf, Edwin W., Assistant Statistician, Metropolitan Life Ins. Co., 1 Madison Ave., New York.
- Feb. 19, 1915 Laird, John M., Actuary, Connecticut General Life Ins. Co., Hartford, Conn.
- Feb. 19, 1915 Landis, Abb, Consulting Actuary, 1107 Independent Life Building, Nashville, Tenn.
- † Law, Frank E., 322 Claremont Ave., Montclair, N. J.
- May 19, 1915 Lawson, F. W., U. S. Manager, London Guarantee & Accident Co., Ltd., 134 So. La Salle St., Chicago, Ill.
- † Leal, J. R., Actuary & Asst. to President, Interstate Life and Accident Co., Chattanooga, Tenn.
- † Leslie, William, Consulting Actuary, 525 Market St., San Francisco, Cal.
- † Luckett, D. G., General Manager and Secretary, United States Casualty Co., 80 Maiden Lane, New York.
- May 23, 1919 McDougald, Alfred, Accident Manager, Phoenix Assurance Company, Phoenix House, King William St., E. C., London, England.
- \*Oct. 31, 1917 McManus, Robert J., Travelers Ins. Co., Hartford, Conn.
- Feb. 19, 1915 Maddrill, James D., Actuary, Pennsylvania Mfrs. Assn. Casualty Ins. Co., Finance Bldg., Philadelphia, Pa.
- † Magoun, William N., General Manager, Massachusetts Rating & Inspection Bureau, 88 Broad St., Boston, Mass.
- May 19, 1915 Maycrink, Emma C., Auditor, Compensation Inspection Rating Board, 370 Seventh Ave., New York.

- Feb. 19, 1915 Mead, Franklin B., Secretary and Actuary, Lincoln National Life Ins. Co., Fort Wayne, Ind.
- Apr. 20, 1917 Meltzer, Marcus, Statistician, National Workmen's Compensation Service Bureau, 13 Park Row, New York.
- † Michelbacher, G. F., Secretary, National Council on Workmen's Compensation Insurance, 16 E. 40th St., New York.
- † Miller, David W., Chief Accountant, S. W. Straus & Co., Investment Bonds, 150 Broadway, New York.
- † Milligan, Samuel, Assistant Actuary, Metropolitan Life Ins. Co., 1 Madison Ave., New York.
- † Mitchell, James F., First Asst., U. S. Manager, General Accident Fire and Life Assur. Corp., Fourth and Walnut Sts., Philadelphia, Pa.
- † Moir, Henry, Second Vice-President and Actuary, Home Life Ins. Co., 256 Broadway, N. Y.
- † Moore, George D., Actuary, Royal Indemnity Co., 84 William St., New York.
- May 19, 1915 Morris, Edward B., Actuary, Life Dept., Travelers Ins. Co., Hartford, Conn.
- Nov. 21, 1919 Morrison, Charles E., Vice-President and General Manager, Utilities Mutual Ins. Co., 5 Nassau St., New York.
- † Morrison, James, Chief Accountant, Royal Indemnity Co., 84 William St., New York.
- † Mowbray, Albert II., Actuary, National Council on Workmen's Compensation Insurance, 16 E. 40th St., New York.
- May 20, 1918 Mudgett, Bruce D., Associate Professor of Economics, University of Minnesota, Minneapolis, Minn.
- \*Nov. 17, 1920 Mueller, Louis H., Statistician, State Compensation Insurance Fund, 525 Market St., San Francisco, Cal.
- † Mullaney, Frank R., Actuary and Asst. Secy., American Mutual Liability Ins. Co., 245 State St., Boston, Mass.
- May 28, 1920 Murphy, Ray D., Associate Actuary, Equitable Life Assurance Society, 120 Broadway, New York.
- † Nicholas, Lewis A., Statistician, Fidelity & Casualty Co., 92 Liberty St., New York.
- † Olifiers, Edward, Actuary, A Sul America, Rio-de-Janeiro, Brazil.
- † Orr, Robert K., President, Michigan Employers Casualty Co., Lansing, Mich.
- † Otis, Stanley L., Secretary, Insurance Federation of the State of New York, 80 Maiden Lane, New York.



- \*Nov. 21, 1919 Outwater, Olive E., Assistant Actuary National Workmen's Compensation Service Bureau, 13 Park Row, New York.
- † Pally, Julius J., Statistician, London Guarantee & Accident Co., Ltd., 134 So. La Salle St., Chicago, Ill.
- May 26, 1916 Parker, Jr., John M., Secretary, Accident and Liability Department, Aetna Life Ins. Co., Hartford, Conn.
- Nov. 15, 1918 Perry, W. T., Manager for Canada, Ocean Accident and Guarantee Corporation, Toronto, Canada.
- † Reiter, Charles G., Assistant Actuary, Metropolitan Life Ins. Co., 1 Madison Ave., New York.
- † Remington, Charles H., Assistant Treasurer, Aetna Life Ins. Co., Hartford, Conn.
- May 23, 1919 Richardson, Frederick, U. S. Manager, General Accident Fire and Life Assur. Corp., Fourth and Walnut Sts., Philadelphia, Pa.
- † Rubinow, I. M., Director, American Zionist Medical Unit, Jerusalem, Palestine.
- † Ryan, Harwood E., General Manager, National Council on Workmen's Compensation Insurance, 16 E. 40th St., New York.
- † Saxton, Arthur F., Chief Examiner of Casualty Companies, New York Ins. Dept., 165 Broadway, New York.
- † Scattergood, Claude E., Vice-President, A. M. Best & Co., 75 Fulton St., New York.
- † Scheitlin, E., Asst. Treasurer, Globe Indemnity Co., Washington Place, Newark, N. J.
- † Senior, Leon S., Manager and Secretary, Compensation Inspection Rating Board, 370 Seventh Ave., New York.
- † Smiley, J. W., Actuary and Chief Accountant to the West Virginia State Compensation Commissioner, Charleston, W. Va.
- Apr. 20, 1917 Smith, Charles G., Actuary, New York Ins. Dept., 165 Broadway, New York.
- Feb. 25, 1916 Strong, Wendell M., Associate Actuary, Mutual Life Ins. Co., 32 Nassau St., New York.
- Oct. 22, 1915 Strong, William Richard, Care of Mr. H. W. Ivery, 131 Derby St., Kew, Melbourne, Australia.
- † Sullivan, Robert J., Secretary, Liability Department, Travelers Ins. Co., Hartford, Conn.
- \*Nov. 17, 1920 Tarbell, Thomas F., Actuary, Conn. Ins. Dept., Hartford, Conn.

May 19, 1915	Thiselton, Herbert C., General Manager, London Guarantee and Accident Co., Ltd., 20, 21 and 22 Lincoln's Inn Fields, London, W. C. 2, England.
†	Thompson, John S., Assistant Actuary, Mutual Life Ins. Co., 32 Nassau St., New York.
†	Train, John L., Secretary and General Manager, Utica Mutual Ins. Co., 239 Genesee St., Utica, New York.
*Nov. 21, 1919	Van Tuyl, Hiram O., Examiner, New York Ins. Dept., 165 Broadway, New York.
*Nov. 17, 1920	Waite, Alan W., Aetna Life. Ins. Co., Hartford, Conn.
May 23, 1919	Welch, Archibald A., Vice-President, Phoenix Mutual Life Ins. Co., Hartford, Conn.
†	Whitney, Albert W., General Manager, National Workmen's Compensation Service Bureau, 13 Park Row, New York.
†	Wolfe, Lee J., Consulting Actuary, 165 Broadway, New York.
†	Wolfe, S. Herbert, Consulting Actuary, 165 Broadway, New York.
†	Woodward, Joseph H., Assistant Actuary, Equitable Life Assurance Society, 120 Broadway, New York.
*Nov. 17, 1920	Young, Charles N., Actuary, Insurance Department, U. S. Chamber of Commerce, Washington, D. C.
†	Young, William, Actuary, New York Life Ins. Co., 346 Broadway, New York.

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 ASSOCIATES.
 

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Those marked (\*) have been enrolled as Associates upon examination by the Society.

Those marked (1) have passed Part I of the Fellowship Examination.

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 Date Enrolled

*Nov. 15, 1918	Ackerman, Saul B., Assistant Actuary, New York Ins. Dept., 165 Broadway, New York.
Nov. 15, 1918	Ankers, Robert E., Actuary, Virginia Ins. Dept., Richmond, Va.
*Nov. 17, 1920	Barber, Harmon T., Travelers Insurance Co., Hartford, Conn.
Nov. 17, 1920	Black, Nellis C., Supt., Statistical Division, Maryland Casualty Co., Baltimore, Md.

- \*Oct. 31, 1917 Bessey, John M., General Manager, Employers Mutual Ins. Co., 61 Broadway, New York.
- \*Oct. 22, 1916 Brann, Ralph M., Supt. Compensation Dept., London & Lancashire Indemnity Company of America, 57 William St., New York.
- Nov. 15, 1918 Brooks, LeRoy, Statistician, U. S. Fidelity & Guaranty Company, Baltimore, Md.
- \*Nov. 15, 1918 Brunnquell, H. G., Actuary, Wisconsin Ins. Dept., Madison, Wis.
- \*Oct. 22, 1915 Buffer, Louis, Employers Mutual Ins. Co., 61 Broadway, New York.
- Mar. 31, 1920 Burt, Margaret A., Office of George B. Buck, Consulting Actuary, 256 Broadway, New York.
- \*Nov. 17, 1920 Comstock, W. Phillips, Statistician, Continental Casualty Co., 910 Michigan Ave., Chicago, Ill.
- Nov. 15, 1918 Egli, W. H., Statistician, Zurich General Accident & Liability Ins. Co., 431 Insurance Exchange, Chicago, Ill.
- \*Nov. 15, 1918 Elston, James S., Assistant Actuary, Life Dept., Travelers Insurance Co., Hartford, Conn.
- May 23, 1919 Fletcher, Nicholas, Secretary, Workmen's Compensation Board, Winnipeg, Manitoba, Canada.
- Nov. 21, 1919 Haydon, George F., General Manager, Wisconsin Compensation Rating & Inspection Bureau, 373 Broadway, Milwaukee, Wis.
- May 23, 1919 Hoage, Robert J., Chief Statistician, U. S. Employees Compensation Commission, Washington, D. C.
- \*Oct. 31, 1917 Jackson, Edward T., Statistician, General Accident, Fire & Life Assur. Corp., 421 Walnut St., Philadelphia, Penn.
- \*Nov. 21, 1919 Jones, Loring D., Claim Auditor, State Ins. Fund, 124 E. 28th St., New York.
- (1)\*Oct. 31, 1917 Kearney, T. P., Manager, State Compensation Insurance Fund, Denver, Colo.
- (1)\*Oct. 27, 1916 McClure, Laurence H., Colt's Patent Fire Arms Mfg. Co., Hartford, Conn.
- \*Oct. 22, 1915 McGuire, Vincent G., Equitable Life Assurance Society, 230 Fifth Ave., New York.
- (1)\*Oct. 27, 1916 Miller, Tilford W., Travelers Ins. Co., Hartford, Conn.
- \*Oct. 31, 1917 Montgomery, Victor, Actuary, California Ins. Dept., San Francisco, Cal.
- \*Nov. 21, 1919 Mothersill, R. V. 504 Boyer Building, Detroit, Mich.
- \*Oct. 22, 1915 Müller, Fritz, New York Life Ins. Co., 346 Broadway, New York.

- (1)\*Oct. 27, 1916 Newell, William, Chief Safety Engineer, State Insurance Fund, 124 E. 28th St., New York.  
 May 23, 1919 Otto, Walter E., Treasurer and Actuary, Michigan Mutual Liability Co., Detroit, Mich.
- (2) Nov. 21, 1919 Perkins, Sanford B., Actuary, Compensation & Liability Dept., Travelers Ins. Co., Hartford, Conn.  
 \*Nov. 17, 1920 Pike, Morris, Examiner, New York Ins. Dept., 165 Broadway, New York.  
 \*Nov. 15, 1918 Raywid, Joseph, Statistician, International Fire & Marine Ins. Corp., 153 Fifth Ave., New York.  
 \*Nov. 21, 1919 Robbins, Rainard B., Assistant Actuary, New York Ins. Dept., Albany, N. Y.  
 Nov. 15, 1918 Sibley, John L., Statistician, United States Casualty Co., 80 Maiden Lane, New York.  
 \*Nov. 15, 1918 Spencer, Harold S., Aetna Life Insurance Co., Hartford, Conn.  
 Nov. 15, 1918 Sullivan, Oscar M., Chief Statistician, Minnesota Dept. of Labor, Old Capitol, St. Paul, Minn.
- (1)\*Nov. 21, 1919 Trench, Frederick H., Mgr., Underwriting Dept., Utica Mutual Ins. Co., 239 Genesee St., Utica, New York.  
 \*Nov. 21, 1919 Voogt, Walter G., State Compensation Ins. Fund, 525 Market St., San Francisco, Cal.
- (1)\*Oct. 27, 1916 Waite, Harry V., Statistician, Compensation & Liability Dept., Travelers Ins. Co., Hartford, Conn.  
 May 23, 1919 Warren, Charles S., Chief Statistician, Ocean Accident & Guarantee Corp., 114 Fifth Ave., New York.  
 \*Nov. 17, 1920 Watson, J. J., Asst. Genl. Mgr., Texas Employers' Ins. Assn., Dallas, Texas.  
 \*Nov. 17, 1920 Webber, Charles W., Asst. Statistician, Liberty Mutual Ins. Co., 210 Lincoln St., Boston, Mass.  
 Nov. 15, 1918 Wilkinson, Albert E., Statistician, Standard Accident Ins. Co., Detroit, Mich.  
 Nov. 17, 1920 Willbach, Harry Zurich General Accident & Liability Ins. Co., 55 John St., New York.  
 Sept. 17, 1919 Williams, John F., Actuary, Tennessee Ins. Dept., Nashville, Tenn.  
 \*Oct. 22, 1915 Williamson, W. R., Assistant Actuary, Life Dept., Travelers Ins. Co., Hartford, Conn.  
 \*Nov. 17, 1920 Wilson, W. Norbert, Travelers Ins. Co., Hartford, Conn.

- \*Oct. 22, 1915 Wood, Donald M., of Childs, Young & Wood,  
Insurance Exchange, Chicago, Ill.
- \*Oct. 22, 1915 Woodman, Charles E., Comptroller, Ocean Acci-  
dent & Guarantee Corp., 114 Fifth Ave.,  
New York.

## SCHEDULE OF MEMBERSHIP, NOVEMBER 17, 1920.

	Fellows.	Associates.	Total.
Membership, May 28 .....	148	49	197
Deductions:			
By resignation .....	—	1	1
By withdrawal .....	1	4	5
By death .....	1	—	1
Additions:	146	44	190
By election, Nov. 17, 1920 .....	1	2	3
By examination .....	5	6	11
	152	52	204
Transfers from Associate to Fellow .....	—	5	5
Membership, November 17, 1920 .....	152	47	199

## ABSTRACT FROM THE MINUTES OF THE SEVENTH ANNUAL MEETING, NOVEMBER 17, 1920.

The seventh annual and fifteenth regular meeting of the Casualty Actuarial and Statistical Society of America was held at the Hotel Pennsylvania, New York, on Wednesday, November 17, 1920.

President Flynn called the meeting to order at 10:15 A.M. The roll was called, showing the following fifty Fellows and sixteen Associates present:

### FELLOWS.

BLANCHARD	HAMMOND	MOORE
BRODIN	HENDERSON	MOWBRAY
BUDLONG	HOLMES	NICHOLAS
CARVER	JACKSON, C. W.	OTIS
COGSWELL	KELLY	OUTWATER
CRAIG, J. D.	KING	PALLAY
DAVIS	KIRKPATRICK	RYAN
DEKAY	KOPF	SENIOR
DEARTH	LAIRD	SMITH
DORWEILER	LUBIN	STRONG, W. M.
DUNLAP	MC MANUS	TARBELL
FALLOW	MADDRILL	VAN TUYL
FLYNN	MAYCRINK	WOLFE, L. J.
FONDILLER	MELTZER	WOLFE, S. H.
GARRISON	MICHELbacher	WOODWARD
GLOVER	MILLIGAN	YOUNG, C. N.
GOULD	MOIR	

### ASSOCIATES.

ACKERMAN	HOAGE	WAITE, H. V.
BARBER	NEWELL	WARREN
BESSEY	PERKINS	WILKINSON
BLACK, N. C.	PIKE	WILLBACH
BUFFLER	SPENCER	WILSON
COMSTOCK		

The President's address was presented.

The minutes of the meeting held May 28, 1920, were approved as printed in the *Proceedings*.

The report of the Council was read and, upon motion, adopted by the Society. The Council had amended "Rules Regarding Examinations" by adopting the new rules 4 and 5 which appear in this number.

The Council had adopted the Editor's recommendations to substitute an Editorial Committee for the Committee on Book Reviews and to allow the Editor an expense fund of not exceeding One Hundred Dollars annually for assistance.

The Council recommended the following for election to Fellowship in the Society, without examination, under the terms of Article III of the Constitution:

Heath, Charles E., Acting Chief Examiner of Casualty Companies, New York State Insurance Department.

After ballot, this nominee was declared a duly elected Fellow.

The Council reported that the following had been enrolled, without examination, as Associates:

BLACK, N. C.

WATSON, J. J.

The Council reported that the following Associates had passed the necessary examinations and had been admitted as Fellows:

DORWEILER, P.

WAITE, A. W.

MUELLER, L. H.

YOUNG, C. N.

TARBELL, T. F.

The Council also reported that the following candidates had passed the necessary examinations and had been enrolled as Associates:

BARBER, H. T.

WEBBER, C. W.

COMSTOCK, W. P.

WILLBACH, H.

PIKE, M.

WILSON, W. N.

The report of the Secretary-Treasurer, a summary of which follows, was read and accepted:

The membership of the Society, as it stood as of each annual meeting, is shown in the following table:

Annual Meeting.	Date of Meeting.	Fellows.	Associates.	Total.
First .....	Nov. 7, 1914	97	0	97
Second .....	Oct. 22, 1915	134	13	147
Third .....	Oct. 27, 1916	140	21	161
Fourth .....	Oct. 31, 1917	144	25	169
Fifth .....	Nov. 15, 1918	145	41	186
Sixth .....	Nov. 21, 1919	150	50	200
Seventh .....	Nov. 17, 1920	152	47	199

On account of the increased cost of printing and binding, the Council has found it necessary to charge members the sum of One Dollar to cover the cost of furnishing members with a bound volume of the *Proceedings*, which heretofore has been furnished gratis. The paper covered numbers will continue to be sent, so that members will have two sets in their possession.

The report of the Editor, a summary of which follows, was read and accepted:

The Society, during the year just closed, has published two numbers of the *Proceedings* (13 and 14). These taken together constitute Volume VI—a book of 436 pages. *Proceedings* No. 14 is the largest single number ever issued. The papers contained in Volume VI covered a variety of subjects and were not too largely confined to workmen's compensation insurance, as had been the case in some of the preceding volumes.

Two recommendations were presented to the Council:

The first recommendation was that the Committee on Book Reviews be abolished and that there be substituted in its place a new committee to be known as the Editorial Committee. It was suggested that this Committee be composed of three members—the Editor, as an ex-officio member, and two additional members, to be appointed by the President. The work of the members associated with the Editor will be devoted to the "Book Review" and "Current Notes" departments. They will be responsible for the material for these departments of the *Proceedings* and will call upon all the members of the Society for contributions.

The second recommendation was that a special fund should be created for the purpose of enabling the Editor to secure assistance in the mechanical work of publishing the *Proceedings*. The Council was requested to authorize the disbursement of not to exceed One Hundred Dollars annually, which the Editor in his discretion might use in this work.

The report of the Librarian was read and accepted.

The Auditing Committee (Mr. Charles Hughes, Chairman) reported that the books of the Secretary-Treasurer had been audited and his accounts verified.

The Educational Committee (Mr. Albert H. Mowbray, Chairman) reported that the new "Recommendations for Study" for the May, 1921, examinations had been completed, following upon the Council's approval of the syllabus (*Proceedings*, Vol. VI, 414, 420).

The Examination Committee (Mr. Mervyn Davis, Chairman) submitted a report, of which the following is a summary:

#### 1920 EXAMINATIONS—SUCCESSFUL CANDIDATES.

The following is a list of those who passed the examinations held by the Society on May 5th and 6th, 1920:

#### *Associateship—Part III.*

AULT, GILBERT E.  
BARBER, HARMON T.  
DUBUAR, CHARLES G.  
PIKE, MORRIS

WEBBER, CHARLES W.  
WILLBACH, HARRY  
WILSON, W. NORBERT



*Associateship—Part IV.*

BARBER, HARMON T.	WILLBACH, HARRY
COMSTOCK, W. PHILLIPS	WILSON, W. NORBERT
PIKE, MORRIS	

*Fellowship—Part I.*

DORWEILER, PAUL	TARBELL, THOMAS F.
KEARNEY, T. P.	TRENCH, F. H.
PERKINS, S. B.	YOUNG, C. N.

*Fellowship—Part II.*

DORWEILER, PAUL	WAITE, A. W.
MUELLER, LOUIS H.	YOUNG, C. N.
TARBELL, THOMAS F.	

The annual elections were then held, and the officers and members of the Council, as stated below, were elected in the following order:

<i>President</i> .....	ALBERT H. MOWBRAY
<i>Vice-President</i> .....	WILLIAM LESLIE
<i>Vice-President</i> .....	LEON S. SENIOR
<i>Secretary-Treasurer</i> .....	RICHARD FONDILLER
<i>Editor</i> .....	G. F. MICHELbacher
<i>Librarian</i> .....	LOUIS I. DUBLIN
<i>Member of Council</i> (term to expire November, 1922) .....	EDMUND E. CAMMACK
<i>Member of Council</i> (term to expire November, 1922) .....	EDMUND S. COGSWELL

A motion was carried that the Council consider the desirability of cooperating with other scientific organizations studying the unemployment problem.

The papers printed in this number were read or presented.

Recess was taken until 2:15 P.M.

The papers read at the last meeting of the Society were discussed.

An informal discussion was held of several topics of current interest.

Upon motion, the meeting adjourned at 5:30 P.M.

## CONSTITUTION.

(AS AMENDED MAY 20, 1918.)

ARTICLE I.—*Name.* This organization shall be called THE CASUALTY ACTUARIAL AND STATISTICAL SOCIETY OF AMERICA.

ARTICLE II.—*Object.* The object of the Society shall be the promotion of actuarial and statistical science as applied to the problems of casualty and social insurance by means of personal intercourse, the presentation and discussion of appropriate papers, the collection of a library and such other means as may be found desirable.

The Society shall take no partisan attitude, by resolution or otherwise, upon any question relating to casualty or social insurance.

ARTICLE III.—*Membership.* The membership of the Society shall be composed of two classes, Fellows and Associates. Fellows only shall be eligible to office or have the right to vote.

The Fellows of the Society shall be the present members and those who may be duly admitted to Fellowship as hereinafter provided. Any Associate of the Society may apply to the Council for admission to Fellowship. If his or her application shall be approved by the Council with not more than one negative vote he or she shall become a Fellow on passing such final examination as the Council may prescribe. Otherwise no one shall be admitted as a Fellow unless recommended by a duly called meeting of the Council with not more than one negative vote followed by a ballot of the Society with not more than four negative votes and not less than twenty affirmative votes.

Any person may, upon nomination to the Council by two Fellows of the Society and approval by the Council of such nomination with not more than one negative vote, become enrolled as an Associate of the Society provided that he shall pass such examination as the Council may prescribe. Such examination may be waived in the case of a candidate who for a period of not less than two years has been in responsible charge of the statistical or actuarial department of a casualty insurance organization or has had such other practical experience in casualty or social insurance as in the opinion of the Council renders him qualified for Associateship.

ARTICLE IV.—*Officers and Council.* The officers of the Society shall be a President, two Vice-Presidents, a Secretary-Treasurer, an Editor, and a Librarian. The officers with ex-Presidents, ex-Vice-Presidents and four other Fellows shall constitute the Council.

ARTICLE V.—*Election of Officers and Council.* The officers shall be elected by a majority ballot at the annual meeting for the term of one year and two members of the Council shall, in a similar manner, be annually elected to serve for two years. The President

and Vice-Presidents shall not be eligible for the same office for more than two consecutive years nor shall any retiring member of the Council be eligible for re-election at the same meeting.

ARTICLE VI.—*Duties of Officers and Council.* The duties of the officers shall be such as usually appertain to their respective offices or may be specified in the by-laws. The duties of the Council shall be to pass upon candidates for membership, to decide upon papers offered for reading at the meetings, to supervise the examination of candidates and prescribe fees therefor, to call meetings, and, in general, through the appointment of committees and otherwise, to manage the affairs of the Society.

ARTICLE VII.—*Meetings.* There shall be an annual meeting of the Society on such date in the month of November as may be fixed by the Council in each year, but other meetings may be called by the Council from time to time and shall be called by the President at any time upon the written request of ten Fellows: At least two weeks notice of all meetings shall be given by the Secretary.

ARTICLE VIII.—*Quorum.* A majority, or seven members, of the Council shall constitute a quorum. Twenty Fellows of the Society shall constitute a quorum.

ARTICLE IX.—*Expulsion or Suspension of Members.* Except for non-payment of dues no member of the Society shall be expelled or suspended save upon action by the Council with not more than one negative vote followed by a two-thirds ballot of the Fellows present and voting at a meeting of the Society.

ARTICLE X.—*Amendments.* This constitution may be amended by an affirmative vote of two-thirds of the Fellows present at any meeting held at least one month after notice of such proposed amendment shall have been sent to each Fellow by the Secretary.

#### BY-LAWS.

(AS AMENDED OCTOBER 27, 1916.)

ARTICLE I.—*Order of Business.* At a meeting of the Society the following order of business shall be observed unless the Society votes otherwise for the time being:

1. Calling of the roll.
2. Address or remarks by the President.
3. Minutes of the last meeting.
4. Report by the Council on business transacted by it since the last meeting of the Society.
5. New membership.
6. Reports of officers and committees.
7. Election of officers and Council (at annual meetings only).
8. Unfinished business.
9. New business.
10. Reading of papers.
11. Discussion of papers.

ARTICLE II.—*Council Meetings.* Meetings of the Council shall

be called whenever the President or three members of the Council so request, but not without sending notice to each member of the Council seven or more days before the time appointed. Such notice shall state the objects intended to be brought before the meeting, and should other matter be passed upon, any member of the Council shall have the right to re-open the question at the next meeting.

ARTICLE III.—*Duties of Officers.* The President, or, in his absence, one of the Vice-Presidents, shall preside at meetings of the Society and of the Council. At the Society meetings the presiding officer shall vote only in case of a tie, but at the Council meetings he may vote in all cases.

The Secretary-Treasurer shall keep a full and accurate record of the proceedings at the meetings of the Society and of the Council, send out calls for the said meetings, and, with the approval of the President and Council, carry on the correspondence of the Society. Subject to the direction of the Council, he shall have immediate charge of the office and archives of the Society.

The Secretary-Treasurer shall also send out calls for annual dues and acknowledge receipt of same; pay all bills approved by the President for expenditures authorized by the Council of the Society; keep a detailed account of all receipts and expenditures, and present an abstract of the same at the annual meetings, after it has been audited by a committee of the Council.

The Editor shall, under the general supervision of the Council, have charge of all matters connected with editing and printing the Society's publications. The *Proceedings* shall contain only the proceedings of the meetings, original papers or reviews written by members, discussions on said papers and other matter expressly authorized by the Council.

The Librarian shall, under the general supervision of the Council, have charge of the books, pamphlets, manuscripts and other literary or scientific material collected by the Society.

ARTICLE IV.—*Dues.* The dues shall be ten dollars for Fellows and five dollars for Associates payable upon entrance and at each annual meeting thereafter, except in the case of Fellows not residing in the United States, Canada, or Mexico, who shall pay five dollars at the times stated.

It shall be the duty of the Secretary-Treasurer to notify by mail any Fellow or Associate whose dues may be six months in arrears, and to accompany such notice by a copy of this article. If such Fellow or Associate shall fail to pay his dues within three months from the date of mailing such notice, his name shall be stricken from the rolls, and he shall thereupon cease to be a Fellow or Associate of the Society. He may, however, be reinstated by vote of the Council, and upon payment of arrears of dues.

ARTICLE V.—*Amendments.* These by-laws may be amended by an affirmative vote of two-thirds of the Fellows present at any meeting held at least one month after notice of the proposed amendment shall have been sent to each Fellow by the Secretary.

## CASUALTY ACTUARIAL AND STATISTICAL SOCIETY OF AMERICA.

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### RECOMMENDATIONS FOR STUDY.

#### INTRODUCTION.

Realizing the difficulties which arise in undertaking the course of study outlined by the Casualty Actuarial and Statistical Society of America in its requirements for admission to membership, the Council authorized some time since the appointment of an Educational Committee designed to assist students in preparing for the examination for admission as an Associate or for advancement to Fellowship Grade. The Committee feels that its first duty in this regard is the preparation of a course of reading and study by which students working independently or in classes may prepare themselves for the examination. The accompanying list is a result of the Committee's efforts in that direction. It may be found feasible at some later time further to extend the Committee's efforts.

The Educational Committee has no authority to limit the Examination Committee to questions within the confines of this outline, but it believes that, if carefully followed and supplemented by reading of current literature relating to material within the syllabus, it furnishes a sufficient preparation for the several examinations.

The student is warned, however, that he is expected to exercise care and discrimination in his reading. The citation of any book or paper should not be taken as an endorsement of the expressions of opinion therein, nor as indicating that it is of first-rank importance throughout, but rather as an indication that it presents a phase of the subject matter which should be examined and considered by the student. His comprehension of the subject will be aided by a careful reading of the subsequent discussion of the papers in the publications of the various actuarial societies which appear in the same or the following volume. The Committee has not attempted to record exhaustively the available literature on

any topic, and the student will find in the bibliographies, book reviews, and notes published from time to time in the *Proceedings* much additional matter of value.

A citation reading "*Proc.* III, 140" means that the paper will be found at page 140 of the third volume of the *Proceedings*. The publications of the Actuarial societies are indicated as follows:

*Proc.* Proceedings of the Casualty Actuarial and Statistical Society of America.

*T.A.S.A.* Transactions of the Actuarial Society of America.

*J.I.A.* Journal of the Institute of Actuaries of Great Britain.

*T.F.A.* Transactions of the Faculty of Actuaries of Scotland.

*R.A.I.A.* Record of the American Institute of Actuaries.

EDUCATIONAL COMMITTEE,

By A. H. MOWBRAY,

*Chairman.*

## TEXT BOOKS RECOMMENDED BY THE EDUCATIONAL COMMITTEE.

The following list contains the names of separate publications referred to in these recommendations, in the order in which they are presented.

<i>Author.</i>	<i>Title.</i>	<i>Publisher.</i>
Hall & Knight.....	Elementary Algebra for Schools, Higher Algebra.	Macmillan.
Wells .....	An Advance Course in Algebra.	D. C. Heath & Co.
McKinsey .....	Bookkeeping and Accounting.	Southwestern Pub. Co., Cincinnati, O.
Kester .....	Accounting Theory and Prac- tice (Vol. I).	Ronald Press Co.
Cole .....	Accounts, Their Construction and Interpretation.	Houghton, Mifflin & Co.
Hatfield .....	Modern Accounting.	D. Appleton & Co.
King .....	Elements of Statistical Method.	Macmillan.
Rugg .....	Statistical Methods Applied to Education.	Houghton, Mifflin & Co.
Bowley .....	Elements of Statistics.	P. S. King & Son, London.
Whitworth .....	Choice and Chance.	G. Bell & Son, Lon- don.
Blanchard .....	Liability and Compensation Ins.	Appleton.
Dunham (Editor)....	The Business of Insurance.	The Chronicle Co.
Wolfe .....	The Examination of Insurance Companies.	N. Y. Ins. Press, N. Y. C.
Law .....	A Review of Liability and Workmen's Compensation Loss Reserve Legislation.	The F. & C. Co.
Vance .....	Hand Book of the Law of In- surance.	West Pub. Co., St. Paul, Minn.
Richards .....	A Treatise of the Law of In- surance.	Banks Law Pub. Co., N. Y. C.
Fuller .....	Law of Accident and Employ- ers' Liability Insurance.	Vernon Law Book Co., K. C., Mo.
Bradbury .....	Workmen's Compensation and State Insurance Law.	Banks Law Pub. Co., N. Y. C.
Honnold .....	A Treatise on American and English Workmen's Compens- ation Laws.	Vernon Law Book Co., K. C., Mo.

Parker .....	The Insurance Laws of New York.	Banks Law Pub. Co., N. Y. C.
F. R. S. ....	Calculus Made Easy.	Macmillan.
Granville .....	Elements of the Differential and Integral Calculus.	Ginn & Co.
King .....	Institute of Actuaries' Text Book, Part II.	C. E. Layton, London.*
Boole .....	Calculus of Finite Differences.	Macmillan.
Elderton, E. N. & W. P.	Primer of Statistics.	Adam and Chas. Black, London.*
West .....	Introduction to Mathematical Statistics.	R. G. Adams & Co., Columbus, O.
Ross & Roberts.....	Actuarial Theory.	Oliver & Boyd, London.*
Willet .....	Economic Theory of Risk and Insurance.	Columbia Univ. Press.
Zartman & Price.....	Yale Readings in Insurance.	Yale Univ. Press.
Huebner .....	Property Insurance.	D. Appleton & Co.
Seager .....	Social Insurance.	Macmillan.
Rubinow .....	Social Insurance.	Henry Holt & Co.
Rubinow .....	Standards of Health Insurance.	Henry Holt & Co.
Rubinow .....	Standard Accident Table.	The Spectator Co.
Elderton & Fippard..	Construction of Mortality and Sickness Tables.	Adam and Chas. Black, London.*
Parks .....	Accident and Health Experience.	The Spectator Co.
Watson .....	Friendly Society Finance.	C. and E. Layton, London.*

\* The Spectator Co., 135 William St., Selling Agents.



## ASSOCIATESHIP.

*Part I.*

1. Elementary algebra up to and including the binomial theorem and the use of logarithms, and compound interest and annuities-certain.

There are many good algebra textbooks which fit the candidate for this examination and with which in his school work he may have become familiar. The Committee feels that among the best are

Hall & Knight: Elementary Algebra for Schools—to be supplemented by

Hall & Knight: Higher Algebra, Chapters XVI and XVIII.

Wells: An Advance Course in Algebra. Chapters I to XXX will also be found to cover the ground very well, in some respects more thoroughly than Hall & Knight's Elementary Algebra. If this reference is used that portion of Chapter XXIX from section 606 on may be omitted.

2. Double Entry Bookkeeping.

There are so many good textbooks on Double Entry Bookkeeping that the Committee finds it difficult to single out one or more as more appropriate as the basis of preparation for examination. Students of commercial courses will probably have their own which they have used in their studies and prefer to review from that source. Those who have not had any preliminary training, nor a textbook which they personally prefer are recommended to read

McKinsey: Bookkeeping and Accounting.

Kester: Accounting, Theory and Practice, Vol. I, Chapters I-XXX.

As an aid to understanding the theory the student will do well if he reads

Cole: Accounts—Their Construction and Interpretation (pages 9-66); or

Hatfield: Modern Accounting.

3. Elements of statistics, including theory of compilation, tabulation and presentation, but excluding critical mathematical analysis. The text recommended for study is

King: Elements of Statistical Method.

It would be well for the students to read carefully

Bowley: Elements of Statistics, Chapters I, II, IV, V, VII, VIII, IX.

Rugg: *Statistical Methods Applied to Education*. As the title of the latter book implies the material is specialized, but the approach to the problem is particularly good.

### ASSOCIATESHIP.

#### *Part II.*

#### 1. Elements of the Theory of Probabilities—Algebraic Treatment only.

Hall & Knight: *Higher Algebra*, Chapter XXXII, if thoroughly mastered should equip the student to pass this test.

The student may omit the geometrical methods following the 4th set of examples, but the miscellaneous set of examples following and the 5th set of examples contain many problems which should not be overlooked.

Whitworth, *Choice & Chance*: Though this textbook is out of print it may be found in many libraries and is probably the best in its own field, the treatment being much more extensive than that given in Hall & Knight's algebra. As indicated by the title the work deals with the two topics of

- (1) Permutations and combinations of numbers (Choice),
- (2) Theory of Probabilities (Chance).

The work is further divided into two parts, in the first both topics being covered by purely arithmetic methods and in the second receiving algebraic treatment. The more advanced theorems, particularly those dealing with inverse probabilities may be omitted. The large number of examples for test work given in this volume together with solutions and answers make it especially valuable.

#### 2. Policy Forms and Underwriting Practice in Casualty Insurance.

To meet the requirements of this subject the student must be thoroughly familiar with the policy forms and rate manuals in use. The analysis of the policy contract and the study of the descriptive matter and rate tables of the manual will together give the student a fundamental understanding of the various kinds of insurance. Particular attention should be given to the following:

##### A. The insuring clauses of the contract:

- (1) The subject matter of the insurance;
- (2) The contingency insured against;
- (3) Service in investigations and settlements;
- (4) Defense of suits;
- (5) Payment of expenses;
- (6) Exceptions as to coverage;

- (7) Period of the insurance;
- (8) Conditions relieving insurer from liability.
- B. The Premium:
  - (1) Unit on which computed;
  - (2) When payable;
  - (3) Methods of adjustment when policy cancelled by insurer or assured.
- C. General Provisions:
  - (1) Inspection of premises or subject of the insurance by insurer;
  - (2) Inspection of assured's books;
  - (3) Notice of accidents, etc.;
  - (4) Subrogation.

The student may profitably refer to:

Rhodes: "The Liability Contract." "Liability and Compensation Lectures." The Insurance Institute of Hartford, 1913, p. 25.

Denniston: "Policy Forms." "Liability and Compensation Lectures." The Insurance Institute of Hartford, 1913, p. 39.

Dunham: "The Business of Insurance," Chapters XLIV, LIV, LV, LVI, LVII, LIX, LXII, LXIII, LXXIII, LXXVII, LXXXVII-LXXXIX.

Michelbacher: "Manufacturers' and Contractors' Public Liability Insurance," *Proc.*, IV, 89.

"Casualty Insurance for Automobile Owners," *Proc.*, V, 213.

Blanchard: "Liability and Compensation Insurance."

In workmen's compensation and liability insurance a familiarity with the methods of practically applying schedule rating and experience rating is advisable. The last reference above will give the student the essential facts. At the time this book was written both schedule and experience rating were in their formative stages, and the student should look up the plans at present in effect.

Fitch: "Some Distinctive Features of Steam Boiler Underwriting and Their Bearing upon the Formulation of Premium Rates," *Proc.*, II, 407.

The Steam Boiler and Fly Wheel Service Bureau, of 13 Park Row, are now engaged in the preparation of a general statistical plan for steam boiler and fly wheel insurance. A study of this plan would be very useful in this connection, and it is suggested that, if the student is not able through his own office to obtain a copy of this plan, he communicate with the Manager of this Bureau, Mr. H. G. Chase, who may be able to furnish him with a copy of the plan or further information.

3. Simple Problems relative to Procedure in Compilation and Use

of Statistics relating to Casualty (including Social) Insurance Problems.

4. Simple Problems relating to Procedure in Insurance Accounting and Statistics, including the preparation of Annual Statements and Schedules.

The student must be thoroughly familiar with the Convention Edition of the Annual Statement blanks for miscellaneous Stock and Mutual Companies and all schedules therein or supplemental thereto. He should understand the construction of Schedules "W" and "Z" required by several of the states for compensation business.

The student will find help in the following pamphlets issued by the National Council on Workmen's Compensation Insurance, 16 E. 40th Street, New York City.

Hon. Frank H. Hardison: The Origin and History of Schedule "Z" in Massachusetts.

E. H. Downey, Ph.D.: The Uses and Abuses of Schedule "Z." Instructions for the Preparation of Schedule "Z"—1920.

If possible the student should obtain practical experience in connection with the compilation of such Schedules.

A knowledge of the accounting procedure involved in the preparation of the statement and schedules is necessary. The student should understand that for this purpose an elementary knowledge of the methods required for claim and premium reserve statements is necessary. This does not conflict with Part I, subject 1 of the Fellowship Syllabus which has to do with the study of the principles underlying correct reserve determination.

The following are recommended for reading:

Wolfe: The Examination of Insurance Companies.

Cammack: A System of Analyzing Workmen's Compensation Business by Means of Perforated Cards, *Proc.*, II, 90.

Scattergood: Cost Accounting in Casualty Insurance, *Proc.*, II, 253.

The provisions of the liability and compensation loss reserve laws in force in New York, Massachusetts, Illinois and other states should be carefully examined.

In connection with the development of existing laws, the student will find help in

Law: A Review of Liability and Workmen's Compensation Loss Reserve Legislation.

5. Insurance Law, including the more important Statutes of the United States and Canada (for Canadian Candidates) relating to Casualty Insurance.

The student is expected to have a general grasp of the legal principles applied to insurance practice in the United States. The following list of references is formidable in appearance,

but it is not expected that the student should master them all. He should read rather rapidly the text cited to orient himself and get the general principles, and then rather critically examine the legal notes cited and some of the decisions to understand their practical application. Too close reading of specific statutes is not recommended, as statutory provisions are subject to frequent change.

Insurance-General:

Vance: Hand Book of the Law of Insurance, or

Richards: A Treatise on the Law of Insurance.

Accident and Employers' Liability Insurance:

Fuller: Law of Accident and Employers' Liability Insurance.

Current Decisions:

Legal Notes in the *Proceedings*, and also in the *Transactions of the Actuarial Society of America*. It is hardly necessary to go back more than three years in examining these notes.

Insurance Law Journal, published by C. C. Hine's Sons Co. and the

Workmen's Compensation Law Journal, published by the same firm, furnish a more extensive basis of study under this subject.

Workmen's Compensation Insurance Law:

Bradbury: Workmen's Compensation and State Insurance Law. or

Honnold: A Treatise on the American and English Workmen's Compensation Laws.

Current Decisions on Workmen's Compensation:

Reported decisions of administrative commissions, particularly those of Massachusetts, New York, Connecticut and California.

These decisions are generally reported in some official publication, such as the Bulletin of the New York State Industrial Commission. Of course, some of these cases are reviewed in the Legal Notes referred to above.

Statute Law Governing Insurance Companies:

The student can generally obtain from the insurance departments of the several states a pamphlet reprint of the insurance law, and he should be familiar with the laws relating to casualty companies. In some states as, for example, New York, the law cannot be obtained in this way but must be found in such a publication as

Parker: The Insurance Laws of New York, which is issued annually, giving the latest texts of the law and copious annotations.

## FELLOWSHIP.

The Educational Committee feels that, in view of the comparatively small compass as yet of the *Proceedings*, candidates taking the examination for Fellowship may properly be expected to be familiar with most of the material appearing in the papers so published and with the discussions of such papers. While the Committee has cited candidates of this class to papers in the *Proceedings*, it should not be assumed that the Examination Committee will confine itself to material in those papers.

The student's attention is also directed to the book reviews and current notes appearing in the various numbers of the *Proceedings*, which indicate sources of information which may be very valuable to him.

Volume LXX of the *Annals* of the American Academy of Political and Social Science is entitled "Modern Insurance Problems" and divided into three parts, one of which deals with casualty insurance. There are a number of papers in this part by members of this Society and by others, which bear upon most of the subjects set in the second part of the Fellowship examination, and a study of this part of such volume should therefore be of much assistance to the student.

## FELLOWSHIP.

*Part I.*

## 1. Advanced Algebra, Elementary Differential and Integral Calculus and Elementary Calculus of Finite Differences.

Hall & Knight: Higher Algebra, first 24 chapters, omitting, however, chapters XVI and XVIII as these topics have already been covered in the Associateship examinations. It will, however, do the candidate no harm to review these chapters also because of their bearing on other work.

A knowledge of differential and integral calculus is essential to the understanding of the modern mathematical methods of statistical analysis. There are many good texts in college courses and those who have had such courses will mainly require a review of their college work. For students who have no previous knowledge of the subject a small book entitled "Calculus Made Easy," by F. R. S. may be found useful as an introduction to more reading.

Granville's Calculus published by Ginn and Company is recommended for those who have not previously studied other texts.

A knowledge of the calculus of finite differences is also essential to such work and the student is referred to the Institute of Actuaries Text Book, Part II, Chapters XXII, XXIII, XXIV to section 29.

A more elaborate treatment will be found in

Boole: Finite differences,

but this text is now out of print and found only in the libraries.

2. Critical Analysis of Statistics, including Elementary Mathematical Theory.

As a means of approach to this subject the student is recommended to read

Elderton (W. Palin and Ethel M.): Primer of Statistics.

This book comprises only 86 pages and presents important principles very simply and clearly. It will be particularly helpful in introducing the student to the general subject of Statistical Analysis. The book does not deal at all with the collection and compilation of statistical data.

This book may be followed up by

West, Carl G.: Introduction to Mathematical Statistics.

The student should carefully work through the examples given in this text. If he wishes to pursue the subject further he will find considerable help cited in the Bibliography appearing in the back of this book.

3. Elements of the Theory of Life Contingencies, including the Calculation of Present Values of Annuities based upon Life Contingencies.

Institute of Actuaries Text Book, Part II, Chapters I, II, III, IV, V, VI, VII (those portions that deal with Annuities only are required), IX, XI, XII.

Ross & Robertson: Actuarial Theory.

This work parallels the Text Book, Part II, by chapters further explaining and elucidating the propositions therein presented and will be of great help to the student.

Questions set in the past by the Examination Committee show the necessity for a knowledge of the use of fractional and continuous annuities. The use of these in the valuation of Workmen's Compensation Benefits seems to justify the Examination Committee in this view.

4. Economic Theory of Insurance, including the Theory of Social Insurance.

Willett, A. H.: Economic Theory of Risk and Insurance.

This is a doctor's thesis published by Columbia University and probably the best treatment of this subject. It is practically out of print, though a few copies may be had from Columbia University.

Zartman & Price: Yale Readings in Insurance—Personal Insurance, Chapters I, II, III and IV.

This latter reference contains one chapter from Dr. Willet's thesis above presented.

Huebner, S. S.: Property Insurance, Chapter I.

This text is concerned with fire insurance, but the ideas are applicable to other forms.

Seager: Social Insurance, A Program of Social Reform.

In simple and compact form this presents the conception of the theory of Social Insurance by those who are advocating its widest extension in the United States.

Rubinow: Social Insurance.

Standards of Health Insurance.

The first of these texts treats extensively the social insurance systems of European countries, and the latter, the specialized problem of social health insurance from the standpoint of those who believe private enterprise has no place in this field.

## FELLOWSHIP.

### *Part II.*

1. Advanced Practical Problems in the Compilation and Use of Statistics relating to Casualty (including Social) Insurance Problems.

As is apparent from its phraseology, this topic is inserted in the syllabus with a view to developing not so much the knowledge of the student as to certain facts in past or present practice of Casualty insurance, as his capacity to handle original problems which may come up. His mode of preparation therefore is to study critically the efforts of others to solve such problems in the past. In reading the accounts of such efforts he should critically review each in the light of later developments and not necessarily accept the procedure set forth as the best possible. Examples of such solutions are found in

Rubinow: Standard Accident Table, and

Madrill: The Compensation Cost of Industrial Disease, *Proc.*, II, 208,

as well as many other papers in the *Proceedings*.

In addition to these references the student should study the Report of the Work of the Augmented Standing Committee on Workmen's Compensation Insurance Rates, 1917, issued by the National Workmen's Compensation Service Bureau, and the

Report of the 1920 National Rate Revision, issued by the National Council on Workmen's Compensation Insurance.



The statistical plans of the National Workmen's Compensation Service Bureau covering workmen's compensation, general liability and automobile insurance may well be studied and if it is possible for the student to obtain for comparison some of the earlier drafts of these plans he will find a study of their developments of much help.

2. Calculation of Premiums and Reserves for Accidents, Sickness, Workmen's Compensation and other Branches of Casualty Insurance, including Consideration of Basis of Reserve.

*For Workmen's Compensation Manual Rates:*

- Blanchard: Liability and Compensation Insurance, Chap. 17, 18, and 21.
- Downey: "Classification of Industries for Workingmen's Compensation Insurance," *Proc.*, II, 10.
- Mowbray: "How Extensive a Payroll is Necessary to Give a Dependable Pure Premium?" *Proc.*, I, 24.  
"A New Criterion of Adequacy of Exposure," *Proc.*, IV, 263.
- Michelbacher: "The Theory of Law Differentials," *Proc.*, III, 195.
- Rubinow: "Scientific Methods of Computing Compensation Rates," *Proc.*, I, 10.
- Ryan: "Revision of Workmen's Compensation Rates," *Proc.*, III, 195.
- Woodward: "Provision for Expenses in Workmen's Compensation Premiums," *Proc.*, III, 140.
- Downey & Kelley: "Revision of Compensation Insurance Rates, 1918," *Proc.*, V, 243.
- Greene: "Upon Combining Compensation Experience from Several States," *Proc.*, VI, 10.
- Michelbacher: "Technique of Rate Making as illustrated by the 1920 National Rate Revision of Workmen's Compensation Insurance Rates," *Proc.*, VI, 201.
- Mowbray: "The Actuarial Problems of the 1920 National Revision of Workmen's Compensation Insurance Rates, and the Solution Developed by the Actuarial Committee of the National Council on Workmen's Compensation Insurance," *Proc.*, VI, 250.

*For Merit Rating:*

- Various: "Schedule Rating in Compensation Insurance," *Proc.*, I, No. 3.

The entire meeting was devoted to this general topic. The several papers and discussions should be read and compared with the following:

- Wilson: "Inspection and Schedule Rating for Coal Mine Insurance," *Proc.*, II, 39.
- Downey: "A Preliminary Test of the Coal Mine Schedule of the Associated Companies," *Proc.*, II, 394.

"Some Principles of Compensation Merit Rating,"  
*Proc.*, III, 26.

"The Industrial Compensation Rating Schedule,  
1918," *Proc.*, IV, 325.

Mowbray: "Scheduled Experience Rating," *Proc.*, III, 14.

Woodward: "The Experience Rating of Workmen's Compensation Risks," *Proc.*, III, 356.

Whitney: "The Theory of Experience Rating," *Proc.*, IV, 274.

Michelbacher: "The Practice of Experience Rating," *Proc.*,  
IV, 293.

Blanchard: "Liability and Compensation Insurance," Chaps.  
19 and 20.

*For Premiums on Other Casualty Lines:*

Institute of Actuaries Text Book, Part II, Chap. XX.

Elderton & Fippard: "Construction of Mortality and Sickness  
Tables."

Watson: "Friendly Society Finance Considered in its Actuarial  
Aspects."

Parks: "Accident and Health Experience."

The following papers would be of interest to the student to  
read:

Hardy, G. F.: "On Friendly Societies," *J. I. A.*, XXVII, 245.

Watson: "Some Points of Interest in the Operation of  
Friendly Societies," *J. I. A.*, XLIV, 168.

"The Business of Insurance," Vol. 11, Chap. 33.

Fallow, E. S.: "Accident Statistics and Reserves."

Accident and Health Insurance Lectures, Insurance  
Institute of Hartford.

Messenger: "The Rate of Sickness," *T. A. S. A.*, 371.

Craig: "Health Insurance from a Theoretical and Practical  
Standpoint," *T. A. S. A.*, XV, 271.

King: "Accident and Health Insurance from an Actuarial  
Point of View," *Proc.*, II, 39.

*On Loss Reserves for Workmen's Compensation:*

Various: "Compensation and Liability Claim Reserves," *Proc.*,  
I, No. 2.

The entire meeting was devoted to this general topic.  
The several papers and discussions should be carefully  
read and compared with the following:

Fondiller: "Tables for Computing Present Value of Death  
Benefits," etc., *Proc.*, II, 110.

Woodward: "Premiums and Reserves of the Swiss Accident  
Insurance Institutions," *Proc.*, IV, 45.

Penman: "On the valuation of the Liabilities of an Insurance  
Company under its Employers' Liability Contract,"  
*J. I. A.*, XLV, 101.

Blanchard: "Liability and Compensation Insurance,"  
Chap. 21.

While there are some papers in the *Proceedings* and elsewhere dealing with other lines of casualty insurance than those above referred to, the Committee believes that a thorough study of the above topics coupled with a careful consideration of the policy forms, the nature of the indemnities furnished, and the basis of premium charge, should enable the student to attack the problem of premium and reserves for other branches of casualty insurance.

3. Advanced Practical Problems in Insurance Accounting and Statistics, including the Preparation of Annual Statements and Schedules.

As with topic (1) this topic is inserted in the syllabus for the purpose of testing the capacity of the candidate to solve original problems. Many of the references stated with respect to other topics of the syllabus furnish help in preparation for this topic. Aside from these no specific references are presented for this topic. The candidate should endeavor to obtain where possible opportunity for practical discussion with those charged with the supervision of the practical work in the various offices and rate making bodies.

4. Underwriting Problems in Casualty Insurance, including Inspection of Risks, Adjustment and Settlement of Claims, etc.

The Committee feels that the student will gain most under this subject from discussion with competent underwriters, engineers and adjusters. The Committee strongly recommends all students preparing for this examination to seek instruction in this way if possible. In default of acquiring information in this way the student will find help in the following references:

Dunham (editor): *The Business of Insurance*.

The student will find many special chapters dealing with underwriting, inspection and adjustment problems in various lines of casualty insurance in this three volume work.

Insurance Institute of Hartford: This Institute has put out separate volumes for different years dealing with different branches of casualty insurance in each of which several phases of that branch are discussed. The student will find much help in these lectures.

## RULES REGARDING EXAMINATIONS FOR ADMISSION TO THE SOCIETY.

(AS AMENDED OCTOBER 8, 1920.)

The Council adopted the following rules providing for the examination system of the Society:

1. Examinations will be held on the first Wednesday and Thursday during the month of May in each year in such cities as will be convenient for three or more candidates.

2. Application for admission to examination should be made on the Society's blank form, which may be obtained from the Secretary-Treasurer. No applications will be considered unless received before the fifteenth day of March preceding the dates of examination.

3. A fee of \$5.00 will be charged for admission to examination. This fee is the same whether the candidate sits for one or two parts and is payable for each year in which the candidate presents himself. Examination fees are payable to the Secretary-Treasurer and must be in his hands before the fifteenth day of March preceding the dates of examination.

4. The examination for Associateship consists of two parts. Subject to the provisions of Rule 5 following, no candidate will be permitted to present himself for Part II unless he has previously passed in Part I or takes Part I and II in the same year. If a candidate takes both parts in the same year and passes in one and fails in the other, he will be given credit for the part passed.

5. In the case of applicants not less than thirty years of age who have had not less than five years' experience in actuarial or statistical work in insurance offices, the Council may, upon receipt of satisfactory evidence of general education, waive the passing of Part I of the Associateship Examination. Such applicants may thereupon become Associates by passing Part II thereof.

6. Admission to Fellowship examinations is granted only to those who are Associates of the Society. The examination for Fellowship is divided into two parts. No candidate will be permitted to present himself for Part II unless he has previously passed in Part I or takes Parts I and II in the same year. If a candidate takes both parts in the same year and passes in one and fails in the other, he will be given credit for the part passed.

7. As an alternative to the passing of Part II of the Fellowship examination, a candidate may elect to present an original thesis on an approved subject relating to casualty or social insurance. Candidates electing this alternative should communicate with the Secretary-Treasurer as to the approval of the subject chosen. All

theses must be in the hands of the Secretary-Treasurer before the first Thursday in May of the year in which they are to be considered. Where Part I of the Fellowship examination is not taken during the same year, no examination fee will be required in connection with the presentation of a thesis. All theses submitted are, if accepted, to be the property of the Society and may, with the approval of the Council, be printed in the *Proceedings*.

8. In Part II of the Fellowship examination the papers will be so arranged that it will be necessary for the candidate to write on only three of the four prescribed topics in order to obtain full credit.

## SYLLABUS.

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### ASSOCIATESHIP.

#### *Part I.*

1. Elementary algebra up to and including the binomial theorem and the use of logarithms, and compound interest and annuities-certain.

*Note.*—Under this topic the student is expected to understand what is presented in the ordinary college algebras through the binomial theorems but excluding exponential and logarithmic series. He is expected to understand the ordinary use of logarithms and to be able to handle the simpler problems in compound interest and annuities-certain as they are presented in the average college algebra, without going into the more intricate problems of bond amortization and similar matters.

2. Double entry bookkeeping.

3. Elements of statistics, including theory of compilation, tabulation and presentation, but excluding critical mathematical analysis.

#### *Part II.*

1. Elements of the theory of probabilities—algebraic treatment only.

2. Policy forms and underwriting practice in casualty insurance, viz., personal accident, health, liability, workmen's compensation, fidelity, surety, plate glass, steam boiler, burglary, fly wheel, automobile, workmen's collective, credit.

3. Simple practical problems relative to procedure in compilation and use of statistics relating to casualty (including social) insurance problems.

4. Simple practical problems relating to procedure in insurance accounting and statistics, including the preparation of annual statements and schedules.

*Note.*—As respects items 3 and 4, the student is expected to be prepared to carry through, under instructions, such compilations

of statistical data as are usually made in the office of a casualty company and to carry through the usual accounting work, including the preparation of the statement. He should also be prepared to adapt, for the use of his particular company, statistical and accounting methods in general use. It is not expected that the candidate for Associateship should be prepared to work out new plans and methods for developing data and answering intricate questions, facility for coping with the latter type of problems being among the qualifications required for Fellowship.

5. Insurance law, including the more important statutes of the United States and Canada (for Canadian candidates) relating to casualty insurance.

#### FELLOWSHIP.

##### *Part I.*

1. Advanced algebra, elementary differential and integral calculus and elementary calculus of finite differences.

2. Critical analysis of statistics, including elementary mathematical theory.

3. Elements of the theory of life contingencies, including the calculation of present values of annuities based upon life contingencies.

##### *Part II.*

1. Advanced practical problems in the compilation and use of statistics relating to casualty (including social) insurance problems.

2. Calculation of premiums and reserves for accident, sickness, workmen's compensation and other branches of casualty insurance, including consideration of basis of reserve.

3. Advanced practical problems in insurance accounting and statistics, including the preparation of annual statements and schedules.

4. Underwriting problems in casualty insurance, including inspection of risks, adjustment and settlement of claims, etc.

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“Recommendations for Study” is a pamphlet which outlines the course of study to be followed in connection with the above syllabus. Copies of this pamphlet and also past examination questions may be obtained free, upon application to the Secretary-Treasurer.

VOLUME VII, PART II

NUMBER 16

PROCEEDINGS  
OF THE  
Casualty Actuarial Society

MAY 24-25, 1921

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### NOTICE.

The Society is not responsible for statements made or opinions expressed in the articles, criticisms, and discussions published in these *Proceedings*.



## PROCEEDINGS

MAY 24-25, 1921.

## THE CASUALTY ACTUARIAL SOCIETY AS AN EDUCATIONAL INSTITUTION.

## ADDRESS OF THE PRESIDENT, A. H. MOWBRAY.

In his address at our last session President Flynn expressed a very hopeful view of the future of statistical and actuarial work in the casualty field, but closed with the suggestion that this development will on the one hand be promoted by and on the other hand require for meeting its demand a sound professional foundation and wide practical knowledge of the business on the part of the actuary and statistician. Reflection on this thought naturally raises the question how this training and knowledge may be secured and the part this Society is to play in the work. We are led to consider our Society as an educational institution. Whether we are accustomed so to think of it or not, this is what our Society was intended to be and is.

Examining ourselves from this point of view, we may ask what we accomplished in an educational way through our Society; what are we doing today; and what of the future. All these questions we may consider in their relation: (a) to ourselves—the profession; (b) to those who are just coming into our work—the future of the profession; (c) to the casualty insurance business and through it the public. Let us briefly consider each of them in turn.

Our published *Proceedings* giving the record of our past actions is naturally the source to which we turn for the answer to the first question. We find that at the outset our attention was engrossed with the problems of Workmen's Compensation Insurance, and all of the papers in Volume I covering the first year of our existence deal with some phase of that business or its predecessor and kindred line—liability insurance. That still probably constitutes our major interest, but we find we early began to broaden our view, and one of the first papers in Volume II, "Accident and Health Insurance from an Actuarial Viewpoint," by Walter I. King, pointed out the

advantages both to the public and the companies of the writing of personal accident and health insurance under a non-cancellable contract. Each succeeding meeting has shown a tendency to broaden the field of our view, but the rapidity of developments in workmen's compensation insurance has naturally caused a continuance of our major attention being concentrated on this subject. And this has not been a disadvantage, for in the papers in our *Proceedings* we have a fairly complete historical record of the development of rate making in this field, the first, perhaps, of the casualty lines to be handled in a scientific manner.

Starting as it does with the pioneer efforts, the record contains much that is now obsolete and, as events have proved, was at the time it was presented of but passing interest. Yet it was the discussion of these passing phases which prepared us for taking the forward steps. And in our being free from the pressure of competitive business interests, we have done much to educate ourselves, to broaden our points of view and to enable us impartially to view our problems from all angles. We are reaching the point where we can receive proposed solutions in a cordial spirit and subject them to searching and critical analysis in an impersonal and friendly way. The educative value of this to ourselves can hardly be overestimated, and its effect on the business of casualty insurance can not but be beneficial. The attitude of the managers pointed out by Mr. Flynn is evident of appreciation of this value.

So much for what we have done for ourselves and for the business of casualty insurance. Let us review the record for the future of the profession. What have we done for those just entering on our work, for those who are to come after us?

As I have pointed out, we have prepared a complete and frank record of our experiments in the effort to make scientific workmen's compensation rates and our failure and successes. We can hardly expect that the placing of other branches of casualty insurance on a scientific basis will present the identical problems workmen's compensation has and is presenting, yet there will doubtless be analogous problems for which our work will point the way to a profitable line of approach.

We have placed in the record descriptive papers of practices in various lines of casualty insurance which form an appropriate introduction for their deeper study and have similarly recorded the results of investigations into mathematical and statistical problems

related to casualty insurance. What is probably more important, we have laid out a course of study by which a young man or woman, having an appropriate fundamental education, may prepare for work in our profession and through our examinations have set him a means of measuring his attainments therein. We have not yet found the way of supplementing this study by training and practical experience. Yet if I mistake not the meaning of several recent appointments, company executives are coming more to realize the value of actuarial guidance based on well-compiled statistics, and are, therefore, becoming more receptive to the idea of placing on the staff a few young men of good fundamental education to be trained for future technical work. The importance of this attitude for the future personnel of the profession can not be over-emphasized.

So much for what we have done. What are we doing today?

Our history is so short that perhaps all I have said may be taken merely as what we are doing today. Yet I think one or two points should be noted as perhaps significant.

The last general rate revision in Workmen's Compensation Insurance was not even completed when two of our members, those most closely connected with the work, presented a year ago extensive papers giving the decision as to general principles followed and the working plans and methods in much detail. Today the basic work in Non-Cancellable Health and Accident Insurance is only just completed, and two of our members connected with that work are presenting papers giving us the benefit of their studies. Are not these significant of the true spirit of helpfulness our Society was promoted to foster?

And in our discussion of these papers we have sought the underwriters' participation and advice. For we recognize, as Mr. Flynn pointed out, that our point of view must not be narrow. We seek in our Society the scientific attitude. We wish to suppress for the time being our individual company or office viewpoint, that we may not be blinded by competitive bias. But we value the practical and recognize that our scientific work reaches its highest value when it is made practical. Indeed, until it is so made practical our work can not be truly called scientific. Theory which can not be connected up to the facts of life can not become a body of guiding principles, but must remain little better than mere hypothesis. And so we seek contact with and the point of view of the strong

practical men in the casualty business. We feel that the record of this work in our *Proceedings* will be the more valuable for their criticism and comment. It is a step in directing our educational efforts for ourselves and our students in practical as well as theoretical lines. Here, again, the effect upon the casualty insurance business can not but be helpful.

Well or ill, what we have done is done. Today is passing. What shall we say of the future? It is for the future we must plan. It is for the future our Educational Committee is planning, and I believe there is much to be done for our students and ourselves.

Let us consider first what we should further do to assist students preparing to enter our profession. We have outlined a course of study and I believe the references are fairly well selected. But books of the kind are expensive and students are seldom wealthy. The salaries of beginners are not large. We should assist them to secure access to these books. The Educational Committee has recommended to the Council that the Society purchase for its library a set of these references to be loaned to our students on proper terms and steps to carry this out are being taken. As a Society that is perhaps as far as we can go in this direction, but through our members we can go further. If we as individuals are willing to make our own libraries available to students in our own vicinities, can we not and should we not arrange for some clearing center of information of the facilities so available in various localities?

Some of us have in our company offices fairly satisfactory library facilities, and these can be of material assistance to our students. We should encourage the use of these facilities by them. As our executives find these facilities are used and are producing more skilful and better service for the companies, they will be more willing to add to them when requested.

I am one of those who believe we get little more out of any exercise of mind or body we undertake than we put into it. I am therefore inclined to put as much of the burden of his preparation on the student as he can carry. I feel the laboratory is a better developer of information and ideas than the lecture room. But the most profitable laboratory is one that is directed by a skilful and sympathetic teacher. So I think while we should not attempt to carry our student over all the difficulties of acquiring the foundation for his future work, we may with profit to him and to ourselves supplement his own efforts with something resembling class work.

This is done in some of the large life offices. Can we not do so with groups of students in our own offices? Our work might take the form of quizzes on subjects being studied designed to bring out the salient points and to show the practical application and value of the subject matter, or informal talks on subjects not well covered in available books. While such work would primarily interest students preparing for our examinations, others not so preparing might be encouraged to participate, and the office would doubtless profit by added interest in their work and better results from it. Such talks might well be woven into a general scheme of interdepartmental classes where such have been organized. Where we have not a group of students, but one or two men studying individually, should we not encourage them to come to us freely and discuss their work with us?

Although this is all individual and personal rather than work of the Society as a body, it has occurred to me and to the Chairman of our Educational Committee that by using the committee as a clearing body we might assist each other to more effective work in this regard. And where we have but one or two men studying in individual offices, but several in the same community, ought we not to try to bring them together for mutual help and such common directive guidance?

And this brings me to another phase of this interesting work of Insurance Education, the work of the Insurance Institutes and the attitude and relation we should bear toward them. It seems to me our attitude here should be one of sympathetic interest and hearty cooperation, for they are certainly also educational institutions working for the betterment of the insurance business. Their work is not confined to our line. They are perhaps not so technical or so far advanced in some phases of their work. But they cultivate a broader field, and one has only to look at the results achieved and positions attained by those who first became interested in their work to appreciate the value of what they are doing.

Just what form the cooperation should take will perhaps be a matter of evolution. It would appear that some coordination of library and class work would be mutually helpful. Unless I misjudge the spirit of our membership, we are not likely to assume an air of superiority because we may set higher standards in our examinations and deal with insurance in a more technical way. Such an attitude would in the end only react to our detriment, whatever our

own achievement might be. At least two of the members of our Society are much interested in the Institute work, and with this thought of cooperation in mind I have asked them to serve on our Educational Committee. Though very busy men, they have, I am pleased to say, accepted.

Turning to another phase, our work within the Society, particularly with regard to the presentation and discussion of papers, I could wish we were a little less diffident and modest. I can not but express my appreciation of the cordial willingness with which individual members have responded to my invitations to prepare and discuss papers, and as we look through the *Proceedings* we note a steadily growing list of contributors, but we venture the hope that more and more the papers will be presented spontaneously. I would especially address these remarks to those who have recently passed our tests. In no way do we become more masters of our work and technique than by presenting its various phases for the consideration of others, especially of those who by training and experience are qualified to give our work critical study. The training in so preparing and presenting the results of investigations will be of highest value to us when called upon to make similar presentations to our executives, state officials and others.

Often in our work we find little short cuts, office methods, formulae, matters we think too trivial to become the subject of a formal paper, a judgment in which the Committee on Papers might well concur, yet the communication of these to our fellow workers would often be most welcome and helpful. I believe we should not hesitate to send these in not as papers, but as informal notes. Our editor, I am sure, would be glad to start a Department of Actuarial and Statistical Notes were the material forthcoming. Such notes should still probably be passed on by the Committee on Papers to assure the correctness of the formulae and methods presented, but so rigid a standard as to form and fullness of treatment would not be required.

While Mr. Flynn urged upon us sound preparation for our work, he closed his address with an emphasis on the need of practicality and capacity to deal with practical men, and that is a point we should keep well in mind. As we acquire training and theoretical knowledge we must not lose our common sense. The term "academic" has become almost synonymous with useless, not because teachers and research workers do not do useful work or give valuable



training, but because in too many instances they have shut themselves off from the common workaday world and lost their capacity of approach to the common sense every-day man.

As we grow in knowledge and influence and acquire a professional status there will be a tendency toward such an academic attitude. As the proportion of men among us who have become members by examination increases there will naturally come a tendency to over-estimate the value of the examination in itself and overlook the fact that ability to pass a set of examinations is not the sole test of real professional ability. Notwithstanding its well-known imperfections, we use the examination to search out the candidate's capacity to attack the actuarial problem of casualty insurance in a clear, intelligent and scientific manner, to find correct solutions and adapt them to practical application. It is this capacity that qualifies him for recognition as entitled to standing.

We should do all we can to make the certificate the Council has voted to issue to the Fellows by Examination something to be highly prized and sought for as evidence of real qualification, but we must guard against falling into what I might call—without implying any invidious comparison thereby—the trades-union spirit, a closed-shop attitude. We should encourage the young man to come to us by the examination route and keep at it until he has attained the Fellowship, because his preparation for the examinations will be invaluable training to him. Because of our special interest we should continue to insist upon our own examinations rather than accept those of another body, even though its standards in some respects be higher than ours. But when we find a worker in our field or a related field, if he has shown a broad sympathy with our work, who is not one of us, whatever the reason, whose age and position is such that he can not properly undertake the work of preparing for examination, and who has clearly in his work shown that capacity our examinations are designed to test, then it seems to me we should unhesitatingly admit him as a Fellow without the formality of examination.

For this the framers of our constitution wisely made provision, and as I review the use that has been made of the provision it seems to me it has been wise. Notwithstanding the natural tendency to which I have alluded and the small number who can by withholding assent prevent an election on this basis, I have high confidence that the same wise use of the provision—neither too free nor too re-

stricted—which always works to our own good will be made in the future as in the past.

The program I have presented may seem ambitious, yet it seems to me merely what is necessary to realize for the future the ideals we have cherished in the past, the ideals which have enabled us to do what we have done. If we can carry forward these ideals, the future of our profession and of this Society as its exponent seem fully assured.

## A STUDY OF SCHEDULE RATING.

BY

ALBERT W. WHITNEY.

The National Council on Workmen's Compensation Insurance has undertaken a revision of the schedule-rating system. Although the present schedule is unsatisfactory, there is no such pressing need of a new schedule that the work can not be carried on deliberately and thoughtfully and thoroughly; unless a schedule can be evolved which shall show marked improvement over the present schedule, which shall bear indubitable signs of being structurally right, which upon that right structure shall carry a content that is based upon fact rather than mere judgment, there will be no use of making a change, for every change is disturbing and to that extent to be avoided.

The present schedule is not based upon a fundamental analysis: it therefore is lacking in adaptability and flexibility; it is not based upon statistical facts: quantitatively it is therefore presumably not correct. It is more valuable for its accident prevention effects than as a measure of the hazard. It should be possible, however, to create a schedule that will also be a reasonably correct measure of the hazard.

The making of a schedule involves three fairly distinct processes: first the creation, or more properly the discovery, of the proper structure, second the determination of the particular elements (accident causes) which should enter into the schedule, and third the determination of the weights of these different causes. The first process is primarily actuarial, the second primarily engineering, and the third primarily statistical.

The actual work of revision grew out of a joint meeting of the Actuarial and Engineering Committees; the first stage of the process was intrusted to a subcommittee consisting of Messrs. Mowbray (chairman), Newell, Paine, Perkins, Wheeler and Whitney. This committee has developed a schedule-structure which bears the earmarks of being correct. To what extent, however, it will prove to be amenable to actual application still remains to be seen, for only

the first stage of the process has been completed ; the engineers have scarcely had their hands upon the problem and the statisticians not at all.

There is, however, much reason to feel encouraged. For one thing the present structure has been the result of the convergence of several independent lines of thought, one of which was that of Mr. Downey, the chairman of the last Schedule Revision Committee, who at the end of the last revision foreshadowed the new developments to a considerable extent. Furthermore, the new structure has successfully stood all the tests that can be applied short of actual use.

At the request of Mr. Mowbray I am describing the result of the work of the committee up to date; this is not a report of the committee, but only a personal view of how the matter stands. It is hardly necessary to say that the comparatively direct way in which the results are here derived was not the way in which the results were originally secured, for the committee did much wandering before it got upon the right track. I may express the satisfaction, and surprise indeed, of the committee itself that the problem has seemed to yield so well to mathematical analysis.

The committee has made use of the following notation:

Let  $N$  be the number of employees in the standard (average) risk of the classification in question.

Let  $N'$  be the number of employees in the particular (in general non-standard) risk of the class.

In general the unprimed letters refer to the standard (average) risk of the class and the corresponding primed letters to the particular (in general non-standard) risk of the class. Briefly the unprimed letters may be said to refer to class and the primed letters to risk.

Let all accidents be separated into classes according to cause, the causes being numbered and indicated by subscript.

Let  $A_i$  equal the number of employees injured through cause  $i$ .

Let  $D_i$  equal the number of danger-points associated with cause  $i$ ; as there are within the same cause different types of danger-points, this involves the conception of a standard danger-point for each cause and the reduction by a system of weights of other types of danger-points to this basis.

Let  $N_i$  equal the average number of employees exposed per danger-point associated with cause  $i$ .

Then  $N_i D_i$  will equal the number of employee danger-points—that is, the number of “exposures.” An exposure is a double-ended entity, an employee at one end and a danger-point at the other; it is fundamental in this analysis, the quantities  $N_i$  and  $D_i$  not occurring separately, but only in this combination.

Let  $E_i$  equal the number of “careless exposures”—that is, the number of exposures in which the employees are careless. This presupposes a standard degree of carelessness, and that the employees are separable into two classes, the perfectly careful and standard careless. This is an actuarial fiction; it is, however, the commuted expression of actual facts—that is, for actuarial purposes the effect of a certain distribution of varying degrees of carelessness is the same as a certain separation into standard careless and perfectly careful. It may also be explained that the term “careless” is used only in a suggestive sense. We shall desire in practice to include in this category other “personnel” qualities having a bearing upon the frequency or seriousness of accidents. The “careless exposure” is conceived of as consisting of a standard danger-point on the one hand and a standard “careless” employee on the other, more correctly an employee who is standard in his susceptibility to accident. In this category we propose to include such elements affecting personnel susceptibility as light, sanitation, safety organization, first aid, hospital, use of goggles and approved clothing, personnel work, education, etc. The effect of such factors as first aid, hospital, etc., which in reality reduce the seriousness of accidents (and therefore  $K_i$ , later to be defined) rather than their actual number, is conceived of as commuted into an equivalent effect, expressed in  $\epsilon_i$  (defined in the next paragraph) in reducing the number of accidents.

Let  $\epsilon_i$  (the coefficient of susceptibility) equal  $E_i/N_i D_i$ .

Let  $p_i$  (a probability) equal  $A_i/E_i$ , or the proportion of careless exposures which result in injury.

Let  $\pi$  equal the pure premium for the class; then  $\pi'$  will be the pure premium for the risk.

Let  $\pi_i$  equal the part of  $\pi$  that is allocable to cause  $i$ , then

$$\pi = \sum_{i=1}^n \pi_i$$

and

$$\pi' = \sum_{i=1}^n \pi_i',$$

where  $n$  is the total number of causes.

Let  $W$  equal the average annual wages.

Let  $K_i W$  equal the average cost of each accident.

Then:

$$\pi_i = \frac{\text{Losses due to cause } i}{\text{Total payroll}} = \frac{A_i K_i W}{N W} = \frac{A_i K_i}{N} = \frac{\epsilon_i N_i D_i p_i K_i}{N}. \quad (1)$$

Similarly

$$\pi_i' = \frac{\epsilon_i' N_i' D_i' p_i' K_i'}{N'};$$

and

$$\pi_i' = \frac{N}{N'} \cdot \frac{\epsilon_i' N_i' D_i' p_i' K_i'}{\epsilon_i N_i D_i p_i K_i} \pi_i. \quad (2)$$

$$\therefore \pi' = \frac{N}{N'} \sum_{i=1}^n \frac{\epsilon_i' N_i' D_i' p_i' K_i'}{\epsilon_i N_i D_i p_i K_i} \pi_i \quad (3)$$

Now  $K_i$  is the average percentage cost per accident caused by a standard danger-point to a standard careless employee (that is, an employee of a standard susceptibility to accident) in a risk in a given classification. It may therefore be assumed constant from risk to risk, therefore  $K_i' = K_i$ .

Similarly  $p_i'$  is the proportion of exposures of a standard careless employee to a standard danger-point in a risk of a given classification which result in injury. It also may be assumed constant from risk to risk, therefore  $p_i' = p_i$ .

Making these two simplifications, we have:

$$\pi_i' = \frac{N \epsilon_i' N_i' D_i'}{N' \epsilon_i N_i D_i} \pi_i = \frac{N E_i'}{N' E_i} \pi_i,$$

and

$$\pi' = \frac{N}{N'} \sum_{i=1}^n \frac{\epsilon_i' N_i' D_i'}{\epsilon_i N_i D_i} \pi_i = \frac{N}{N'} \sum_{i=1}^n \frac{E_i'}{E_i} \pi_i. \quad (4)$$

Now, let us suppose that the causes can be separated into two groups, first a group of what we may call major, or better schedule-ratable causes, and second a group of minor or non-schedule-ratable causes. The causes belonging to the first group we may number 1, 2, . . .,  $m$ ; the causes belonging to the second group we may number  $m+1$ ,  $m+2$ , . . .,  $n$ .

Making this separation, we shall have:

$$\pi' = \frac{N}{N'} \sum_{i=1}^m \frac{\epsilon_i' N_i' D_i'}{\epsilon_i N_i D_i} \pi_i + \frac{N}{N'} \sum_{i=m+1}^n \frac{\epsilon_i' N_i' D_i'}{\epsilon_i N_i D_i} \pi_i.$$

The non-schedule-ratable causes will in theory be causes the hazards of which will not vary from risk to risk—that is, causes for which  $N_i' = N_i$  and  $D_i'/D_i = N'/N$ , the latter condition expressing the fact that the relative frequency of danger-points in risk and class will be the same as the corresponding relative number of employees.

We may now make the further assumption that  $\epsilon_i'/\epsilon_i$  is constant for all causes (with one exception, to be discussed later), say  $\epsilon'/\epsilon$ . This is not a violent assumption. The personnel conditions are peculiarly a matter of management, and the policy of the management may be generally assumed to extend throughout the plant and to affect all causes in practically the same way.

When these substitutions are made our expression for  $\pi'$  becomes

$$\pi' = \frac{\epsilon'}{\epsilon} \left( \frac{N}{N'} \sum_{i=1}^n \frac{N_i' D_i'}{N_i D_i} \pi_i + \sum_{i=m+1}^n \pi_i \right)$$

Letting the part of the pure premium that is allocable to minor causes be  $R$ , that is

$$R = \sum_{i=m+1}^n \pi_i,$$

we have

$$\pi' = \frac{\epsilon'}{\epsilon} \left( R + \frac{N}{N'} \sum_{i=1}^m \frac{N_i' D_i'}{N_i D_i} \pi_i \right). \tag{5}$$

I may now make some comments upon the schedule-structure which this formula represents. It will be noticed, in the first place, that it is not of the additive type (that is, in the manner of Taylor's series) by which the adjusted rate is expressed as the basic rate plus or minus certain increments (although it might readily be reduced to that form); in a general way it can be said that the rate is built up by adding together the parts of the pure premium for the average risk of the class that are allocable to the various causes, each affected by a factor expressing the relativity between the risk in question and the average risk as respects both number of exposures and degree of susceptibility to accident.

These factors, for the schedule-ratable causes, are of the form

$$\frac{N}{N'} \frac{\epsilon_i}{\epsilon_i} \frac{N_i' D_i'}{N_i D_i}.$$

$N/N'$  takes care of the effect upon the pure premium of size of

risk; whether this shall be measured by a comparison of the actual number of employees or by a comparison of payrolls is a practical consideration which need not be discussed here.

The remainder of the factor, which is in reality  $E_i'/E_i$  or the ratio of careless exposures in risk and class, breaks up into two factors,  $\epsilon_i'/\epsilon_i$  and  $N_i'D_i'/N_iD_i$ ; the first takes account of all "personnel" elements of the exposure, the second takes account of the physical elements of the exposure.

It is significant that these two elements are related to each other multiplicatively. It is, in fact, clear intuitively that the effect of carelessness is not additive; a careless employee is a greater hazard in proportion to the greater physical hazard of the risk.

So much for the schedule-ratable causes. The residue  $R$  in theory should be made up of hazards that do not vary from risk to risk. There are probably none such, although there are doubtless hazards that vary little from risk to risk. In practice, however,  $R$  will doubtless have to be made up of those hazards which, while collectively substantial, are individually so small as to be impracticable to measure by actual inspection. The presence of  $R$  gives the formula a most valuable flexibility: if a very simple schedule is desired, only the most important causes will be thrown into the schedule-ratable class and the balance of the causes will contribute to  $R$ ; in that case  $R$  will be relatively large; on the other hand, if an elaborate schedule is desired, a large number of causes will be thrown into the schedule-ratable group and will be the subject of inspection; in that case  $R$  will be small.

It should be noted that no limitations have been placed upon the nature of the hazard. The formula is therefore general and should include the several types of hazard that are to be found. The treatment of these types will be differentiated by assumptions with regard to the  $N_i$ 's and  $D_i$ 's. There are several of these types of hazard. There is, in the first place, the catastrophe hazard. This we may assume affects all employees alike; therefore  $N_i' = N'$  and  $N_i = N$ . The personnel items with the exception of first aid and hospital will probably affect this hazard in a minor degree, and therefore for this hazard the personnel factor will have an individual value less than  $\epsilon'/\epsilon$ , which we may represent by  $\epsilon_c'/\epsilon_c$ . The charge for catastrophe, representing the catastrophe cause by the



subscript  $c$ , reduces therefore to

$$\frac{\epsilon_c' D_c'}{\epsilon_c D_c} \pi_c \quad (6)$$

$D_c'/D_c$  is a factor representing the relative probability of catastrophe for risk and class.

The case of machines is too complicated to discuss in detail. We may assume, however, for illustrative purposes, an ideally simple case of an industry in which the machines are thoroughly standardized both as to type and relative number. In that case it will not be too violent an assumption to make  $N_i' = N_i$ ; this will be strictly true if, in addition to the standardized conditions mentioned above, the machines are fully manned. In that case the inner multiplier reduces to  $D_i'/D_i$  and is obtained by forming the ratio of the actual number of danger-points revealed by inspection in the risk as compared with the corresponding number in the average risk of the class. It is assumed that in counting danger-points they will first be reduced to a common basis by a system of weights.

Another type of hazard is that of stairs and elevators. Under the present schedule two elevators, each of which had a certain defect, would receive twice the debit that one such elevator would receive, and still more absurdly two elevators that had a certain good characteristic upon which a credit was due would receive twice as great a credit as one such elevator. In theory, therefore, the rate would be reduced to zero by putting in a sufficient number of superior elevators.

Two elevators may produce twice the hazard of one, but that question can not be decided until we know how many people use the elevators. Suppose the following case: a factory has only one elevator. This is insufficient; it is overcrowded. A second is added; it relieves the congestion, and in that respect the hazard is actually reduced. However, in general the hazard to each employee remains the same, for he makes the same number of trips as before. Suppose the number of employees using the elevator to be 200. After the second elevator is put in the number using each elevator will be 100. The number of danger-points will be doubled, but the number of persons exposed per danger-point will be only half as great, so that the number of exposures,  $N_i'D_i'$ , will remain unchanged. The installation of the second elevator will not affect the hazard so far as riding employees are concerned. It has, of course,

doubled the hazard, so far as the operatives are concerned, and probably doubled the danger of falling down shafts; all three of these hazards are, however, covered by the general formula when properly used.

These examples illustrate the flexibility of the schedule and the fact that each type of hazard must be given individual consideration.

Innumerable questions make their appearance when the schedule formula is applied to the various causes. I shall not undertake to discuss these with the exception of one very fundamental question. The question is briefly this: In counting danger-points shall we confine ourselves to bad conditions or shall we take account of the hazard that is inherent in even good conditions? The problem is practical rather than theoretical, for there can be no doubt that the theory of the schedule contemplates the latter procedure. We are dealing in our formula with absolute hazards, and if a hazard exists, even associated with a so-called good condition, we must take it into account in making an enumeration of the danger-points. This, however, is not done in the present schedule and there are certain practical difficulties in the way of carrying out such a procedure.

The especial province of the schedule is to carry the classification process beyond the manual. This it does by an analysis of the hazards that are actually to be found in industrial processes. A schedule that does not deal with absolute hazards can not only not produce right results, but it will obviously fail to penetrate into this territory.

The acceptance of the principle of absolute hazard means in practice that a schedule must express the hazard not only of sub-standard conditions, but of standard and super-standard conditions as well; the schedule must take account of the hazard not only of unguarded machines, but of guarded machines.

The carrying out in concrete practice of the principle of absolute hazard unquestionably involves very great difficulties, particularly of a statistical nature. How successfully they can be overcome it is too early to foretell.

A mathematical analysis can be made of the general statistical problem in the following way: Reverting to the formula (4), we have

$$\pi' = \frac{N}{N'} \sum_{i=1}^n \frac{E_i'}{E_i} \pi_i.$$

Let  $\pi_i/\pi = h_i$ , then  $\pi_i = \pi h_i$  and

$$\pi' = \frac{N}{N'} \pi \sum_{i=1}^n \frac{E_i'}{E_i} h_i.$$

Multiply both sides of this equation by the payroll  $P'$  ( $=N'W'$ ) and write similar equations for the risks 1, 2, . . . ,  $s$ , indicating the number of the risk by the number of primes.

Then

$$\begin{aligned} \pi' N' W' &= N \pi W' \left( \frac{E_1'}{E_1} h_1 + \frac{E_2'}{E_2} h_2 + \dots \text{to } n \text{ terms} \right) \\ \pi'' N'' W'' &= N \pi W'' \left( \frac{E_1''}{E_1} h_1 + \frac{E_2''}{E_2} h_2 + \dots \text{to } n \text{ terms} \right) \\ \pi^{(s)} N^{(s)} W^{(s)} &= N \pi W^{(s)} \left( \frac{E_1^{(s)}}{E_1} h_1 + \frac{E_2^{(s)}}{E_2} h_2 + \dots \text{to } n \text{ terms} \right). \end{aligned} \quad (7)$$

Adding, using for convenience the first term as type, we have:

$$\begin{aligned} \sum_1^s \pi' N' W' \\ = N \pi \left( \frac{h_1}{E_1} \sum_1^s E_1' W' + \frac{h_2}{E_2} \sum_1^s E_2' W' + \dots \text{to } n \text{ terms} \right). \end{aligned} \quad (8)$$

If we assume that the rates for these risks have been right in the aggregate, the term on the left will give the amount of the losses, but since

$$\pi = \frac{\text{losses}}{\text{payroll}},$$

we shall have

$$\sum_1^s \pi' N' W' = \pi \sum_1^s N' W'.$$

Making this substitution and cancelling  $\pi$ , we have:

$$\sum_1^s N' W' = N \left( \frac{h_1}{E_1} \sum_1^s E_1' W' + \frac{h_2}{E_2} \sum_1^s E_2' W' + \dots \text{to } n \text{ terms} \right). \quad (9)$$

Now, observe that

$$\frac{E_1}{N} = \frac{\sum_1^s \frac{E_1'}{N'} N' W'}{\sum_1^s N' W'} = \frac{\sum_1^s E_1' W'}{\sum_1^s N' W'}.$$

This, in effect, says that the careless exposures per employee for the

normal (average) risk is equal to the average value of the careless exposures per employee for all risks, 1, 2, . . . ,  $s$ , where each value of the careless exposure per employee is weighted by the corresponding value of the payroll.

Substituting this value for  $E_1$ , and similar values for  $E_2$ , etc., in equation (9), the equation reduces to

$$1 = h_1 + h_2 + \dots + h_n \quad (10)$$

which is identically true.

Our schedule-formula is therefore satisfied identically by the following statistical equations compounded from the figures for  $s$  risks, which it is assumed are sufficiently numerous to provide for the working of the law of averages.

$$\pi = \frac{\sum_1^s \pi' N' W'}{\sum_1^s N' W'}, \quad (11)$$

$$E_i = \frac{N \sum_1^s E_i' W'}{\sum_1^s N' W'}, \quad (12)$$

where  $i$  runs from 1 to  $n$ .

These are the equations which define the combinations of statistics.

The significance should be noted of the fact that these conditions satisfy equation (8) independently of the values of  $h_1, h_2, \dots, h_n$ .

This means that the problem of determining the  $h_i$ 's, which is solved by means of the companies' claim records, is entirely independent of the problem of determining the  $E_i$ 's, which is to be solved by data obtained from inspection reports.

DISTRIBUTION OF "SHOCK" LOSSES IN WORKMEN'S  
COMPENSATION AND LIABILITY INSURANCE.

BY

G. F. MICHELbacher.

Early in our studies we learn that the institution of insurance rests upon the paradox that *uncertainties*, when taken in the aggregate, produce *certainty*. It is the function of the insurer to assume the individual uncertainties of its policyholders and, by pooling these, to commute them into a single and definite certainty. Such is the process which creates the confidence so indispensable to the transaction of the world's business.

All this seems extremely simple, and it is simple in theory. In practice, however, as the insurance business is actually conducted, there are numerous fundamental principles which must be obeyed if proper results are to be obtained. Perhaps the most important of all these principles is that the paradox in question, which is commonly referred to as the "law of averages," does not function unless applied to large exposures. It follows that the less frequent a given type of loss, the greater the spread of exposure necessary to absorb it. If a type of loss which occurs infrequently be also one of considerable magnitude (a "shock" loss), the requirement of broad exposure to permit its proper absorption with safety and certainty can be even more readily appreciated.

It is conceivable, therefore, that as respects some of its obligations, an individual insurer, particularly if its operations be limited, may stand in a position similar to that of any one of its policyholders. There is always the chance that an extraordinary loss arising out of its transactions may seriously impair its finances and possibly force it into insolvency. Even an insurance carrier may require means of relieving itself of uncertainty. In fact, there are cases where approximate certainty is not secured until the risk of abnormal loss has been distributed and redistributed to the uttermost ramifications of the insurance business.

It is the purpose of this paper to inquire into the various methods

employed by carriers underwriting workmen's compensation and liability insurance in providing for the distribution of these "shock" losses. This is a most important phase of the casualty insurance business since the obligations assumed involve the potentiality of catastrophes\* of unlimited severity. There are few carriers with sufficient resources to stand by themselves in this field. As a general rule, outside assistance is necessary for the attainment of desirable safety of operation. It is here assumed, of course, that individual carriers recognize the existence of this problem and exert all normal means to safeguard themselves; that reserve and surplus are accumulated against unknown contingencies. But even though this be done, there are carriers whose resources will not guarantee absolutely that catastrophe or "shock" losses will be absorbed without disrupting their operations. These are the cases where some method of distributing abnormal losses over an exposure broader than that provided by the resources of the individual carrier not only is desirable, but is absolutely necessary to the safety and welfare of the business.

#### EXTENT OF OBLIGATIONS ASSUMED BY INSURANCE CARRIERS.

An examination of the obligations assumed by insurance carriers underwriting workmen's compensation and liability insurance will disclose the necessity for cooperation in dealing with certain phases of the insurance.

In workmen's compensation insurance many of the carriers use a standard policy form† with appropriate indorsements rendering it applicable to the legal conditions of the several States. This policy defines the obligation of the carrier as follows:

"One (a)—To Pay Promptly to any person entitled thereto, under the Workmen's Compensation Law and in the manner therein provided, the entire amount of any sum due, and all instalments thereof as they become due,

\* The term "catastrophe" as it is used in this paper, may be defined as an accident which involves at least five death or permanent total disability cases. Catastrophies are presumed to result in "shock" losses; shock losses may originate in other ways, however, as for example, where a verdict for injury to one individual exceeds \$50,000, or where, under a workmen's compensation law with liberal benefits, the compensation allowed on account of injury to a single employee, exceeds \$25,000. There are many cases where the loss from an accident involving less than five persons reaches a sum which is substantial enough to warrant the use of the term "shock" loss.

† The "Universal Standard Workmen's Compensation Policy."

(1) *To such person because of the obligation for compensation for any such injury imposed upon or accepted by this Employer under such of certain statutes, as may be applicable thereto, cited and described in an endorsement attached to this Policy, each of which statutes is herein referred to as the Workmen's Compensation Law, and*

(2) *For the benefit of such person the proper cost of whatever medical, surgical, nurse or hospital services, medical or surgical apparatus or appliances and medicines, or, in the event of fatal injury, whatever funeral expenses are required by the provisions of such Workmen's Compensation Law.*

It is agreed that all of the provisions of each Workmen's Compensation Law covered hereby shall be and remain a part of this contract as fully and completely as if written herein, so far as they apply to compensation or other benefits for any personal injury or death covered by this Policy, while this Policy shall remain in force. Nothing herein contained shall operate to so extend this Policy as to include within its terms any Workmen's Compensation Law, scheme or plan cited in an endorsement hereto attached.

One (b)—To Indemnify this Employer against loss by reason of the liability imposed upon him by law for damages on account of such injuries to such of said employees as are legally employed wherever such injuries may be sustained within the territorial limits of the United States of America or the Dominion of Canada. In the event of the bankruptcy or insolvency of this Employer the Company shall not be relieved from the payment of such indemnity hereunder as would have been payable but for such bankruptcy or insolvency. If, because of such bankruptcy or insolvency, an execution against this Employer is returned unsatisfied in an action brought by the injured, or by another person claiming by, through or under the injured, then an action may be maintained by the injured, or by such other person claiming by, through or under the injured, against the Company under the terms of this Policy for the amount of the judgment in said action not exceeding the amount of this Policy."

The obligation under section one (a) refers to the employer's legal responsibility for payment of compensation. As compensation benefits are strictly set forth in the workmen's compensation statutes, the obligation, as respects the liability arising out of the injury of a single employee, is limited, although the various statutes differ a great deal in the amount of compensation allowed. In some States (*e.g.*, New York) life pensions are granted; in others the maximum compensation period is limited. In New Jersey, for example, compensation payments do not extend beyond a period of 400 weeks from the date of injury. There is, however, no limit as

to the number of claims which may result from a single accident. This, then, is where "shock" losses originate. A gas explosion in a mine, the collapse of a structure, a fire in a factory building, a railway disaster, a boiler explosion, and other occurrences of this type involving the possible death or disablement of numerous employees, create hazardous situations for the insurance carrier. And it should be noted that this hazard affects every carrier of insurance, whatever its field of operations, for while the chance of "shock" loss is greater in some industries than in others, it is, even in the industries of lowest normal hazard, a potential source of trouble. This thought needs no proof: the falling of a dirigible into a Chicago bank, the Triangle Waist Company fire in the New York clothing industry, and numerous accidents of similar nature have demonstrated that no industry is free from the danger of catastrophe.

The obligation under section one (b) covers any common law liability which may arise out of accidental injuries sustained by employees of the assured. It supplements the workmen's compensation coverage and is intended to provide completely for every contingency which may develop as the result of an industrial accident. Thus, it covers cases of individual employees who are not subject to the provisions of the workmen's compensation law, as where an employee is subject to maritime jurisdiction and may sue in the Admiralty Courts.\* It also covers suits for damages for loss of service,† etc.

This part of the coverage is treated differently in different states. In some states it is not limited in any respect and covers any amount of damages which may be awarded an individual claimant as well as an unlimited aggregate amount due to collective injuries

\* Just at present, because of the United States Supreme Court decision in the case of *Stewart vs. Knickerbocker Ice Company*, maritime employees are denied the benefits of state workmen's compensation laws. Special forms of coverage have been devised to meet this situation in stevedoring and vessel risks but the standard form of policy is still used in other cases where there is some element of maritime employment, as, for example, in ship building, ship repairing and dredging risks. In these cases the liability feature of the standard policy is very important as it covers claims by maritime workers in the Admiralty Courts, and may therefore apply to a large percentage of accidents in the individual risk.

† A case in point is where a father claims damages for "loss of service" of a minor who is injured in a work accident or where a husband presents a similar claim on account of injury to his wife.



occasioned by a single accident. In other states the liability for each person injured or killed is limited (for example, to \$5,000), while unlimited collective loss as the result of a single accident will be covered. In still other states there are limits with reference both to the liability for each person injured or killed (for example, \$5,000) and to the liability for each accident in which two or more persons are injured or killed (for example, \$10,000). In all these cases, except the last, the insurance carrier undertakes to assure the policyholder that, subject to the possible limit of \$5,000 per individual, he is relieved of all negligence liability, irrespective of the number of employees who may be injured or killed in a single accident. Here, again, is a potential source of "shock" losses.

The situation, then, is that even with the most careful underwriting the individual carrier in workmen's compensation insurance assumes obligations which involve serious possibilities. "Prohibited lists"—lists of risks which the individual carrier will not assume under any circumstances—offer some protection in that they permit the carrier to avoid certain extra hazardous lines. But the catastrophe hazard exists in some measure even though the operations of the carrier be limited to those industries which have the lowest normal hazard. In fact, it may be said that the lower the normal hazard, the greater the necessity for special provision for handling "shock" losses, for in these cases, while the abnormal losses occur infrequently, when they do occur they loom particularly large in relation to the normal premium income.

In liability insurance no standard forms having been developed, the policy forms vary from carrier to carrier. However, the coverage granted is similar, and any one form may be taken for illustration. Liability insurance protects the assured against "liability imposed by law . . . for damages on account of bodily injuries, including death resulting therefrom, accidentally suffered . . ." by an employee or a third person,\* as the case may be. The general

\* Public liability insurance, sometimes referred to as "third party" insurance, is of several kinds depending upon the business of the assured or the nature of the operations conducted by him. Thus, manufacturers' and contractors' public liability insurance is offered for the protection of manufacturers and contractors, teams public liability insurance is offered for the protection of owners of teams, theater public liability insurance is offered for the protection of theater owners, etc. In all cases the policy covers the liability of the assured for injuries done to persons, not his employees or members of his family.

practice is to limit this liability in two ways: first, by imposing a limit upon the liability for loss from an accident *to one person*; and, second, subject to the same limit for each person, by imposing a limit upon the *total liability* for loss from an accident *to more than one person*. Manual rates are quoted in terms of limits of \$5,000 per person and \$10,000 per accident. Thus in case one person is injured and secures a verdict of \$6,000, the policy would cover \$5,000 of this amount and the assured would be responsible for the remainder. In case two persons were injured, one securing a verdict of \$6,000 and the other a verdict of \$4,000, the carrier's liability would be \$9,000—\$5,000 for the first claim and \$4,000 for the second. The coverage, however, need not be restricted to such low limits. Higher limits may be obtained upon payment of an additional premium. Published tables provide rates for limits as high as \$50,000/\$300,000, and limits exceeding these may be had if desired.

In these days when verdicts are increasing and policyholders are demanding broad cover it is customary to issue many policies with "excess" limits. Under this practice obligations are assumed which a carrier may not feel competent individually to handle. There is not the same inherent danger of "shock" losses as in workmen's compensation insurance, because the obligation may be limited to any desired amount. This, however, is largely a theoretical consideration, for active competition forces a carrier, which desires to maintain any sort of standing, to offer such insurance as may be required by the public.

We find, therefore, in employers' liability insurance, where it still exists,\* the danger of catastrophes affecting a large number of employees. In public liability insurance of various kinds we find the possibility of severe losses caused by the falling of crowded elevators, theater fires, automobile collisions, panics, etc.—accidents in which numerous third parties may be involved. For these reasons liability insurance is another field where cooperation among insurance carriers may be required to guarantee absolute protection to the insuring public.

\* Workmen's compensation has largely supplanted employers' liability in the United States. Today there are only five states which have not enacted some form of workmen's compensation law: Arkansas, Florida, Mississippi, North Carolina and South Carolina.

## METHODS OF DISTRIBUTING SHOCK LOSSES.

There are several methods whereby the carrier transacting workmen's compensation and liability insurance may provide for outside assistance in dealing with prospective losses which it feels may exceed its resources, viz.:

1. It may arrange with other carriers interested in the problem to form a "reinsurance pool." In such an organization a number of carriers mutually band themselves together for the purpose of providing for the distribution of abnormal losses sustained by the members. In these cases the individual carrier, subject to the limitations of the agreement, may transact its business with the assurance that any loss exceeding a certain amount will be taken care of by the pool. The pool is supported by regular contributions of the members, but in case it should be inadequate to meet a particular loss, arrangements are made whereby assessments will be levied to meet the obligation. The combined resources of all cooperating carriers are, therefore, available for the distribution of a "shock" loss sustained by any member of the pool. Normal losses are not shared, but when the abnormal accident occurs the result is absorbed without undue shock to the business of any individual contributing carrier.

2. It may arrange with one or more other carriers for the "coinsurance"\* of risks of certain types. Under one such arrangement, which will be later described, each carrier retains its own identity in underwriting its business, but the risks subject to the arrangement are assumed by all members in agreed proportions, each obtaining a definite share of the premium, and, in return, obligating itself for a like share of every loss which is sustained. Thus, the combined resources of all the

\* This form of coinsurance is strictly an arrangement among insurance carriers and is not to be confused with another form of coinsurance which is an arrangement between an insurance carrier and a policy holder. The latter form of coinsurance is practiced in fire insurance and other forms of insurance protecting property and has been described as follows:

"A form of insurance in which the person who insures his property for less than its entire value is understood to be his own insurer for the difference which exists between the true value of the property and the amount of the insurance. Thus, in the event of a partial loss, when the loss is not greater than the insurance, the amount paid is in the ratio of the total amount of insurance to the full value of the property."

cooperating carriers are behind each insurance transaction, and the "shock" loss, when it occurs, instead of falling with undue weight upon a single carrier, is treated in the same manner as normal losses and is automatically distributed over a wide area.

3. It may purchase a contract of "reinsurance" just as an individual assured purchases direct insurance. By such means a carrier can offer to its policyholders the underlying security of the resources of one or more organizations in addition to its own. The "reinsurer" in return for a stipulated premium, as a general rule, obligates itself to assume any loss over a specific amount which the "direct writing"\* carrier may sustain in its transactions. This practice usually covers an entire line of insurance, the reinsurance premium being a fixed percentage of the total premium income or a definite share of the premium for each risk subject to the agreement.

4. It may share an individual risk with one or more insurance carriers. Thus, a carrier may feel competent to deal with the ordinary run of risks which it writes or may have other arrangements for dealing with "shock" losses in certain lines of insurance, but may wish to assume an individual risk exceeding its resources or one which is either not fully covered or is not covered at all by its other arrangements. In such cases it may secure the assistance of one or more carriers, each of which may take a share of the liability in return for a share of the premium. This is a form of reinsurance, but instead of a regular arrangement, either mutual or by a contract of indemnity, affecting all risks of a given type, the reinsurance is arranged for a particular risk or risks as occasion arises.

The remainder of this paper will be devoted to a description of the foregoing methods as practiced in workmen's compensation and liability insurance. In a great many cases it will be found that the situation is exceedingly complicated; one carrier, in the distribution of its "shock" losses, may use several methods; the reinsurer may in turn provide for assistance in dealing with its obligation, as, for example, where a reinsurance pool itself reinsures its obligations

\* The "direct writing carrier" is the carrier that issues the policy to the assured. This carrier is responsible for the administration of the contract and conducts all the relations with the assured, who may be entirely unaware of the existence of a plan to spread the hazard of his risk by distributing it to several carriers.

over a specific amount, or where a carrier accepting a share of the liability of another carrier provides for assistance in dealing with this obligation; a reinsurance pool may not only reinsure its members by mutual exchange of liabilities, but may also issue contracts of reinsurance to non-members. The way in which these arrangements are effected will be best disclosed by an examination of the situation as it actually exists in this field of insurance.

#### THE WORKMEN'S COMPENSATION REINSURANCE BUREAU.

On August 28, 1912, a group of stock company executives met in New York City and adopted the following resolution:

"WHEREAS the undersigned companies have engaged or are about to engage in the business of insuring against liability under Workmen's Compensation Acts in various States of the United States, and

"WHEREAS the companies may not be permitted or may not desire to limit their liability under such policies and there will be danger of a company suffering serious loss by reason of the happening of a catastrophe involving injury to or death of a large number of persons, and

"WHEREAS it is of the utmost importance both to the employees, the employers and the companies that undue loss to any one company should be avoided by the distribution of any such extraordinary loss among the various members of the Bureau;

"NOW, THEREFORE, for the purpose of obviating the dangers incident to this situation, and for the purpose of distributing any such loss among the companies, and thus protecting each company from such extraordinary hazard, the undersigned companies hereby agree to form an association to be known as The Workmen's Compensation Reinsurance Bureau."

The organization, thus effected at the very inception of workmen's compensation insurance in this country, began immediately to function, its transactions dating from July 1, 1912. Today its membership comprises eighteen stock companies, and its operations extend to every workmen's compensation state in which private carriers are permitted to do business.

According to its constitution, the object of the Bureau is to reinsure and reimburse each subscribing member for loss and medical expense, exceeding \$25,000, arising out of a single accident sustained on a workmen's compensation policy subject to the terms of the agreement. Each member, with certain limitations, may transact such of its workmen's compensation business as is covered by

the plan, with the understanding that it will have to depend upon its own resources for losses resulting from individual accidents up to a maximum amount of \$25,000 per accident. Whenever the total losses resulting from a single accident exceed this sum the excess becomes a claim against the Bureau. Both the strictly workmen's compensation feature and the underlying common law liability feature of the workmen's compensation policy are covered by the Bureau, but other forms of insurance, such as employer's liability and public liability insurance, are specifically excluded from its jurisdiction.

The general workmen's compensation business of each member is included in the agreement. Certain risks are excluded, however. The Bureau is not obligated "to pay losses under policies issued jointly or jointly and severally by several companies." This exclusion covers certain lines written by some of the members through The Associated Companies, an organization which will be described later. In addition, the following risks are excluded:

Coal mines.

Cartridge manufacturers.

Fireworks manufacturers.

Fuse manufacturers.

Powder manufacturers.

Dynamite manufacturers.

Nitro-glycerine manufacturers.

Manufacturers of any explosive (the definition of explosive in this connection is a substance manufactured or sold or used as an explosive other than one used in an internal combustion engine).

Operation of power or sailing vessels (excluding vessels of a registered gross tonnage of 1,000 tons or under).

These limitations are important because they make necessary other methods of dealing with these risks in case the individual company desires to assume them.

The affairs of the Bureau are under the direction of a board of governors and a staff of officers. The officers consist of a chairman, a secretary and two trustees. The chairman is ex-officio a trustee, making three trustees in all. The four officers and representatives of three other members of the Bureau constitute the board of governors.

The board of governors is the important administrative body. It recommends the extension of the Bureau to new states, has pre-

liminary jurisdiction over applications for membership, determines the basis of rates upon which premium payments into the Bureau are made by the members, supervises the collection of these premiums, decides whether certain individual risks are subject to the plan, has the right to audit and inspect the books of the members, receives and passes upon claims, controls the funds of the Bureau and decides when refunds may be paid to members, and in general exercises such other powers as are required to conduct the Bureau.

The trustees are charged with responsibility for the finances of the Bureau. Premiums are paid to them personally, and, subject to the direction of the board of governors, they invest and disburse these funds.

For the purpose of premium computation and loss adjustment the states over which the Bureau exercises jurisdiction are divided into two separate and distinct groups. Each of these groups has its own identity and the funds of each constitute an individual account.

The rate of assessment for the first group is  $2\frac{1}{2}$  percent of the net workmen's compensation premiums\* subject to the plan. The majority of states are in this group.

The second group consists of states for which the rate of assessment is 5 percent of the net workmen's compensation premiums.

The distinction between these groups is based upon the compensation benefits of the several states, the higher rate of assessment being required where the benefits are substantial and where, consequently, there is greater chance of the cost of a single accident exceeding \$25,000, thus creating a claim against the Bureau. For example, New Jersey, with its low benefits, is in the first group, whereas New York, with its liberal benefit provisions, is in the second.

Each member is required to report monthly, by states, its net premiums for the business subject to the plan and to remit to the trustees the proper reinsurance premiums indicated by these statements. The basis of premiums is fixed by the board of governors, which specifies a certain manual and merit rating system as constituting the authorized basis of rates for the Bureau. The premium payments are charged to the two groups, each of which is required to be self-sustaining. Provision is made that when the funds in

\* "Business written plus additional premiums less cancellations and return premiums without deduction of commissions."

either group, including premiums paid in and interest thereon, less losses and expenses, amount to more than \$250,000, the excess over such amount, accumulated in any year, may be refunded to the members in the proportions in which premiums were originally paid. \$250,000 must, however, be continually kept in each group and all losses and expenses must be accounted for before the annual refund may be paid. At present the annual premiums of the members are being regularly returned, the interest on invested funds being more than sufficient to provide for losses and for the expenses of the Bureau. The cost of the reinsurance protection offered by the Bureau has, therefore, been very small, being limited to a part of the interest on the funds in the custody of the Bureau.

In case any member, as the result of a single accident covered by the plan, sustains a loss exceeding \$25,000, it is required to file proof of loss, including a complete copy of the policy and indorsements, if any, under which liability for the loss was incurred. Upon verification of the claim by the board of governors the trustees will reimburse the member from the funds of the proper group. Arrangements are made for assessments in case the available funds are not adequate to meet such claims as arise. The Bureau, at the present time, is carrying a reserve of \$297,000 against ten catastrophes which have been reported and are now awaiting settlement. The following are typical accidents which have resulted in claims against the Bureau:

- An explosion in a starch manufacturing plant in Iowa in which forty persons were killed and twenty-seven injured.
- A fire in a Brooklyn, New York, factory in which twelve persons were killed and eighty-nine were injured.
- An iron mine disaster in Michigan in which seventeen persons were killed and one injured.

#### THE MUTUAL CORPORATIONS' REINSURANCE FUND.

When New York became a workmen's compensation state on July 1, 1914, a number of mutual companies which were then organizing for the purpose of transacting insurance under the new law created the Mutual Corporations' Reinsurance Fund. The original purpose was to offer reinsurance facilities for the local business of New York mutual companies, but the Fund later broadened its scope to include mutual carriers organized in other states. Its membership today is composed of six New York mutual com-



panies, and the Fund covers the business of these members in all workmen's compensation states in which they operate.

The principle underlying the Fund is best expressed in the plan of organization, which provides that "each of the signatory corporations hereby agrees to reinsure each of the other signatory corporations to the extent and in the manner hereinafter provided against extraordinary or catastrophe liability."

The Fund assumes the excess over \$25,000 of any loss arising out of a single accident covered by the agreement. In this respect it is similar to the Workmen's Compensation Reinsurance Bureau, but it differs from the latter organization in that it does not provide for unlimited coverage. In addition to the lower limit of \$25,000, it imposes an upper limit of \$75,000 upon its liability for a single accident. Provision is made, however, for reinsurance of the Fund itself, and such outside arrangements have been effected with the American Reinsurance Company. Under this reinsurance contract, the cost of which is paid out of the expenses of the Fund, and is thus shared proportionally by all members, coverage for a single accident is secured from \$75,000 to an unlimited amount. Thus the members secure unlimited protection; each corporation carries the first \$25,000 of any abnormal loss sustained on a policy subject to the agreement, the Fund provides for the next \$50,000 of such loss, and any amount exceeding \$75,000 is taken care of by the American Reinsurance Company under its reinsurance treaty. The maximum loss as a result of the occurrence of a single accident which an individual carrier must bear is \$25,000, and the corresponding maximum for the Fund is \$50,000.

The Fund covers nothing but workmen's compensation insurance and does not offer protection against every risk in this line, the following risks being specifically excluded:

Mines.

Cartridge manufacturers—including charging and loading.

Fireworks manufacturers.

Time-fuse manufacturers.

Powder (used as an explosive) manufacturers.

Dynamite manufacturers.

Nitro-glycerine manufacturers.

Manufacturers of celluloid.

Projectile, shell or case—charging and loading.

Gasoline manufacturers—from casing head gas.

Picric acid manufacturers.

Employers engaged exclusively in wrecking and demolition.  
Subaqueous work under pressure.  
Subway construction.  
Coffer-dam construction and maintenance.  
Tunneling—where the tunnel is over 50 feet in length.  
Operation of power or sailing vessels, excluding vessels of a registered gross tonnage of 1,000 tons or under.  
Manufacturers of explosives (the definition of explosive in this connection is a substance manufactured or sold or used as an explosive other than one used in an internal combustion engine).

Provision is made whereby any member may, at its own cost, secure coverage for these classes of risk by appointing the management of the Fund its agent to effect reinsurance with Lloyd's or other insurance companies or associations, but no such reinsurance arrangements have been made through the Fund.

The administration of the Fund roughly corresponds to that of the Workmen's Compensation Reinsurance Bureau. It is provided that whenever the number of members exceeds ten an executive committee of five shall be appointed, but inasmuch as the present membership is limited to six carriers, this section is inoperative and the management is vested in an advisory council consisting of one delegate representing each member. The powers of this body correspond to those of the governing board of the Workmen's Compensation Reinsurance Bureau. In addition to the advisory council there are three trustees who are responsible for the finances of the Fund.

The rate of assessment is uniform for all states covered by the Fund and is 5 percent of the net written premiums calculated upon a uniform manual of rates and merit rating system. Provision is made that "whenever the Fund shall exceed the sum of \$200,000 over and above expenses, losses and reserves set aside for losses, the said excess shall be distributed for successive fund years, commencing with the first fund year, to the signatory corporations in the proportions in which they made payments for such fund year." The expenses include the cost of reinsurance above \$75,000 with the American Reinsurance Company.

The adjustment of losses follows practically the same procedure as in the case of the Workmen's Compensation Reinsurance Bureau. It is provided, however, that in case the funds on hand are inadequate to meet claims, the total additional assessment which can be levied in any one year shall not exceed 5 percent of the premium writings of the members for that year.

The Fund to date has not sustained a single loss and the entire amount of contributions for 1914, 1915, 1916, 1917, 1918 and 1919 have been returned to the members. As the interest on invested funds greatly exceeds the expenses of administration, the members have enjoyed that part of their reinsurance protection between the limits of \$25,000 and \$75,000 at a nominal cost.

#### THE MUTUAL UNDERWRITERS' SYNDICATE.

The Mutual Underwriters' Syndicate was organized in Chicago in June, 1918. There are two classes of members—"Underwriting Members" and "Reinsured Members." The underwriting members constitute the actual membership of the Syndicate, these carriers exchanging reinsurance among themselves and at the same time offering reinsurance contracts to outsiders ("reinsured members"). Application for underwriting membership on the part of a mutual carrier is subject to unanimous approval by the underwriting members, and carriers are not admitted as underwriting members unless they have a net cash surplus in excess of \$200,000. There are at present six underwriting members in the Syndicate and the combined surpluses of these members exceed \$5,000,000.

The Syndicate specializes on reinsurance for workmen's compensation insurance, but it also accepts reinsurance on employers' liability and public liability hazards. There is no uniform agreement as in the case of the two reinsurance arrangements already described. The requirements of each carrier are covered\* at a definite rate of premium which depends upon the exact nature of the reinsurance obligation assumed in each individual case. This plan applies to underwriting members as well as to reinsured members. The premiums and liability under each contract are distributed among the underwriting members in accordance with certain agreed percentages. In the case of an underwriting member, however, the contract is underwritten by the remaining underwriting members, and the member being reinsured is not permitted to assume any liability under its own reinsurance contract.

The contract covers an entire line of insurance such, for example, as workmen's compensation, without the exception of any specific types of risk. The extent of the obligation assumed varies with the requirements of the reinsured carrier. It is usual for the

\* This practice is known as "treaty" reinsurance and will be more adequately treated in another section of this paper.

Syndicate to assume losses exceeding \$10,000 resulting from individual accidents. The upper limit varies according to circumstances and may be for any agreed amount under liability policies or may be unlimited under workmen's compensation policies. Notwithstanding the low limit assumed by the Syndicate, no losses have been sustained under its contracts up to the present time.

#### THE ASSOCIATED COMPANIES.

The Associated Companies was organized by ten stock companies in Hartford, Connecticut, on February 1, 1915. The plan was to provide some method whereby the members could with safety assume certain extra-hazardous workmen's compensation risks. There have been some changes in membership, five of the original stock companies having been replaced by three others, and, in addition, the scope of the organization has been broadened somewhat so that it now embraces some lines of public liability as well as certain workmen's compensation risks which it was originally intended to cover. The purpose, however, remains the same, and is:

"To furnish speedy and effective means to each member for the coinsurance of risks accepted by such member which are as described and defined in this agreement. Each member transacts its own business, fully administers its own risks and in every respect preserves its identity. The insurance undertaking in all Groups shall be in coinsurance form and shall bind all members jointly and severally to the entire insurance obligation."

Each member, therefore, writes its own business subject to the agreement and issues to its policyholders a contract under which all the cooperating members share the premiums and losses. There are eight members and the shares are equally divided; it follows, therefore, that the premium on each risk (excluding a definite amount reserved for the expenses of the "proposing" company)\*

\* "The Proposing Company is the member which secures a risk. . . . The Proposing Company shall issue the joint and several policy of The Associated Companies for all risks placed with The Associated Companies under this agreement, with notice of such issue and all necessary details to the General Office of The Associated Companies forthwith in due course of mail, shall collect the premium, pay the commission thereon to the agent, administer the risk during its existence, be empowered to give and receive notices as in the policy provided, adjust the losses, supervise and make claim payments, and audit the payroll, all of which shall be undertaken by the Proposing Company at its own expense and through its own employees, except only that the

is divided into eight equal parts, and that the liability is similarly distributed. Under this arrangement some of the most hazardous lines are underwritten without undue strain upon the resources of an individual carrier.

The reasons which led to the formation of this organization are interestingly set forth in the following "argument," which prefaces the agreement:

"The development of any plan for suitable compensation to injured workmen presents many serious problems in all classes of employment due to the long-continued obligation which necessarily results from any well-devised compensation plan and the most serious hazard of far-reaching catastrophe with large resulting claims and long deferred payments. Some forms of employment present far more serious problems than others. Several forms of employment involve not only extremely hazardous undertakings with frequent single injuries, but also involve most serious collective hazards involving simultaneous injuries to a great many persons. Several other forms of employment involve one or both of these elements to a greater or less degree and in addition an insignificant number of plants or amount of payroll to provide reasonable distribution if such risks are divided among many companies, each carrying a few individual risks. To meet the legal as well as the ideal requirements of the compensation obligation from an insurance standpoint, it is necessary that the insurance protection shall be unlimited in amount. An insurance obligation presenting these serious possibilities can not reasonably be undertaken by a single stock company . . . with the hope that the obligation may thus be safely distributed. Nor is it desirable that the obligation should be divided among several companies, leaving the insurance protection complicated in form and compelling those who claim under it to pursue various remedies. The Associated Companies express the belief that the conditions which result in injuries to workmen in the specially hazardous employments which are the subject matter of this agreement are capable of great improvement, which improvement can be more effectively accomplished by consistent, concerted action than by the unaided efforts of any single insurance company. Therefore, The Associated Companies have entered into this agreement for the purpose of providing joint and several Workmen's Compensation and Public Liability co-insurance upon such classes as are hereinafter named and on such properly defined and described classes as may hereafter be specifically agreed upon and to secure by means of association such distribution of the possible excessive actual indemnities paid, including statutory medical aid, together with federal and state taxes upon premiums, shall be equally divided between the members as herein provided."

loss due to the hazards in such risks as will render the writing of such business reasonably safe to each of the members and will provide for the assured adequate and complete protection of a nature that is at all times readily available. It is the further purpose of The Associated Companies by means of this association to use every legitimate means for the prevention of accidents in such risks.

All members are required to use uniform policy forms, each of which includes a paragraph in the following language:

"The Insurers, having chosen one of their number to act as the representative of all the Insurers upon this risk, the name of which company is hereinafter indicated as the 'Representative of the Insurers,' it is agreed that such company is duly empowered to act for and in behalf of all the Insurers in the issuance and administration of this Policy, including the collection of its premium, the giving and receiving of notices as in the Policy provided, the care and adjustment of losses, the audit of payroll and the final adjustment of premium. The Employer shall address all notices required by this Policy to, and conduct all correspondence relating to this Policy with such Representative of the Insurers. Notices to or demands upon the Employer by such Representative of the Insurers shall be accepted by the Employer as the notices or demands of the Insurers. The Registrar who countersigns this Policy has been duly appointed, authorized and empowered by the Insurers for that purpose."

The risks covered by the agreement are classified into three groups.

Group (A) includes risks which, if written by a member company, must be reported to the central organization. But before these risks are accepted they must be passed upon individually by the Governing Committee. This group, which is known as "Compulsory Risks Subject to Submission," comprises the following risks:

Acid manufacturing.  
 Certain chemical risks.  
 Analytical chemists.  
 Blasting.  
 Celluloid manufacturing.  
 Explosive manufacturing—including transportation and handling.  
 Leather (imitation) manufacturing.

Group (B) covers risks which, if written by a member company, must be insured with The Associated Companies. Risks in this group need not be individually submitted, but are automatically covered under the agreement. The group, which is known as

"Compulsory Risks Not Subject to Submission," includes the following risks:

Acetylene gas tank charging stations—operation.

Coal mining—underground and surface.

Coke burning.

Culm recovery.

Degreasing skins.

Garbage works—reduction or incineration of garbage or offal.

Junk dealers.

Match manufacturing.

Public automobiles.\*

1. Livery automobiles, *i.e.*, automobiles of the private pleasure type, rented or used for livery purposes by the hour or day, subject to call from a garage only, not equipped with a taximeter and not offered for hire at stands, hotels, stations or any other places of public resort.
2. Taxicabs, omnibuses, sight-seeing automobiles, jitneys, automobiles for hire at stands and all other public automobiles.
3. Emergency ambulances, newspaper delivery, emergency cars or trouble wagons (electric light, telephone, street railway, etc.), fire patrols or salvage corps, express companies (such companies having express messenger service on trains or boats), mail trucks, police patrol, transfer (baggage or express).

Rubber reclaiming.

Salvage operations.

Stevedores—all classifications.

Vessels—all classifications.

The third group (C) is a list of risks which may be placed with The Associated Companies at the option of the members. This group is known as "Permissive Risks," but it is provided that, if one risk falling within a classification in this group is submitted, all other risks assumed by the member in the same classification must likewise be submitted. Group (C) comprises the following risks:

Aeroplane manufacturing.

Baseball clubs and parks.

Building raising.

Caisson work.

\* The risks under this caption are covered for public liability only or for public liability and property damages in case both are written concurrently on a single risk.

Celluloid goods manufacturing.  
 Chimney construction.  
 Cleaning and renovating outside surfaces of buildings, including  
   tuck pointing.  
 Composition goods manufacturing.  
 Detective agencies.  
 Dextrine, glucose and starch manufacturing.  
 Gas holders—metal—erection.  
 Masonry—building chimneys only.  
 Motion-picture film exchanges.  
 Oil- and gas-well shooting.  
 Painting.  
 Painting steel structures and bridges.  
 Quarries.  
 Rifle ranges or gun clubs.  
 Rigging—not ship or boat.  
 Saw mills—portable.  
 Shaft sinking.  
 Shooting galleries.  
 Tanks—metal—erection.  
 Threshing machines and corn shredders, ensilage cutters and har-  
   vesting machines (operation).

In calendar year 1920 the premium writings of The Associated  
 Companies were distributed as follows:

Workmen's compensation—coal mines.....	\$3,979,288
Workmen's compensation—other risks.....	3,431,925
Public liability—property damage—automobile risks....	1,222,749
	<hr/>
Total .....	\$8,633,962

The Associated Companies maintain a central office which is, at present, located in Hartford, Connecticut. This is the central source of administrative rules, etc. The final word in all matters pertaining to the conduct of the business is vested in the members themselves. Strict rules are provided in the agreement covering the use of policy forms, the underwriting of the business, the calculation of rates, the methods of premium computation, etc. Questions of policy as they arise are subject to the unanimous vote of all members. Provision is made for two special departments at the central office; an accounting department and a department of inspection and safety. The first department is under the supervision of a special accounting committee of three selected from the membership of the organization. Uniform accounts are kept by the members and periodical reports are rendered to the central account-



ing office. By means of this machinery a prompt division of premiums, losses and expenses is accomplished. The department of inspection and safety devotes its activities largely to coal-mining risks, but is equipped to inspect other risks subject to the agreement as occasion arises. The department inspects, rates and provides accident prevention service for coal-mining, chemical, explosive and other unusual risks, on behalf of all members, the technical engineering problems involved making it desirable to have this work done by the central office.

Since its organization in 1915 The Associated Companies have had two catastrophe losses, both of which occurred in connection with coal-mining operations and fell in a single year—1920. The first was a gas explosion at a shaft-sinking operation, when five men were killed through contact of a spark or open light with gas generated when the coal seam was reached. The other involved eleven deaths and was caused by a gas explosion in the interior of a mine.

Coinurance as a means of distributing risk is practiced also by carriers not affiliated with The Associated Companies. In such cases it is customary to arrange for coinurance of specific risks as they come up in the underwriting of the carrier, and the arrangement is a matter depending upon the convenience of any two or more carriers who may desire to cooperate in this manner whenever abnormal risks are assumed. The plan, however, is similar, the cooperating carriers jointly and severally undertaking the insurance of each risk and arranging among themselves for the administration of the business and the division of premiums and losses.

#### REINSURANCE BY CONTRACT (TREATY).

One of the most complex and at the same time one of the most fascinating phases of the insurance business is the practice of insuring insurance carriers. Instead of the comparatively simple relationship in the case of direct insurance—that of insured and insurer—this branch of the business involves a complicated mechanism that has ramifications extending to every section of the globe. It is not difficult to appreciate the desirability of this widespread organization. Certain risks involve such serious possibilities and such extraordinary liability that they must necessarily be automatically spread over as broad an area as possible. There must be cooperation among the insurance carriers themselves, as no individual

carrier could undertake the insurance single-handed. Thus it may be said that reinsurance is no more than the application of the simplest insurance principle to special cases of abnormal risk. It involves the application of the law of averages to hazards so great that they overshadow the resources of the individual insurance carrier. The organization by means of which these abnormal risks are absorbed is necessarily complicated, because the burden is so great that many carriers must somehow come in contact with it and share in it if the desired security and safety of operation are to be obtained.

Before attempting to discuss reinsurance in general and its application to workmen's compensation and liability insurance in particular, it will be desirable to define some of the terms peculiar to this subject.

The carrier that is reinsured is called the *ceding company*. This carrier may be either the direct writing carrier which has relations with the policyholder in the first instance, or it may be a carrier that has reinsured another and wishes to relieve itself of a part of the liability thus assumed.

The carrier that grants or issues reinsurance coverage is the *reinsurer* or the *reinsuring company*.

The ceding company *cedes* reinsurance to the reinsurer, which in turn *accepts* reinsurance. Each individual transaction in a reinsurance arrangement in which reinsurance is ceded by one carrier and is accepted by the other is known as a *cession*.

Where the reinsurer in turn reinsures the obligation which it assumes, either in whole or in part, the transaction is termed a *retrocession*—hence the designation of a carrier that accepts reinsurance of a reinsurance carrier as a *retrocessionaire*.

Most reinsurance companies have well-defined arrangements for retrocessions, so that any liability assumed, which is in excess of that which the reinsurer desires to retain, may be satisfactorily taken care of.

The reinsuring company may write its business in either or both of two forms; by *treaty* or on a *facultative* basis. A treaty is a general contract or agreement covering one or more classes of insurance. Under this arrangement it is obligatory upon the ceding company to report every risk as it is written, and in turn it is incumbent upon the reinsurer to accept every risk. The facultative arrangement, on the contrary, is an optional or selective proposition.

Instead of covering an entire line of insurance under a blanket policy, individual risks are covered, and such risks are subject to optional treatment by both parties; it is optional with the ceding company whether it shall present them for reinsurance and the reinsurer may accept or reject them at its will. In treaty practice the reinsurer trusts the direct writing carrier to underwrite its business satisfactorily and follows its underwriting blindly. In facultative business the reinsurer has an opportunity to underwrite each risk for itself, accepting liability if it chooses or refusing coverage.

In workmen's compensation and liability reinsurance the arrangement is usually what is termed *excess reinsurance*. That is to say, the reinsurer covers losses and expenses only in case they exceed certain limits specified in advance. This is to be distinguished from *pro-rata* or *concurrent reinsurance* which is written in some other lines and in which the reinsurer shares losses and expenses arising out of each and every accident irrespective of amount.

The term *limit* is used to define the relationship between the liability *retained* by the ceding company and the liability accepted by the insurer, the minimum *retention* of the ceding company and the maximum reinsurance assumed by the reinsurer being strictly set forth in the contract or certificate. The practice with reference to the fixing of limits varies with different types of insurance and with the nature of the risk assumed. The general term *multiple-limit reinsurance* is sometimes used to designate the extent of excess reinsurance. Thus a *one-limit reinsurance* agreement provides that the reinsurer shall accept liability equal in amount to that retained by the ceding company on any individual risk. If the ceding company retains limits of \$5,000/\$10,000, the reinsurer will take limits of \$5,000/\$10,000, thus providing a total coverage of \$10,000/\$20,000. Any number of limits may be assumed in individual cases subject only to possible limitations, imposed by law,\* upon the total liability which an individual insurance carrier may incur upon an individual risk. Thus three-, four- or five-limit reinsurance treaties may be negotiated. In the case of a five-limit treaty, if the ceding company retains limits of \$10,000/\$20,000, the reinsurer will take limits of \$50,000/\$100,000, thus providing a total coverage of

\* In New York, for example, certain classes of insurance are so limited that an individual carrier may not "expose itself on any one risk or hazard . . . in an amount exceeding ten per centum of its capital and surplus."

\$60,000/\$120,000. In facultative reinsurance, which will be described in the next section of this paper, it is usual for the reinsurer to limit its liability to an amount equivalent to that retained by the ceding company. In treaty practice the reinsurance may be for any number of limits, the number usually depending upon the retention of the ceding company.

In treaty reinsurance the reinsurer is advised from time to time concerning the business which it reinsures by *bordereaux*—periodical statements containing information with reference to the risks subject to the arrangement. The following data are usually presented for each risk:

1. Reinsurance number. Each ceding company uses a series of numbers which are applied consecutively to the risks subject to the arrangement in the order in which they are written.

2. Policy number of ceding company. It is the practice of insurance carriers to designate each policy that is issued by a number usually known as the "Home Office number."

3. Form of policy issued. This is designated in code, since the various policy forms authorized by the agreement are on file in the office of the reinsurer.

4. Name and address of assured to whom policy is issued.

5. Effective and expiry dates of policy. For example, if a risk is written for one year, the policy taking effect on January 1, 1921, the effective and expiry dates would be 1-1-21 and 1-1-22.

6. The gross liability incurred on the risk. For example, if an automobile public liability risk is written for limits of \$50,000/\$100,000, this fact is reported under this item.

7. The gross premium collected by the ceding company. This corresponds to the gross liability incurred on the risk and is determined from the manual of rates.

8. The net liability retained by the ceding company. Continuing the example stated under item 6, the ceding company might retain limits of \$10,000/\$20,000, in which case this fact would be noted here.

9. The liability ceded to the reinsurer under the treaty. If the treaty were a one-limit treaty, the liability reported under this item would be \$10,000/\$20,000.

10. The reinsurer's share of the total premium. This is determined as a percentage of the total premium in workmen's compensation insurance or it is calculated from the manual of rates in lia-

bility insurance. In the case used as an example it would represent the difference in cost between premiums for limits of \$20,000/\$40,000 and limits of \$10,000/\$20,000.

#### 11. Remarks.

It will be noted that all of the essential information for the guidance of the reinsurer is contained in this exhibit. In this respect it corresponds to the "daily reports" of business written, which are forwarded to the home office of an insurance carrier by representatives in the field.

A peculiarity of reinsurance treaties is that they are *honorable* as distinguished from *legal* engagements. That is to say, they are expressly drawn as gentlemen's agreements with the distinct provision that all controversies will be adjusted by arbitration rather than in the courts. If the two parties in interest fail to agree upon a reasonable settlement of a difficulty, provision is made for arbitration. Each party will appoint an arbitrator to represent him, and the arbitrators in turn are required to select a third person to act as umpire. If there is failure to agree upon the umpire, each arbitrator will submit the names of three persons, two of the names on each list will be declined and one of the remaining two selected by lot. When the arbitration board is complete, briefs are submitted and a thorough discussion takes place. The decision when it is rendered is binding upon both parties. Provision is made that the members of the arbitration board shall be officials of insurance or reinsurance companies, thus insuring the selection of men who are in intimate contact with the technical problems that require consideration. While this elaborate mechanism for the settlement of disputes is provided for in the treaty, it is seldom that it becomes necessary to use it, the terms of the agreement being so definite as not to give rise to frequent controversies.

One further feature should be noted, and that has to do with the treatment of expenses. The liability of the parties subscribing to the treaty is determined with reference to the pure loss. To illustrate this let us assume a case where the ceding company retains limits of \$5,000/\$10,000 and the reinsurer accepts a corresponding liability. If an accident were sustained resulting in a verdict requiring the payment of damages in the amount of \$4,000, and legal and court fees of \$1,500, the entire cost would fall upon the ceding company, as the pure loss (\$4,000) does not exceed the limits retained by the ceding company. In case, however, the verdict were

for damages of \$7,500 and the court and legal fees amounted to \$3,000, the ceding company would bear \$5,000 of losses and \$2,000 of expenses, while the reinsurer would assume \$2,500 of losses and \$1,000 of expenses, the expenses being divided in the same ratio as the losses.

Reinsurance treaties covering workmen's compensation and liability insurance are negotiated in this country by the following six carriers:

American Reinsurance Company.  
Employers' Indemnity Corporation.  
European General Reinsurance Company, Ltd.  
First Reinsurance Company of Hartford.  
Lloyds of London.  
Norwegian Globe Insurance Company, Ltd.

Because of the existence of so many mutual pools there are comparatively few reinsurance treaties negotiated to cover workmen's compensation risks. In the beginning, when workmen's compensation was in its experimental stage, there was some demand for reinsurance protection between limits which individual carriers thought it wise to retain and the limits assumed by the various pools. Thus a carrier might have desired coverage between a limit of \$10,000 per accident and the \$25,000 limit assumed, for example, by the Workmen's Compensation Reinsurance Bureau. But as experience with this form of insurance was acquired the demand for this coverage practically disappeared. Today the demand arises principally from the carriers which have no affiliation with the several mutual arrangements described in preceding sections of this paper.

In workmen's compensation insurance, as has been pointed out, the coverage is practically unlimited, the so-called "lower limit" or limit of liability per individual being governed by the provisions of the workmen's compensation laws, and any number of cases resulting from a single accident being covered by the policy. Where reinsurance is undertaken the limits, therefore, refer to the total cost per accident rather than to both cost per accident and cost per individual. The reinsurance premium rate is usually a fixed uniform percentage of the net premium writings of the ceding company, the size of the percentage varying with the amount of reinsurance liability assumed in the transaction.

In the field of liability insurance treaties are becoming increasingly prevalent. Here there are two limits—a limit per individual

and a limit per accident—and the reinsurance premium for each risk is calculated from the manual of rates, the amount depending upon the limits assumed by the reinsurer.

#### EXCHANGE OF REINSURANCE ON INDIVIDUAL RISKS (FACULTATIVE REINSURANCE).

The field of workmen's compensation insurance is rather thoroughly provided with methods of shock loss distribution, and there are few cases, therefore, where a carrier requires special assistance in dealing with individual risks of abnormal hazard. The carrier, whose resources are limited, usually covers its workmen's compensation business either by affiliation with one or more cooperative organizations or by purchasing a contract of reinsurance. If these arrangements fail to cover certain types of risks, the carrier may refuse to write such risks. There are times, however, when it is desirable from a business point of view to take on individual risks which may not be adequately covered by available methods of shock loss distribution. If such cases arise, the carrier will find it necessary to attempt to negotiate for assistance in dealing with the obligation. In this way an individual workmen's compensation risk may constitute the basis for a reinsurance transaction, one carrier writing the risk, issuing a policy, administering the insurance, and for its own protection relieving itself of excessive liability by dividing the premium and arranging to share the losses with one or more other carriers. This is what has been referred to in the preceding section as *facultative reinsurance*.

While this situation is extremely rare in workmen's compensation insurance, it arises frequently in liability insurance where mutual arrangements and general reinsurance contracts are not as common owing to the practice of limiting the liability. Even where reinsurance is effected by treaty, as it frequently is, facultative reinsurance is practiced, because there are many cases where the limits provided by treaty reinsurance fail to cover the entire liability which the ceding company wishes to incur on an individual risk. A case in point is where a direct writing carrier wishes to issue a policy providing for limits of \$50,000/\$150,000 and can only cover \$25,000/\$75,000 of this amount by its own retention and by reinsurance under a standing treaty. If the risk is to be assumed at all, it is obvious that extraordinary arrangements must be effected

to meet the excess liability over and above the limits provided by the carrier's normal reinsurance facilities. This affords an opportunity for facultative reinsurance in which several carriers may cooperate to deal with the liability incurred upon an individual risk. Probably the best way to illustrate this practice is to give a hypothetical example of an arrangement which might be effected for the purpose of providing coverage for a liability risk.

Let us take the case of an insurance carrier which desires to issue a policy protecting the owner of a motion-picture theater against claims for damages arising out of "accidents sustained by persons while within the theater or hall (including rooms or other spaces appurtenant thereto and connected therewith by interior openings) and upon approaches, exits or sidewalks, by reason of the use, occupancy or maintenance" of the theater. Assume that it is desired to limit the liability of the carrier to \$50,000 for injury to one person, and, subject to this limit per person, to \$150,000 for injury to more than one person as a result of a single accident. Assume further that the manual premium for the risk, which provides for limits of \$5,000/\$10,000, is \$1,000. The premium for limits exceeding \$5,000/\$10,000 (5/10) is determined by applying to the manual premium the factors in Limit Table "A." The appropriate factor for limits of 50/150 is 180 percent, thus producing a premium for the risk of \$1,800.

Carrier "A" accepts the risk, issues a policy, and undertakes to administer the insurance. It feels, however, that it can not safely assume the entire liability. It arranges to retain liability for limits of 10/25 and secures the assistance of carriers "B," "C," "D," "E" and "F" in providing for the remaining coverage. The additional carriers assuming liability on the risk may be direct writing carriers or they may be reinsurance carriers. Furthermore, the first share of the excess liability may be automatically covered by a reinsurance treaty. In this case, however, for the sake of simplicity it is assumed that the reinsurance is entirely on a facultative basis, and is thus specifically arranged for the particular risk under consideration.

Carrier "B" agrees to assume liability between limits of 10/25 and 20/50, Carrier "C" undertakes to cover liability between limits of 20/50 and 30/75, etc.

The first problem is to determine how the total premium of \$1,800 shall be distributed. The method of doing this is not a



fixed practice, but it is customary in such cases to use the limit table and to determine each company's share by ascertaining the premium for the risk for the different limits involved in the transaction. If this is done, the following exhibit will demonstrate how the total premium is allocated to the several carriers on the risk:

## DISTRIBUTION OF LIABILITY AND PREMIUM.

Total Liability—\$50,000/\$150,000.

Total Manual Premium—(Limits \$5,000/\$10,000) \$1,000.

Company.	Limit Assumed by Company (Distribution of Liability).	Highest Limits Reached by Company.	Charge for These Limits.		Distribution of Premium.
			In Percent.	In Dollars.	
A.....	10/25	10/25	139	1,390	\$1,390
B.....	10/25	20/50	161	1,610	220
C.....	10/25	30/75	169	1,690	80
D.....	10/25	40/100	174	1,740	50
E.....	10/25	50/125	178	1,780	40
F.....	-/25	50/150	180	1,800	20
Total..					\$1,800

This is only one example of an arrangement of this character and it purposely has been made as simple as possible. There is no limit to the complications which may be found in these transactions. Carrier "A," for example, might have retained limits of 25/75 and might have ceded the remaining liability to Carrier "B," both carriers "A" and "B" in turn securing the assistance of other carriers in dealing with these obligations. Or the obligation might have been distributed as indicated, every carrier except one retaining the entire liability assumed, and this individual carrier providing for outside assistance in dealing with its obligation. However, a general idea of the practice will be secured from the case selected for explanation.

Now, assume that an accident occurs which involves claims exceeding the limits carried by "A." The losses and expenses will be shared by the carriers on the risk to the extent to which they have assumed liability. Two rather extreme hypothetical cases will illustrate the principles involved.

I. An accident occurs in which nine persons are killed or injured. The total losses and expenses are \$50,000. The cost of each case and the method of distribution to the carriers on the risk will be found in the following exhibit:

## DISTRIBUTION OF LOSSES AND EXPENSES RESULTING FROM ACCIDENT I.

Claim Number.	Award.	Amount of Loss and Expense Assumed by Carrier.						All Carriers.
		A	B	C	D	E	F	
1.....	\$500	\$500						\$500
2.....	4,300	4,300						4,300
3.....	0	0						0
4.....	2,500	2,500						2,500
5.....	7,000	7,000						7,000
6.....	10,000	10,000						10,000
7.....	25,000	700	10,000	10,000	4,300	—	—	25,000
8.....	100		100					100
9.....	600		600					600
Total.	50,000	25,000	10,700	10,000	4,300			50,000

In this case Carrier "A" is responsible for losses not exceeding \$10,000 per individual or \$25,000 for the entire accident. It is therefore responsible for the entire amount of the first six claims and \$700 of the seventh claim. Carrier "B" is responsible, subject to a limit of \$10,000 per claim, for the amount of the total losses between a lower limit of \$25,000 and an upper limit of \$50,000. It, therefore, assumes \$10,000 of the seventh claim and the entire amount of the eighth and ninth claims. Carrier "C," subject to a limit of \$10,000 per claim, is responsible for total loss between limits of \$50,000 and \$75,000. It must therefore cover \$10,000 of the seventh claim. Carrier "D" is then reached, and in this case it is responsible for the remainder of the seventh claim, or \$4,300. In this example the insurance is broad enough to cover the entire amount of each claim and also the entire amount of the losses resulting from the accident.

II. Another example of a serious accident which introduces several new principles is described by the following exhibit:

## DISTRIBUTION OF LOSSES AND EXPENSES RESULTING FROM ACCIDENT II.

Claim Number.	Award.	Amount of Loss and Expense Assumed by Carrier.						All Carriers.
		A	B	C	D	E	F	
1.....	75,000	10,000	10,000	10,000	10,000	10,000		50,000
2.....	500	500						500
3.....	56,500	10,000	10,000	10,000	10,000	10,000		50,000
4.....	20,500	4,500	5,000	5,000	5,000	1,000		20,500
5.....	1,500					1,500		1,500
6.....	2,500					2,500		2,500
7.....	6,000						6,000	6,000
Total.	162,500	25,000	25,000	25,000	25,000	25,000	6,000	131,000

In this case the limit of the policy is reached on the first and third claims, and while every cooperating carrier is called upon to share in the total losses and expenses, the amount covered by the insurance is \$31,500 under the total cost arising out of the accident. In this case the assured is responsible for the excess cost, and the only way in which he might have secured complete protection would have been by procuring insurance for higher limits, say, \$75,000/\$175,000.

#### CONCLUSION.

The writer was prompted to investigate this important subject by the fact that there is little or no literature available on it, and it was his thought that a paper in the *Proceedings* might be of some assistance to students of workmen's compensation and liability insurance. The paper is not technical. It is intended merely as an introduction to the problems in this field, the thought being that a description of the present machinery for shock loss distribution must be set down before a deeper analysis of these problems can be attempted.

The reason for the present lack of literature on the subject is that the practice of insurance by insurance carriers for their own protection has doubtless been looked upon as an internal company matter of primary interest to executives. However this may be, it is hoped that this paper will stimulate discussion of some of the phases of the problem which are quite obviously of decided interest to our members and upon which we may be able to offer some suggestions. The following is presented as a suggested list of topics which it would be interesting to review and discuss:

From the standpoint of the accountant; the proper treatment of reinsurance and coinsurance premiums and losses, particularly for annual statement work.

From the standpoint of the statistician; the effect of reinsurance and coinsurance upon statistical procedure, and particularly upon the preparation of standardized statistical analyses such as Schedules "Z" and "W."

From the standpoint of the claim adjuster; the preparation of reinsurance agreements and the adjustment of claims under such agreements.

From the standpoint of the actuary;

The determination of the conditions under which reinsurance or coinsurance is necessary for the safety of the individual carrier.

The determination of the amount of reinsurance necessary for the protection of an individual carrier.

The determination, particularly in liability insurance, of the limits which an individual carrier can safely assume on certain risks.

The calculation of reinsurance premiums, particularly in the case of liability insurance, where the distribution of the obligation may be extremely complicated.

The determination of proper bases for reserves against the obligations assumed under such practice.

From the standpoint of the underwriter;

This practice opens up the possibility of dealing with abnormal risks which can not be accepted in the ordinary run of business. It therefore involves a specialized conception of underwriting and the development of a special technique. A great many difficult problems would seem to be involved, such as the determination of how best to group risks of this character for the purpose of securing a stable experience, the possibility of selection against the carrier which freely accepts abnormal risks of this character, etc.

PREMIUMS AND RESERVES FOR NON-CANCELLABLE  
ACCIDENT AND HEALTH POLICIES.

BY

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The difficulty that confronts the actuary in preparing tables of net premiums and reserves for non-cancellable Accident and Health policies lies in the absence of any published sickness tables compiled from experience in this country suitable for the purpose.

Until recently but little, if any, disability insurance has been issued by American companies under the non-cancellable form. It is true that a great volume of Accident and Health insurance has been in force in American companies for many years, but this insurance has been written under policies which give the insurance companies the right to cancel at any time and which restrict benefits, for the most part, to payment of indemnity for disabilities that last longer than a year to fifty-two weeks.

The existence of these two restrictions in the policies heretofore issued makes the experience under the so-called Commercial Accident and Health policies of doubtful value in determining rates for the non-cancellable form of Health insurance.

Non-cancellable insurance is issued only to applicants who can successfully pass a rigid medical examination, and it may be anticipated that for a year or two after this medical examination there will be experienced a very low rate of disability, lower than that under cancellable forms of disability insurance written without medical examination. But after the effects of medical selection have worn off, it may be anticipated that the periods of disability, on the average, will be much longer than we might be led to expect from an examination of our past experience under cancellable forms. This will be so because it will be impossible to eliminate cases of prolonged sickness and cases of total and permanent disability, which it has been possible to avoid heretofore when such disabilities have been preceded by temporary sicknesses.

In a recent report made by a Committee on Statistics of the

Bureau of Personal Accident and Health Underwriters an analysis of a large body of claims disclosed the fact that of the payments made under policies issued with benefits payable for not longer than fifty-two weeks approximately 50 percent were for the first two weeks of sickness, 70 percent for the first four weeks of sickness and 90 percent for the first thirteen weeks of sickness. This analysis was not available by attained age of the insured. For the reasons stated above, I believe that it would be unsafe to assume that the elimination of payment of indemnity for the first few weeks of sickness under non-cancellable Health policies would warrant any such reductions in premium as the committee's analysis would seem to indicate.

The Metropolitan Life Insurance Company have insured all their Home Office employees since 1915. Through their courtesy, I am permitted to state that their actual claims, amounting to \$96,000, among Home Office men for the years 1915 to 1918 (and 1918, the epidemic year, showed no worse than prior years) were 94 percent of the expected by the Manchester Unity A. H. J. group. A surprising feature of this experience is that the claims in the first three months of sickness were but 73 percent of the expected and in the sickness after three months they were 150 percent of the expected. Too much weight can not be given to this experience, because the exposure was comparatively small. I have not the number of years exposed, but the amount of claims paid in the first three months of sickness was \$53,000 and for sickness after the first three months \$43,000. The experience is an indication of the unsuitability of our experience under cancellable Accident and Health policies for the calculation of premiums for long-term contracts.

There being no available experience in America, the natural course is to use, for the present, the best available abroad. In England the most suitable table seems to be that of the Manchester Unity Friendly Society. Members of this Society (which is a mutual benefit association drawing its members largely from the industrial classes) were only admitted upon a certificate of good health from a medical practitioner, and no sickness benefits were paid until after the completion of six months' membership. Benefits were payable throughout disability, however long it lasted, but the benefit was successively reduced with the duration of disability, so that it is believed that malingering was largely eliminated. Indemnity was paid for disabilities arising both from sickness and

from accident (occupational and non-occupational). The fact that the experience is upon industrial lives does not in itself necessarily make it unsuitable for use in computation of premiums for the professional classes, salaried employees and business people, among which classes non-cancellable Health insurance will, for the most part, be sold in this country. Among persons not engaged in extra-hazardous occupations, perhaps 87 percent of the total disability experienced arises from sickness and 13 percent from accident, and it is not believed that there is very much variance in rates of sickness between industrial workers and other classes of society. Moreover, the latest published experience of the Manchester Unity (covering the five years 1893-1897) is grouped according to hazard of occupation. The A. H. J. group covers the experience in non-hazardous occupations and in agriculture. In this group approximately one fifth of the exposure was upon agricultural workers.

Mr. James D. Craig, in his paper to the Actuarial Society submitted at their fall meeting in 1914, discusses the suitability of the Manchester Unity tables. He quotes from Mr. Dawson in the *American Labor Legislation Review* of March, 1914, as follows:

"Sickness Insurance Tables are entirely wanting in the United States, or virtually so, but the following tables prepared by me from American data are about to appear:

"a. Disability experience (comprising both sickness and accident) of the Brotherhood of Locomotive Engineers.

"b. Disability experience (comprising both sickness and accident) of the Westinghouse Airbrake Company's relief fund.

"The first of these is being published by the Bureau of Labor Statistics; the second I have been authorized to turn over to them for publication also.

"The engineers' experience is, of course, highly restricted, but the other experience is perhaps fairly representative of sickness rates of mechanical industries. It is interesting to note that it corresponds reasonably with the experience of British Friendly Societies."

He also quotes the late Mr. Messenger from his paper on the sickness experience of the Travelers' Life Insurance Company as follows:

"It is quite probable that if the Travelers' general health business should ever become as old as that of the Manchester Unity, its rate of sickness would approximate that of the Manchester Unity from 1893-1897, making allowance for the fact that the health policy does not cover disability from accident."

A considerable volume of Group Health insurance has been written in the past year or two, and the rates for this insurance were based upon the Manchester Unity A. H. J. group. Indications are that the experience on the best class of risks will follow the Manchester Unity fairly closely for the first fifty-two weeks of sickness.

An examination of the rates being charged for non-cancellable Health insurance by companies now transacting it discloses most astonishing differences of opinion. Below are given the rates of one American company compared with the rates quoted by three other American companies for a policy paying indemnity of \$10 a month for as long as disability lasts, provided disability occurs before age 65.

Age at Entry.	Rate Charged by Company A.	Rate Charged by Companies B, C and D.
20 .....	\$ 4.17	\$6.00
30 .....	5.26	6.00
40 .....	7.23	6.00
50 .....	11.03	6.00

Nothing, however, is paid for the first two weeks of disability.

For a similar policy, except that nothing is paid for the first thirteen weeks of disability, are shown below the rates for seven companies designated E, F, G and H and B, C and D.

Age at Entry.	Rate Charged by Company E.	Rate Charged by Company F.	Rate Charged by Company G.	Rate Charged by Company H.	Rate Charged by Companies B, C and D.
20 .....	\$2.29	\$2.53	\$2.46	\$2.62	\$2.00
30 .....	3.23	3.34	3.57	3.34	2.00
40 .....	4.83	4.95	5.38	4.99	2.00
50 .....	7.50	7.59	8.58	7.57	2.00

Companies E, F, G and H are British companies. It will be noted that there are most glaring discrepancies between the British rates and American rates. The business is new in America, but the British companies have had a considerable experience with it. The policies issued by the American companies are more liberal in their terms than those written by the British companies. Moreover, the policies of the British companies provide that no payments will be made after the age of 65, while the American companies pay throughout duration of sickness, provided only that the disability starts before age 65.



An examination of the above rates shows that the British companies have based them upon the Manchester Unity or upon a table of sickness departing not very far from it. American companies, for the most part, are charging the same rate for all ages at entry. This course can be justified only if it can be shown that sickness rates do not increase with age, and this we know is not so. Even under cancellable forms of insurance there has been observed an increasing rate of disability beyond the age of 50. This increase is likely to be much more marked upon the business that is not selected upon each annual renewal. The company, therefore, that is charging the same rate of premium, irrespective of age, and is working upon the basis that what is left over after payment of the year's incurred claims and expenses, is profit, is liable to be embarrassed in years to come by reason of a premium wholly inadequate to meet the increasing costs in later years due to advance in age.

The Manchester Unity tables show the amount of sickness per member according to age attained. The sickness is divided into first three months' sickness, second three months' sickness, second six months' sickness, second year's sickness and after two years' sickness. But the sickness tables are not arranged according to the age at which the sickness starts. In Appendix VI of the "Report for 1912 and 1913 on the Administration of the National Insurance Act of Great Britain" is a memorandum on rates of sickness of the Manchester Unity, showing how actuarial formulas were applied to the experience of the whole Society to rearrange the tables so as to show the amount of sickness per member in the first week of sickness, the second week of sickness, and so on up to the fifty-second week of sickness, and how the amount of after two years' sickness per member was split up into second year's sickness, third year's sickness, fourth year's sickness, and so on.

The same formulas have been here applied in rearranging the experience of the A. H. J. group. A brief account of the methods employed may be useful to those who have not at hand the "Report for 1912 and 1913 on the Administration of the National Insurance Act."

Let  $s_t$  = sickness expressed in years per person per annum counting sickness only beyond duration  $t$ ,

Then  $s_t - s_{t,h}$  = sickness expressed in years per person per annum counting sickness only between duration  $t$  and  $t + h$ .

Considering  $l_x$  persons,

(number of cases of sickness between duration  $t$  and  $t + h$  in one year) multiplied by (their average duration beyond  $t$ )

= total amount of sickness in the year

$$= l_{x+\frac{1}{2}} (s_t - s_{t+h}).$$

Hence

number of cases of sickness of between duration  $t$  and  $t + h$  in one year.

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$$= \frac{l_{x+\frac{1}{2}} (s_t - s_{t+h})}{\text{their average duration beyond } t}$$

$$= (\text{as } h \text{ approaches } 0) - \frac{ds_t}{dt},$$

i.e., the proportion of cases of sickness of duration  $t$

$$= - \frac{ds_t}{dt}$$

$$= - s_t \frac{d \log_e s_t}{dt}$$

$$= \frac{1}{\log_e 10} s_t (\Delta - \frac{1}{2} \Delta^2 + \frac{1}{3} \Delta^3 \dots) \log_{10} s_t.$$

The Manchester Unity Tables give values of  $s_0, s_1, s_2, s_4$  and  $s_8$ , representing sickness per member per annum of full duration, of duration over three months, over six months, over twelve months and over two years, respectively.  $s_3, s_6, s_9$  and  $s_7$  are found by interpolation.

The amount of first year's sickness per member is represented graphically. Along a base line are measured successive lengths representing six weeks, seven weeks and then three of thirteen weeks each. Upon these bases are set up rectangles, the areas of which represent the amount of sickness per member for the first six weeks' sickness, the next seven weeks' sickness, the next thirteen weeks' sickness, and so on.

Recourse was had to the British Friendly Society's experience, 1876 to 1880, in order to ascertain the proportion of the first three months' sickness which fell within the first six weeks. The problem is to replace the area of the rectangles by an area bounded by a continuous curve. The ordinate of the curve at any point will

represent the proportion of cases of sickness of duration represented by the abscissa of the point. The initial ordinate is found in the following way:

Among  $l_x$  persons for one year  
 total cases of sickness = number sick at beginning of year + new cases of sickness during the year

$$\begin{aligned} \therefore \frac{\text{total cases of sickness}}{l_{x+\frac{1}{2}}} &= \frac{\text{number of persons sick at beginning of year}}{l_{x+\frac{1}{2}}} \\ &+ \frac{\text{new cases during the year}}{l_{x+\frac{1}{2}}} \end{aligned}$$

*i.e.,*

$$\begin{aligned} \text{Proportion sick} &= \frac{\text{number of persons sick at beginning of year}}{l_{x+\frac{1}{2}}} \\ &+ \text{proportion of new cases} \end{aligned}$$

$$\begin{aligned} \therefore \text{Proportion of new cases} &= \text{Proportion sick} - \frac{\text{number of persons sick at beginning of year}}{l_{x+\frac{1}{2}}} \\ &= \text{Proportion sick} - \frac{\bar{z}_x l_x}{l_{x+\frac{1}{2}}} \end{aligned}$$

where  $\bar{z}_x$  is the force of sickness at age  $x$  and may be taken equal to the mean of the central sickness rates for ages  $x$  and  $x-1$ . It must be remembered that the rates of sickness in the Manchester Unity are expressed in weeks and the force of sickness in the above formula must be expressed in years—that is, the mean of the central sickness rates for ages  $x$  and  $x-1$  must be divided by 52.18 to obtain  $\bar{z}_x$ .

The ordinates corresponding to  $s_{18}$ ,  $s_{26}$ ,  $s_{30}$  and  $s_{32}$  are found from the formula given above. The ordinate corresponding to  $s_6$  is found by the same formula after having first obtained by interpolation  $s_{10}$ ,  $s_{32}$  and  $s_{45}$ .

The curve can then be drawn bounding an area equal to the area of the rectangles and passing through the points fixed by the ordi-

nates that have been determined, and from the curve can then be read off the amount of first week's, second week's, third week's, fourth week's, etc., sickness per member.

It was noticed as to the amount of sickness per member per annum in regard to sickness of duration over three months, over six months, over nine months, over twelve months, over fifteen months, over eighteen months, over twenty-one months and over twenty-four months that the first differences of the logarithms of these quantities approached a constant. This law was assumed to hold good and by it sickness of after two years' duration was split up by years according to time elapsed since sickness started. A test of the accuracy of this method was made from data submitted from some of the Lodges of the Society, and this test indicated that the method gave remarkably good results.

One objection, and a very pertinent one, that has been raised to the use of the Manchester Unity tables is that any premiums calculated therefrom understate the reductions from the premiums for a policy under which indemnity is paid from the first day of sickness to correct for the elimination of payment of indemnity for the first two weeks, the first month or the first thirteen weeks of sickness. This is an important point because these latter forms of policies are the popular ones.

This objection is raised because in the Manchester Unity any case of disability preceded by a former case where there was an interval between the two of less than twelve months was not considered a new case, but a continuation of the old one. For example, if a member was sick for three months, recovered and was well for nine months, and then sick again for three months, the case was considered as one sickness for six months, three months of which occurred in the first three months of sickness and three months in the second year of sickness. It is to be observed that the total amount of sickness was not overstated, but naturally the sickness in the first three months was considerably understated, while the amount of sickness of long duration was correspondingly overstated. Mr. Alfred W. Watson, in his paper read before the Institute of Actuaries, appearing in Volume 35 of the *Journal* of the Institute, gives a table showing approximately the correction that would have to be applied when each attack of sickness, without regard to preceding ones, is considered a new case.

This correction has been applied to the A. H. J. sickness rates, and the results shown below for decennial attained ages.

TABLE I.

MANCHESTER UNITY SICKNESS EXPERIENCE—A. H. J. GROUP (MODIFIED SO AS TO COUNT EACH SUCCESSIVE CASE OF SICKNESS AS A NEW CASE).  
*Amount of Sickness in Weeks per Member per Annum.*

Age.	First 3 Months.	Second 3 Months.	Second 6 Months.	Second 12 Months.	After 2 Years.	All Periods.
20..	.731	.040	.027	.013	.004	.815
30..	.713	.063	.043	.039	.060	.918
40..	.856	.110	.076	.067	.204	1.313
50..	1.146	.206	.152	.144	.529	2.177
60..	1.722	.438	.450	.513	1.698	4.821
65..	2.165	.720	.824	.983	3.491	8.183
70..	2.644	.994	1.380	1.808	7.087	13.913
80..	2.292	1.238	1.932	3.219	21.096	29.777
90..	1.831	.910	1.544	2.522	30.857	37.664

The first year's sickness in the foregoing table for ages 20, 30, 40, 50, 60 and 65 has been divided into sickness occurring in the first week, the first two weeks, the first three weeks and so on for the whole of the year by the method described, and the results are shown in Table II.

In determining the initial ordinate of the curve bounding the area representing the first year's sickness, a slight modification of the method above described had to be made because a case of sickness in the Manchester Unity was not counted as a new case if it had been preceded by a former sickness and the interval had been less than twelve months. Accordingly, the initial ordinate was determined from the graduated rates of sickness appearing in the Manchester Unity tables instead of from the rates of sickness appearing in Table I. It was then increased in the same ratio that the amount of sickness in the first three months, appearing in Table I, bears to the amount of sickness for the first three months appearing in the Manchester Unity tables.

The after two years' sickness appearing in Table I was split up into second, third, fourth, fifth year sickness and so on for the attained ages shown in the table and values for intermediate ages found by interpolation. The table was then rearranged showing the amount of sickness per member for age at which sickness commenced. The results are shown in Table III.

A modification was introduced for the older ages at entry. For

ages at entry 50, 60 and 65 for rates of sickness after the second year values were deduced from Hunter's Total and Permanent Disability table.

The following formula was used:

Between age  $x - \frac{1}{2}$  and  $x + \frac{1}{2}$  there occur  $r_{x-\frac{1}{2}} l_{x-\frac{1}{2}}^{aa}$  cases of disability. Among these cases there will be during the year of age  $x + n$  to  $x + n + 1$

$$r_{x-\frac{1}{2}} l_{x-\frac{1}{2}}^{aa} \frac{l_{x+n+\frac{1}{2}}^i}{l_{x+\frac{1}{2}}^i} \cdot 52$$

weeks of disability.

The amount of  $(n + 1)$ th year of sickness per member of age  $x + n$  is therefore

$$\frac{r_{x-\frac{1}{2}} l_{x-\frac{1}{2}}^{aa}}{l_{x+n+\frac{1}{2}}} \cdot \frac{l_{x+n+\frac{1}{2}}^i}{l_{x+\frac{1}{2}}^i} \cdot 52.$$

Possibly the high rates of sickness shown at the older ages by the Manchester Unity are due to the inclusion, to some extent, of what would be virtually superannuation benefits. Payment of such benefits to any appreciable extent would make the Manchester Unity tables unsuitable for our purposes at the older ages.

Table III has been used for calculating net level premiums and reserves for a disability policy renewable up to age 60, under which the benefit is payable as long as disability lasts, provided it commences before age 60. For mortality the experience of the Manchester Unity Whole Society has been used and interest at  $3\frac{1}{2}$  per cent has been assumed.

If  $s'_{(x),n/1}$  = rate of  $(n + 1)$ th year of sickness among persons aged  $x + n$  to  $x + n + 1$ , then the One-Year-Term premium for a benefit of \$1 a week, payable as long as disability lasts, is

$$\frac{s_{(x)}^{0/1} l_{x+\frac{1}{2}} v^{\frac{1}{2}} + s_{(x)}^{1/1} l_{x+\frac{3}{2}} v^{3/2} + s_{(x)}^{2/1} l_{x+\frac{5}{2}} v^{5/2} + \dots}{l_x}$$

I have denoted the One-Year-Term premium for a unit of payment of \$10 a month by  $\pi_x^{0/all}$  where 0 shows the benefit is payable from the first day of sickness and "all" that there is no limit to the period of payment.  $\pi_x^{13/2/all}$  will represent the One-Year-Term premium for a similar benefit except that here there will be no payment for the first thirteen weeks of disability.

One-Year-Term premiums have been calculated from Table III by the above formula for ages 20, 30, 40, 50, 60 and 65 for policies

with waiting periods of no, two, four and thirteen weeks, and premiums for intermediate ages found by interpolation. These are shown in Table IV. They are shown for a benefit of \$10 a month.

Commutation columns were then constructed. For a policy with no waiting period,

$$H_x^{0/all} = \pi_x^{0/all} D_x,$$

$$K_x^{0/all} = \sum_x^{64} H_x^{0/all}.$$

The net level premium at age  $x$  for \$10 a month indemnity upon such a policy renewable up to age 60 will be

$$\frac{K_x^{0/all} - K_{60}^{0/all}}{N_{x-1} - N_{59}}.$$
 \*

In Table V are given columns for  $K$  for waiting periods of no, two, four and thirteen weeks. In Table VI appear net level premiums for policies renewable up to age 60, and in Table VII the terminal reserves for these policies.

The above formula for a One-Year-Term disability premium was suggested by Mr. J. D. Craig in his paper on Health Insurance appearing in Volume 15 of the Transactions of the Actuarial Society. If in compiling the Manchester Unity all sicknesses starting between attained age  $x - \frac{1}{2}$  and  $x + \frac{1}{2}$  are assumed to start at age  $x$ , the formula would be exact, but in the light of the actual distribution of sickness throughout the year it involves a theoretical error, but one of negligible results.

It should be stated that the net premiums and reserves proposed are intended for male lives. A higher rate of morbidity may be expected among women than among men.

#### CLAIM RESERVES.

The subject of claim reserve for a policy when the insured is disabled assumes much more importance when the indemnity is payable throughout disability without limit than when payments are limited to fifty-two weeks. Moreover, it is evident that a claim under a policy with a thirteen weeks' waiting period will be much heavier on the average than a claim under a policy with a shorter waiting period. What reserve should be made on approval of a

\* In the Manchester Unity Tables  $N$  is given in the English form so that  $N_x = D_{x+1} + D_{x+2} + D_{x+3} + \dots$

claim under a policy with a waiting period of thirteen weeks? Should claim reserves be set aside for long-existing disabilities, having regard to the claim adjuster's estimate of the probable future duration of the sickness in each case? Recoveries and deaths are liable not to occur quite so soon as the adjuster may anticipate. Besides, cases that have run but a short time must be valued by some average method, and in cases of permanent and total disability interest as well as the probable duration of disability is a factor in the determination of the liability. It has been suggested that tables of claim reserves should be prepared for cases of total and permanent disability for various types of disability. But this is contrary to the practice in regard to disability benefits in Life insurance policies and is probably impracticable. After all, given a good volume of cases, the use of an average table of claim reserves according to age of claimant and duration of claim will produce the same result as the aggregate of the individual estimates of the claim adjuster—that is, it will do so if the claim adjuster correctly classifies each claim. But no adjuster can correctly classify all his claims, and the use of an average table of claim reserves will save much labor.

In Table VIII is given an analysis by duration of given number of claims occurring at ages 20, 30, 40, 50 and 60. The table also shows the number of persons among whom these claims will occur during the year. This table is deduced from the rates of disability and mortality upon which the foregoing premiums are based.

The number of cases of sickness starting at age  $x$  of duration  $t$  (where  $t$  is not more than a year) can be obtained from the proportion sick multiplied by the number living—that is, by  $l_{x+1/2}$  in cases of sickness lasting two, three, four years and so on, the amount of sickness in years per annum in each year can be obtained by multiplying the rate of sickness for the second, third, fourth year, etc., by  $l_{x+3/2}$ ,  $l_{x+5/2}$ ,  $l_{x+7/2}$  . . . respectively, and dividing by fifty-two. Representing these amounts of sickness graphically, the number of cases at the end of each year can be obtained. In fact, they can be obtained by inspection except for the first year or two.

From Table VIII a table of claim reserves has been calculated, and appears in Table IX. The reserves have been slightly adjusted so as to merge them into an ultimate table for disabilities existing more than seven years. After the age of 35 this ultimate table



departs but little from Hunter's table of annuities for totally and permanently disabled lives and is identical with it beyond age 53.

#### CONCLUSION.

It is not suggested that sickness rates in this country are likely to follow very closely the Manchester Unity. Opinions have been expressed by some experienced Accident underwriters that the incidence of sickness will be more favorable in America than in the Manchester Unity experience, while others doubt whether the Manchester Unity makes sufficient provision for the moral hazard undoubtedly existing under disability policies issued for substantial amounts. They fear, after policies have been in force some years and after the most active period of business life has passed, long-term disability claims where the insured is impaired in health and claims to be totally disabled.

A start, however, must be made, and it seems to the writer that the Manchester Unity is as reasonable a table as any available.

There is one point to which attention should be drawn, and that is that the Manchester Unity tables of sickness are aggregate tables, and even if they do fairly well represent the sickness rates likely to be experienced in this country, gross premiums based upon the net premium that I have deduced will be likely to be somewhat too high at the older ages.

I have attempted some trial calculations to correct this by assuming that during the first year after medical examination the experience under non-cancellable disability policies would closely follow the experience under cancellable forms, and that the experience would gradually merge into the Manchester Unity by the end of five years. This attempt was abandoned, as the result of introducing any such modification would be inappreciable at the younger ages at entry and not more than five percent or six percent at the older ages. The introduction of such refinements when our knowledge is so limited does not seem to be warranted. A correction can just as well be effected, if thought to be necessary, by the exercise of judgment in loading the net premiums.

And, indeed, the object of this paper has been primarily to call attention to the necessity of grading premiums for this class of insurance according to age at entry and of setting aside reserves in addition to the one-half a year's premium (customarily accepted as

a correct reserve for a Health policy) so as to provide for the increasing claims that will surely come after the effects of medical selection have worn off and as the age of the insured advances. In addition, attempt has been made to prepare reasonable tables of net premiums and reserves for guidance until a reliable experience of our own under this form of insurance is available.

Recently an Actuarial Committee was appointed by the Bureau of Personal Accident and Health Underwriters to prepare a report upon the subject of "Net Premiums and Reserves for Non-Cancellable Disability Insurance." The writer, who was a member of the committee, is indebted to its work for help in preparing this paper.

TABLE II.

SICKNESS IN WEEKS PER MEMBER PER ANNUM FOR THE FIRST WEEK.

*First Two Weeks. First Three Weeks of Sickness and so on up to the First Fifty-Two Weeks of Sickness.*

Weeks.	Age 20.	Age 30.	Age 40.	Age 50.	Age 60.	Age 65.
1.....	.230	.208	.221	.245	.309	.349
2.....	.407	.377	.413	.460	.597	.672
3.....	.494	.467	.533	.633	.848	.951
4.....	.550	.520	.594	.734	1.002	1.161
5.....	.588	.558	.639	.808	1.113	1.317
6.....	.617	.587	.678	.868	1.210	1.449
7.....	.644	.614	.714	.921	1.302	1.573
8.....	.667	.639	.747	.970	1.390	1.693
9.....	.687	.661	.776	1.014	1.473	1.806
10.....	.703	.680	.801	1.053	1.548	1.911
11.....	.716	.694	.823	1.088	1.614	2.006
12.....	.725	.705	.841	1.119	1.672	2.090
13.....	.731	.713	.856	1.146	1.722	2.165
14.....	.736	.720	.869	1.170	1.767	2.236
15.....	.740	.727	.881	1.192	1.809	2.304
16.....	.744	.734	.893	1.212	1.849	2.369
17.....	.748	.740	.904	1.231	1.887	2.431
18.....	.752	.746	.914	1.248	1.924	2.490
19.....	.755	.751	.923	1.265	1.959	2.547
20.....	.758	.756	.931	1.281	1.992	2.602
21.....	.761	.760	.938	1.296	2.024	2.655
22.....	.763	.764	.945	1.309	2.054	2.705
23.....	.765	.768	.951	1.321	2.083	2.753
24.....	.767	.771	.957	1.332	2.110	2.799
25.....	.769	.774	.962	1.342	2.136	2.843
26.....	.771	.776	.966	1.352	2.160	2.885
27.....	.773	.778	.970	1.361	2.184	2.926
28.....	.775	.780	.974	1.369	2.207	2.965
29.....	.777	.782	.978	1.377	2.229	3.003
30.....	.779	.784	.982	1.385	2.250	3.041
31.....	.780	.786	.986	1.392	2.270	3.078
32.....	.781	.788	.990	1.399	2.290	3.114
33.....	.782	.790	.994	1.406	2.309	3.150
34.....	.783	.792	.998	1.413	2.328	3.185
35.....	.784	.794	1.001	1.420	2.347	3.219
36.....	.785	.796	1.004	1.426	2.365	3.252
37.....	.786	.798	1.007	1.432	2.383	3.284
38.....	.787	.800	1.010	1.438	2.400	3.316
39.....	.788	.802	1.013	1.444	2.417	3.348
40.....	.789	.804	1.016	1.450	2.433	3.378
41.....	.790	.806	1.019	1.456	2.449	3.407
42.....	.791	.808	1.022	1.461	2.465	3.436
43.....	.792	.810	1.024	1.466	2.480	3.465
44.....	.793	.811	1.026	1.471	2.495	3.493
45.....	.794	.812	1.028	1.476	2.510	3.521
46.....	.795	.813	1.030	1.480	2.525	3.549
47.....	.796	.814	1.032	1.484	2.540	3.576
48.....	.796	.815	1.034	1.488	2.555	3.603
49.....	.797	.816	1.036	1.492	2.569	3.630
50.....	.797	.817	1.038	1.496	2.583	3.657
51.....	.798	.818	1.040	1.500	2.597	3.683
52.....	.798	.819	1.042	1.504	2.610	3.709

TABLE III.  
 RATES OF SICKNESS IN WEEKS PER ANNUM.  
*Age at Which Sickness Commences.*

Year.	20	30	40	50	60	65
1.....	.798	.819	1.042	1.504	2.610	3.709
2.....	.019	.043	.071	.161	.593	1.107
3.....	.008	.024	.044	.071	.218	.520
4.....	.005	.018	.038	.066	.202	.480
5.....	.003	.014	.033	.061	.187	.450
6.....	.002	.012	.030	.056	.173	.430
7.....	.001	.010	.028	.051	.160	.410
8.....	.001	.009	.025	.047	.148	.390
9.....	.001	.009	.024	.043	.138	.380
10.....	.001	.008	.022	.039	.131	.370
11.....	.001	.007	.020	.036	.126	.360
12.....	.001	.006	.017	.032	.122	.360
13.....	.001	.005	.015	.030	.118	.360
14.....	.001	.005	.013	.028	.114	.360
15.....	.001	.005	.011	.025	.110	.360
16.....	.001	.004	.009	.024	.110	.360
17.....	.001	.004	.009	.022	.110	.360
18.....	.001	.004	.008	.020	.110	.360
19.....	.001	.004	.007	.019	.110	.360
20.....	.001	.003	.007	.018	.110	.360
21.....	.001	.003	.007	.017	.110	.360
22.....	.001	.003	.007	.016	.110	.360
23.....	.001	.002	.006	.015	.110	.320
24.....	.001	.002	.006	.015	.110	.280
25.....	.001	.001	.006	.014	.110	.240
26.....	.001	.001	.006	.014	.110	.200
27.....	.001	.001	.006	.014	.100	.160
28.....	.001	.001	.006	.014	.090	.120
29.....	.001	.001	.006	.014	.080	.080
30.....	.001	.001	.006	.014	.070	.040
31.....	.001	.001	.006	.014	.060	
32.....	.001	.001	.006	.014	.050	
33.....	.001	.001	.006	.014	.040	
34.....	.001	.001	.006	.014	.030	
35.....	.001	.001	.006	.014	.020	
36.....	.001	.001	.006	.014		
37.....	.001	.001	.006	.014		
38.....	.001	.001	.006	.013		
39.....	.001	.001	.006	.012		
40.....	.001	.001	.006	.010		

TABLE IV.  
NON-CANCELLABLE DISABILITY INSURANCE.

*One-Year-Term Premiums.*

*Benefit \$10 a Month.*

Mortality: M. U. Whole Society—Sickness: M. U.—A. H. J. Group  
Modified. Interest  $3\frac{1}{2}$  Percent.

Age.	$\pi_{x^0/all}$ .	$\pi_{x^{1/52}/all}$ .	$\pi_{x^{1/52}/all}$ .	$\pi_{x^{15/52}/all}$ .
20.....	1.91	.99	.67	.26
21.....	1.92	1.00	.69	.26
22.....	1.94	1.03	.71	.28
23.....	1.95	1.06	.75	.31
24.....	1.97	1.09	.78	.36
25.....	1.99	1.13	.82	.40
26.....	2.02	1.17	.86	.44
27.....	2.06	1.21	.90	.47
28.....	2.10	1.26	.94	.51
29.....	2.15	1.30	.99	.55
30.....	2.21	1.36	1.04	.60
31.....	2.27	1.42	1.10	.65
32.....	2.34	1.48	1.16	.70
33.....	2.42	1.55	1.22	.75
34.....	2.50	1.63	1.29	.81
35.....	2.59	1.71	1.36	.87
36.....	2.69	1.80	1.44	.93
37.....	2.79	1.89	1.52	1.00
38.....	2.91	2.00	1.61	1.07
39.....	3.02	2.10	1.70	1.14
40.....	3.13	2.20	1.79	1.21
41.....	3.23	2.29	1.87	1.26
42.....	3.32	2.38	1.94	1.31
43.....	3.42	2.47	2.01	1.35
44.....	3.54	2.58	2.10	1.41
45.....	3.68	2.71	2.21	1.49
46.....	3.85	2.87	2.35	1.60
47.....	4.05	3.06	2.51	1.72
48.....	4.26	3.26	2.69	1.86
49.....	4.50	3.49	2.89	2.02
50.....	4.76	3.73	3.11	2.19
51.....	5.02	3.97	3.32	2.36
52.....	5.29	4.21	3.54	2.52
53.....	5.58	4.47	3.78	2.71
54.....	5.94	4.80	4.08	2.95
55.....	6.40	5.23	4.48	3.29
56.....	6.93	5.73	4.95	3.69
57.....	7.52	6.29	5.48	4.15
58.....	8.19	6.93	6.09	4.67
59.....	8.98	7.68	6.82	5.31
60.....	9.92	8.59	7.69	6.09
61.....	11.00	9.65	8.70	7.00
62.....	12.22	10.85	9.84	8.04
63.....	13.57	12.17	11.12	9.20
64.....	15.05	13.61	12.54	10.48
65.....				

TABLE V.  
COMMUTATION COLUMNS.

Age.	$K'_{x,0}/all.$	$K'_{x,1/52}/all.$	$K'_{x,2/52}/all.$	$K'_{x,13/52}/all.$
20.....	3,401,038	2,419,859	1,979,181	1,332,613
21.....	3,305,981	2,370,589	1,945,836	1,319,673
22.....	3,213,948	2,322,655	1,912,762	1,307,210
23.....	3,124,409	2,275,116	1,879,993	1,294,287
24.....	3,037,772	2,228,021	1,846,671	1,280,514
25.....	2,953,537	2,181,414	1,813,319	1,265,121
26.....	2,871,660	2,134,921	1,779,581	1,248,663
27.....	2,791,702	2,088,609	1,745,540	1,231,246
28.....	2,713,267	2,042,538	1,711,272	1,213,351
29.....	2,636,367	1,996,398	1,676,850	1,194,675
30.....	2,560,657	1,950,620	1,641,988	1,175,307
31.....	2,485,833	1,904,574	1,606,777	1,154,993
32.....	2,411,954	1,858,359	1,570,976	1,133,838
33.....	2,338,759	1,812,065	1,534,691	1,111,942
34.....	2,266,021	1,765,477	1,498,021	1,089,399
35.....	2,193,836	1,718,412	1,460,774	1,066,011
36.....	2,122,018	1,670,995	1,423,063	1,041,887
37.....	2,050,402	1,623,074	1,384,726	1,017,128
38.....	1,979,112	1,574,781	1,345,887	991,576
39.....	1,907,773	1,525,751	1,306,418	965,345
40.....	1,836,773	1,476,380	1,266,451	938,544
41.....	1,766,235	1,426,801	1,226,112	911,275
42.....	1,696,493	1,377,355	1,185,735	884,069
43.....	1,627,842	1,328,141	1,145,620	856,981
44.....	1,560,153	1,279,255	1,105,838	830,262
45.....	1,493,123	1,230,403	1,066,074	803,564
46.....	1,426,489	1,181,333	1,026,058	776,585
47.....	1,359,861	1,131,665	985,389	748,895
48.....	1,292,910	1,081,080	943,896	720,462
49.....	1,225,679	1,029,631	901,442	691,107
50.....	1,157,931	977,089	857,933	660,696
51.....	1,089,630	923,567	813,308	629,272
52.....	1,021,047	869,329	767,950	597,030
53.....	952,314	814,628	721,955	564,288
54.....	883,457	759,468	675,310	530,847
55.....	813,929	703,284	627,554	496,317
56.....	742,972	645,299	577,854	459,841
57.....	670,304	585,214	525,978	421,148
58.....	595,830	522,921	471,707	380,048
59.....	519,353	458,209	414,839	336,440
60.....	440,433	390,714	354,902	289,774
61.....	358,556	319,815	291,431	239,509
62.....	273,501	245,198	224,160	185,383
63.....	185,231	166,824	153,082	127,307
64.....	93,950	84,960	78,281	65,421
65.....				

TABLE VI.

## NON-CANCELLABLE DISABILITY INSURANCE.

Level Annual Premiums for Policy Renewable up to Age 60. Benefit \$10  
a Month.

Mortality: M. U. Whole Society—Sickness: M. U.—A. H. J. Group  
Modified, Interest  $3\frac{1}{2}$  Percent.  
Waiting Period.

Age.	No Weeks.	2 Weeks.	4 Weeks.	13 Weeks.
20.....	2.94	2.01	1.61	1.04
21.....	2.99	2.07	1.66	1.08
22.....	3.05	2.12	1.71	1.12
23.....	3.11	2.18	1.77	1.16
24.....	3.17	2.24	1.82	1.21
25.....	3.24	2.31	1.88	1.26
26.....	3.31	2.37	1.94	1.30
27.....	3.38	2.44	2.00	1.35
28.....	3.46	2.51	2.06	1.41
29.....	3.54	2.59	2.13	1.46
30.....	3.62	2.66	2.20	1.51
31.....	3.71	2.74	2.27	1.57
32.....	3.80	2.83	2.34	1.63
33.....	3.89	2.91	2.42	1.69
34.....	3.99	3.00	2.50	1.75
35.....	4.09	3.10	2.58	1.81
36.....	4.19	3.19	2.66	1.87
37.....	4.30	3.29	2.75	1.94
38.....	4.41	3.39	2.84	2.01
39.....	4.52	3.50	2.93	2.08
40.....	4.64	3.61	3.03	2.16
41.....	4.76	3.72	3.13	2.23
42.....	4.89	3.84	3.23	2.31
43.....	5.03	3.97	3.35	2.40
44.....	5.18	4.11	3.47	2.50
45.....	5.33	4.25	3.60	2.60
46.....	5.50	4.41	3.74	2.71
47.....	5.67	4.57	3.89	2.83
48.....	5.86	4.75	4.05	2.96
49.....	6.05	4.93	4.21	3.09
50.....	6.26	5.11	4.39	3.24
51.....	6.47	5.31	4.57	3.38
52.....	6.70	5.52	4.77	3.55
53.....	6.95	5.76	4.98	3.73
54.....	7.23	6.01	5.23	3.93
55.....	7.53	6.30	5.50	4.16
56.....	7.85	6.61	5.79	4.42
57.....	8.20	6.94	6.10	4.69
58.....	8.57	7.29	6.44	4.98
59.....	8.98	7.68	6.82	5.31

TABLE VII.

TERMINAL RESERVES—DISABILITY INSURANCE.

Benefit \$10 a Month. Policy Renewable up to Age 60. Manchester Unity A. H. J. Group—Modified. Interest 3½ Percent.  
Waiting Period 0 Weeks.

Age at Entry.	End of Year.																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
20.....	1.07	2.17	3.29	4.45	5.63	6.84	8.07	9.30	10.54	11.79	13.02	14.25	15.45	16.62	17.77	18.87	19.92	20.92	21.84	22.70
21.....	1.11	2.25	3.42	4.62	5.85	7.09	8.34	9.60	10.86	12.12	13.36	14.58	15.77	16.94	18.06	19.14	20.16	21.11	21.99	22.81
22.....	1.15	2.34	3.55	4.80	6.06	7.33	8.61	9.89	11.16	12.42	13.66	14.88	16.07	17.21	18.31	19.35	20.33	21.23	22.08	22.87
23.....	1.20	2.43	3.69	4.97	6.26	7.56	8.86	10.15	11.43	12.70	13.94	15.15	16.32	17.44	18.51	19.51	20.44	21.31	22.13	22.90
24.....	1.25	2.53	3.82	5.13	6.45	7.77	9.09	10.39	11.68	12.94	14.18	15.37	16.52	17.61	18.64	19.60	20.50	21.35	22.15	22.89
25.....	1.30	2.62	3.94	5.28	6.63	7.96	9.29	10.61	11.89	13.15	14.37	15.55	16.67	17.73	18.72	19.65	20.53	21.36	22.14	22.83
26.....	1.34	2.69	4.05	5.42	6.78	8.13	9.47	10.78	12.07	13.32	14.52	15.67	16.76	17.78	18.75	19.66	20.53	21.34	22.07	22.70
27.....	1.37	2.76	4.15	5.54	6.92	8.28	9.62	10.94	12.21	13.45	14.63	15.75	16.81	17.80	18.75	19.65	20.50	21.27	21.94	22.48
28.....	1.41	2.83	4.24	5.65	7.04	8.41	9.75	11.06	12.33	13.54	14.69	15.78	16.82	17.80	18.74	19.63	20.44	21.15	21.73	22.14
29.....	1.44	2.88	4.32	5.74	7.14	8.51	9.85	11.15	12.40	13.59	14.71	15.78	16.80	17.78	18.71	19.56	20.32	20.95	21.40	21.68
30.....	1.47	2.93	4.38	5.82	7.22	8.60	9.93	11.21	12.44	13.60	14.71	15.77	16.79	17.76	18.65	19.45	20.13	20.63	20.96	21.07
31.....	1.50	2.98	4.44	5.88	7.29	8.66	9.98	11.24	12.44	13.59	14.69	15.75	16.77	17.71	18.56	19.28	19.83	20.21	20.38	20.30
32.....	1.52	3.01	4.49	5.93	7.34	8.70	10.00	11.24	13.43	13.59	14.68	15.74	16.73	17.62	18.40	19.00	19.44	19.66	19.64	19.36
33.....	1.53	3.04	4.52	5.97	7.37	8.71	9.99	11.22	12.41	13.56	14.67	15.71	16.65	17.48	18.14	18.63	18.91	18.95	18.74	18.26
34.....	1.55	3.07	4.55	5.99	7.37	8.70	9.98	11.21	12.41	13.56	14.65	15.65	16.53	17.25	17.80	18.14	18.24	18.09	17.68	16.96
35.....	1.56	3.08	4.57	5.99	7.36	8.69	9.97	11.21	12.42	13.56	14.62	15.55	16.33	16.94	17.34	17.50	17.43	17.00	16.44	15.40
36.....	1.57	3.09	4.56	5.98	7.35	8.68	9.98	11.24	12.43	13.54	14.54	15.37	16.04	16.51	16.74	16.74	16.46	15.89	14.93	13.46
37.....	1.57	3.09	4.55	5.97	7.36	8.70	10.02	11.27	12.44	13.49	14.39	15.12	15.66	15.96	16.02	15.83	15.33	14.46	13.06	11.04
38.....	1.56	3.08	4.55	5.98	7.39	8.75	10.06	11.29	12.41	13.37	14.17	14.78	15.15	15.29	15.17	14.76	13.96	12.66	10.73	8.08
39.....	1.57	3.09	4.58	6.04	7.46	8.83	10.12	11.30	12.33	13.20	13.87	14.32	14.53	14.49	14.16	13.46	12.24	10.41	7.86	4.46
40.....	1.58	3.12	4.64	6.12	7.55	8.90	10.15	11.25	12.19	12.93	13.46	13.75	13.79	13.55	12.93	11.81	10.08	7.64	4.34	
41.....	1.60	3.18	4.72	6.22	7.64	8.95	10.12	11.13	11.96	12.56	12.93	13.06	12.91	12.38	11.36	9.73	7.40	4.22		
42.....	1.64	3.25	4.81	6.30	7.69	8.93	10.02	10.93	11.61	12.08	12.29	12.23	11.81	10.89	9.37	7.15	4.09			
43.....	1.68	3.31	4.88	6.34	7.66	8.84	9.83	10.60	11.16	11.47	11.51	11.19	10.38	8.98	6.88	3.95				
44.....	1.71	3.35	4.90	6.31	7.57	8.65	9.52	10.18	10.59	10.74	10.53	9.84	8.56	6.60	3.80					
45.....	1.73	3.36	4.86	6.22	7.40	8.37	9.13	9.66	9.92	9.83	9.27	8.12	6.29	3.65						



TABLE VII. (Continued).

TERMINAL RESERVES—DISABILITY INSURANCE.

Benefit \$10 a Month. Policy Renewable up to Age 60. Manchester Unity A. H. J. Group—Modified. Interest  $3\frac{1}{2}$  Percent.  
Waiting Period 0 Weeks.

Age at Entry.	End of Year.																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
46....	1.73	3.33	4.78	6.07	7.15	8.02	8.66	9.05	9.09	8.65	7.65	5.97	3.48							
47....	1.70	3.27	4.66	5.86	6.85	7.61	8.13	8.30	8.01	7.15	5.63	3.31								
48....	1.68	3.19	4.50	5.61	6.51	7.16	7.47	7.33	6.63	5.27	3.12									
49....	1.63	3.07	4.32	5.35	6.14	6.60	6.62	6.08	4.89	2.93										
50....	1.57	2.96	4.13	5.07	5.69	5.87	5.50	4.49	2.72											
51....	1.53	2.85	3.95	4.73	5.08	4.89	4.08	2.51												
52....	1.49	2.75	3.71	4.24	4.24	3.63	2.28													
53....	1.44	2.59	3.32	3.54	3.15	2.03														
54....	1.36	2.31	2.76	2.61	1.76															
55....	1.19	1.90	2.03	1.45																
56....	.98	1.39	1.13																	
57....	.72	.78																		
58....	.41																			



TABLE VII. (Continued).

## TERMINAL RESERVES—DISABILITY INSURANCE.

Benefit \$10 a Month. Policy Renewable up to Age 60. Manchester Unity A. H. J. Group—Modified. Interest  $3\frac{1}{2}$  Percent.  
Waiting Period 2 Weeks.

Age at Entry.	End of Year.																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
20.....	1.06	2.16	3.26	4.38	5.52	6.65	7.80	8.94	10.08	11.23	12.36	13.49	14.59	15.67	16.72	17.73	18.70	19.62	20.47	21.27
21.....	1.11	2.23	3.36	4.51	5.67	6.82	7.99	9.15	10.31	11.46	12.60	13.73	14.83	15.90	16.93	17.92	18.86	19.74	20.56	21.32
22.....	1.14	2.29	3.45	4.62	5.80	6.98	8.15	9.34	10.51	11.67	12.81	13.94	15.03	16.08	17.09	18.06	18.96	19.81	20.59	21.33
23.....	1.17	2.35	3.54	4.73	5.93	7.12	8.33	9.52	10.70	11.86	13.01	14.12	15.20	16.24	17.23	18.15	19.03	19.84	20.60	21.32
24.....	1.20	2.40	3.61	4.83	6.05	7.27	8.49	9.69	10.87	12.04	13.18	14.28	15.34	16.36	17.31	18.21	19.05	19.85	20.59	21.29
25.....	1.22	2.45	3.69	4.93	6.17	7.41	8.63	9.84	11.03	12.19	13.32	14.41	15.45	16.44	17.36	18.23	19.06	19.83	20.56	21.22
26.....	1.25	2.51	3.77	5.03	6.29	7.54	8.77	9.99	11.18	12.33	13.44	14.52	15.53	16.48	17.38	18.24	19.05	19.81	20.50	21.09
27.....	1.28	2.56	3.85	5.13	6.40	7.66	8.91	10.12	11.30	12.44	13.54	14.58	15.57	16.50	17.39	18.23	19.03	19.75	20.39	20.89
28.....	1.30	2.62	3.92	5.22	6.50	7.77	9.01	10.22	11.40	12.53	13.60	14.62	15.58	16.50	17.38	18.21	18.97	19.65	20.19	20.58
29.....	1.34	2.67	3.99	5.30	6.60	7.87	9.11	10.31	11.47	12.58	13.63	14.63	15.58	16.50	17.37	18.17	18.88	19.47	19.90	20.15
30.....	1.36	2.71	4.05	5.37	6.67	7.94	9.18	10.37	11.51	12.60	13.63	14.62	15.57	16.48	17.32	18.08	18.71	19.18	19.48	19.58
31.....	1.38	2.75	4.11	5.44	6.74	8.00	9.23	10.41	11.53	12.60	13.63	14.62	15.57	16.45	17.25	17.93	18.45	18.80	18.94	18.86
32.....	1.40	2.79	4.15	5.49	6.79	8.05	9.26	10.42	11.53	12.60	13.63	14.62	15.55	16.39	17.11	17.68	18.08	18.27	18.25	17.98
33.....	1.42	2.82	4.19	5.52	6.82	8.07	9.26	10.41	11.53	12.60	13.63	14.60	15.49	16.27	16.88	17.34	17.58	17.61	17.41	16.96
34.....	1.43	2.84	4.21	5.55	6.83	8.07	9.26	10.41	11.53	12.61	13.63	14.56	15.39	16.06	16.56	16.87	16.93	16.81	16.43	15.77
35.....	1.44	2.85	4.23	5.56	6.83	8.07	9.26	10.43	11.55	12.62	13.61	14.48	15.21	15.77	16.13	16.28	16.19	15.88	15.29	14.34
36.....	1.45	2.87	4.23	5.55	6.83	8.07	9.28	10.46	11.58	12.61	13.54	14.32	14.94	15.37	15.57	15.56	15.21	14.79	13.91	12.56
37.....	1.46	2.87	4.23	5.56	6.85	8.10	9.33	10.50	11.59	12.57	13.41	14.09	14.57	14.85	14.90	14.72	14.27	13.47	12.19	10.33
38.....	1.45	2.86	4.23	5.57	6.88	8.16	9.38	10.53	11.57	12.47	13.21	13.76	14.09	14.21	14.10	13.73	13.01	11.82	10.04	7.57
39.....	1.46	2.88	4.27	5.62	6.95	8.23	9.44	10.54	11.50	12.30	12.91	13.32	13.51	13.48	13.18	12.54	11.43	9.74	7.37	4.18
40.....	1.47	2.91	4.32	5.71	7.04	8.31	9.47	10.49	11.36	12.04	12.52	12.78	12.82	12.61	12.05	11.03	9.43	7.16	4.07	
41.....	1.49	2.96	4.40	5.80	7.12	8.35	9.44	10.38	11.13	11.68	12.02	12.14	12.01	11.54	10.61	9.11	6.93	3.96		
42.....	1.53	3.03	4.49	5.88	7.17	8.33	9.34	10.17	10.80	11.22	11.43	11.38	11.01	10.17	8.77	6.70	3.84			
43.....	1.57	3.09	4.55	5.92	7.15	8.24	9.15	9.86	10.37	10.66	10.71	10.43	9.70	8.40	6.45	3.71				
44.....	1.60	3.13	4.57	5.89	7.06	8.05	8.85	9.45	9.84	9.99	9.82	9.19	8.02	6.19	3.57					



TABLE VII. (Continued).

TERMINAL RESERVES—DISABILITY INSURANCE.

Benefit \$10 a Month. Policy Renewable up to Age 60. Manchester Unity A. H. J. Group—Modified. Interest 3½ Percent.  
Waiting Period 2 Weeks.

Age at Entry.	End of Year.																		
	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39
20.....	22.01	22.69	23.32	23.90	24.41	24.81	25.08	25.17	25.08	24.77	24.21	23.40	22.33	20.95	19.18	16.88	13.94	10.25	5.67
21.....	22.03	22.69	23.30	23.83	24.26	24.55	24.68	24.62	24.34	23.82	23.05	22.01	20.67	18.94	16.68	13.79	10.14	5.61	
22.....	22.02	22.65	23.21	23.67	24.00	24.16	24.14	23.89	23.41	22.67	21.67	20.38	18.69	16.48	13.63	10.03	5.56		
23.....	21.98	22.57	23.07	23.43	23.62	23.63	23.42	22.98	22.28	21.33	20.07	18.43	16.26	13.46	9.92	5.50			
24.....	21.91	22.44	22.83	23.06	23.11	22.94	22.53	21.88	20.96	19.75	18.15	16.04	13.29	9.80	5.44				
25.....	21.78	22.21	22.47	22.56	22.43	22.06	21.45	20.58	19.42	17.87	15.80	13.11	9.68	5.37					
26.....	21.56	21.87	21.99	21.90	21.58	21.01	20.19	19.07	17.58	15.56	12.92	9.55	5.31						
27.....	21.24	21.40	21.36	21.08	20.56	19.78	18.72	17.27	15.31	12.73	9.42	5.24							
28.....	20.79	20.79	20.55	20.08	19.35	18.34	16.94	15.05	12.53	9.28	5.17								
29.....	20.20	20.01	19.59	18.91	17.96	16.62	14.78	12.32	9.14	5.09									
30.....	19.44	19.07	18.45	17.55	16.27	14.49	12.10	8.99	5.02										
31.....	18.54	17.97	17.13	15.91	14.20	11.87	8.83	4.94											
32.....	17.48	16.70	15.54	13.89	11.64	8.67	4.85												
33.....	16.24	15.16	13.58	11.39	8.50	4.77													
34.....	14.76	13.25	11.14	8.33	4.68														
35.....	12.91	10.88	8.15	4.58															
36.....	10.61	7.96	4.49																
37.....	7.77	4.39																	
38.....	4.29																		

ACCIDENT AND HEALTH POLICIES.

TABLE VII. (Continued).

## TERMINAL RESERVES—DISABILITY INSURANCE.

Benefit \$10 a Month. Policy Renewable up to Age 60. Manchester Unity A. H. J. Group—Modified. Interest  $3\frac{1}{2}$  Percent.  
Waiting Period 4 Weeks.

Age at Entry.	End of Year.																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
20	.98	1.97	2.99	4.00	5.03	6.05	7.07	8.09	9.11	10.13	11.13	12.11	13.08	14.02	14.94	15.82	16.66	17.47	18.22	18.91
21	1.01	2.04	3.06	4.10	5.14	6.17	7.21	8.25	9.28	10.30	11.30	12.28	13.25	14.18	15.08	15.95	16.77	17.54	18.26	18.92
22	1.04	2.08	3.14	4.19	5.24	6.29	7.35	8.39	9.43	10.45	11.45	12.43	13.39	14.31	15.19	16.04	16.83	17.57	18.26	18.90
23	1.07	2.12	3.19	4.26	5.33	6.40	7.47	8.52	9.56	10.58	11.58	12.56	13.50	14.41	15.28	16.09	16.86	17.57	18.24	18.87
24	1.08	2.17	3.25	4.34	5.43	6.51	7.59	8.64	9.69	10.71	11.70	12.67	13.60	14.49	15.33	16.12	16.86	17.55	18.21	18.84
25	1.10	2.20	3.31	4.42	5.52	6.61	7.69	8.75	9.80	10.82	11.81	12.76	13.67	14.54	15.35	16.12	16.84	17.53	18.19	18.79
26	1.12	2.25	3.37	4.49	5.61	6.71	7.79	8.86	9.90	10.91	11.89	12.83	13.72	14.56	15.35	16.10	16.82	17.51	18.14	18.70
27	1.14	2.29	3.43	4.57	5.69	6.80	7.89	8.95	9.99	10.99	11.96	12.87	13.74	14.56	15.34	16.09	16.81	17.47	18.06	18.54
28	1.17	2.33	3.49	4.63	5.76	6.88	7.97	9.03	10.06	11.05	11.99	12.89	13.74	14.55	15.33	16.08	16.78	17.40	17.92	18.30
29	1.18	2.37	3.53	4.69	5.83	6.94	8.03	9.09	10.11	11.08	12.01	12.89	13.73	14.54	15.32	16.05	16.71	17.27	17.69	17.95
30	1.21	2.40	3.58	4.74	5.88	7.00	8.08	9.13	10.13	11.09	12.00	12.88	13.72	14.54	15.31	16.00	16.60	17.06	17.36	17.49
31	1.22	2.42	3.61	4.78	5.93	7.04	8.12	9.15	10.14	11.09	11.99	12.87	13.73	14.53	15.27	15.90	16.40	16.75	16.92	16.89
32	1.23	2.45	3.65	4.82	5.96	7.08	8.14	9.16	10.14	11.08	12.00	12.89	13.73	14.51	15.18	15.73	16.12	16.34	16.35	16.17
33	1.25	2.47	3.68	4.85	5.99	7.09	8.15	9.16	10.14	11.09	12.02	12.91	13.72	14.44	15.03	15.47	15.73	15.80	15.66	15.31
34	1.26	2.49	3.70	4.87	6.01	7.10	8.15	9.16	10.15	11.12	12.05	12.91	13.66	14.30	14.79	15.10	15.22	15.14	14.84	14.29
35	1.27	2.51	3.72	4.89	6.01	7.10	8.15	9.19	10.20	11.16	12.06	12.87	13.55	14.09	14.46	14.62	14.60	14.36	13.87	13.06
36	1.27	2.52	3.73	4.89	6.01	7.11	8.18	9.23	10.24	11.19	12.04	12.78	13.36	13.78	14.01	14.03	13.85	13.43	12.68	11.48
37	1.28	2.53	3.73	4.89	6.03	7.14	8.24	9.30	10.29	11.19	11.97	12.61	13.09	13.37	13.46	13.34	12.97	12.29	11.17	9.49
38	1.28	2.53	3.73	4.91	6.07	7.21	8.31	9.36	10.31	11.14	11.84	12.37	12.71	12.85	12.80	12.50	11.89	10.83	9.24	7.00
39	1.28	2.53	3.76	4.96	6.15	7.30	8.40	9.40	10.29	11.04	11.63	12.02	12.23	12.24	12.01	11.47	10.49	8.97	6.82	3.89
40	1.29	2.56	3.81	5.05	6.25	7.40	8.46	9.40	10.21	10.86	11.32	11.59	11.67	11.51	11.04	10.14	8.70	6.63	3.79	
41	1.32	2.62	3.90	5.16	6.36	7.47	8.48	9.34	10.06	10.58	10.92	11.07	10.98	10.59	9.77	8.42	6.43	3.69		
42	1.35	2.69	4.00	5.26	6.43	7.50	8.43	9.21	9.80	10.22	10.44	10.43	10.12	9.38	8.12	6.23	3.59			
43	1.40	2.77	4.09	5.32	6.45	7.46	8.30	8.97	9.46	9.76	9.84	9.61	8.97	7.80	6.01	3.47				
44	1.43	2.82	4.12	5.33	6.40	7.33	8.07	8.65	9.03	9.20	9.06	8.52	7.45	5.77	3.35					

TABLE VII. (Continued).

TERMINAL RESERVES—DISABILITY INSURANCE.

Benefit \$10 a Month. Policy Renewable up to Age 60. Manchester Unity A. H. J. Group—Modified. Interest  $3\frac{1}{2}$  Percent.  
Waiting Period 4 Weeks.

Age at Entry.	End of Year.																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
45.....	1.46	2.84	4.11	5.27	6.28	7.11	7.77	8.25	8.51	8.48	8.03	7.08	5.52	3.22						
46.....	1.46	2.82	4.06	5.15	6.08	6.83	7.41	7.77	7.85	7.52	6.68	5.24	3.08							
47.....	1.45	2.78	3.96	4.98	5.84	6.52	6.99	7.18	6.97	6.26	4.95	2.93								
48.....	1.42	2.71	3.83	4.79	5.58	6.17	6.48	6.39	5.82	4.65	2.77									
49.....	1.39	2.62	3.69	4.60	5.30	5.74	5.79	5.35	4.33	2.61										
50.....	1.34	2.53	3.56	4.39	4.96	5.15	4.86	3.99	2.43											
51.....	1.31	2.47	3.44	4.15	4.48	4.34	3.64	2.25												
52.....	1.29	2.40	3.26	3.75	3.78	3.25	2.05													
53.....	1.27	2.29	2.96	3.17	2.83	1.84														
54.....	1.21	2.07	2.48	2.36	1.59															
55.....	1.07	1.72	1.84	1.32																
56.....	.89	1.27	1.03																	
57.....	.66	.72																		
58.....	.38																			





TABLE VII. (Continued.)

TERMINAL RESERVES—DISABILITY INSURANCE.

Benefit \$10 a Month. Policy Renewable up to Age 60. Manchester Unity A. H. J. Group—Modified. Interest 3½ Percent.  
Waiting Period 13 Weeks.

Age at Entry.	End of Year.																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
20.....	.80	1.64	2.49	3.34	4.17	5.00	5.81	6.63	7.45	8.25	9.03	9.80	10.55	11.28	11.98	12.65	13.29	13.89	14.44	14.96
21.....	.85	1.71	2.57	3.41	4.25	5.08	5.91	6.74	7.55	8.35	9.13	9.90	10.64	11.36	12.04	12.70	13.31	13.89	14.42	14.91
22.....	.87	1.74	2.60	3.45	4.29	5.14	5.98	6.81	7.62	8.42	9.20	9.96	10.69	11.39	12.07	12.70	13.30	13.85	14.36	14.85
23.....	.89	1.76	2.62	3.48	4.34	5.19	6.03	6.86	7.68	8.47	9.25	10.00	10.72	11.41	12.06	12.68	13.25	13.78	14.29	14.78
24.....	.88	1.76	2.63	3.50	4.37	5.23	6.08	6.91	7.72	8.51	9.28	10.02	10.73	11.40	12.04	12.63	13.18	13.71	14.22	14.72
25.....	.89	1.77	2.66	3.54	4.42	5.28	6.13	6.96	7.77	8.56	9.31	10.05	10.74	11.39	12.00	12.58	13.13	13.66	14.18	14.67
26.....	.90	1.80	2.70	3.59	4.47	5.33	6.18	7.01	7.82	8.59	9.34	10.05	10.73	11.37	11.96	12.54	13.09	13.64	14.15	14.61
27.....	.92	1.83	2.74	3.64	4.52	5.38	6.23	7.05	7.85	8.62	9.35	10.05	10.71	11.33	11.93	12.50	13.07	13.61	14.10	14.50
28.....	.93	1.86	2.77	3.67	4.55	5.42	6.26	7.08	7.87	8.63	9.34	10.02	10.67	11.29	11.89	12.49	13.06	13.57	14.00	14.34
29.....	.94	1.87	2.79	3.69	4.58	5.45	6.28	7.10	7.87	8.61	9.32	9.99	10.63	11.26	11.89	12.48	13.02	13.49	13.85	14.10
30.....	.95	1.89	2.81	3.72	4.60	5.46	6.30	7.10	7.86	8.59	9.28	9.96	10.61	11.26	11.88	12.46	12.95	13.35	13.63	13.77
31.....	.96	1.90	2.83	3.74	4.62	5.48	6.30	7.09	7.84	8.56	9.26	9.94	10.62	11.27	11.88	12.40	12.83	13.14	13.32	13.33
32.....	.96	1.92	2.84	3.75	4.63	5.48	6.29	7.07	7.82	8.54	9.26	9.96	10.65	11.28	11.84	12.30	12.65	12.86	12.91	12.81
33.....	.97	1.93	2.85	3.76	4.63	5.47	6.28	7.05	7.81	8.55	9.29	10.00	10.67	11.25	11.75	12.14	12.38	12.48	12.41	12.19
34.....	.98	1.93	2.86	3.76	4.63	5.46	6.26	7.04	7.82	8.58	9.33	10.03	10.65	11.19	11.61	11.89	12.03	12.00	11.82	11.45
35.....	.98	1.94	2.86	3.76	4.62	5.45	6.26	7.06	7.86	8.64	9.38	10.03	10.61	11.06	11.39	11.56	11.58	11.44	11.12	10.53
36.....	.99	1.94	2.86	3.75	4.61	5.45	6.29	7.12	7.93	8.70	9.40	10.01	10.50	10.87	11.09	11.15	11.06	10.78	10.24	9.33
37.....	.98	1.93	2.85	3.74	4.62	5.49	6.35	7.20	8.01	8.74	9.39	9.93	10.33	10.59	10.70	10.66	10.42	9.94	9.09	7.77
38.....	.98	1.93	2.85	3.76	4.66	5.57	6.45	7.29	8.06	8.75	9.33	9.78	10.09	10.24	10.24	10.06	9.63	8.83	7.57	5.76
39.....	.98	1.94	2.88	3.82	4.75	5.67	6.56	7.37	8.10	8.72	9.21	9.56	9.76	9.82	9.69	9.31	8.57	7.37	5.63	3.23
40.....	.99	1.97	2.94	3.91	4.87	5.79	6.65	7.42	8.09	8.63	9.02	9.27	9.38	9.31	8.99	8.30	7.16	5.48	3.15	
41.....	1.01	2.02	3.04	4.04	5.00	5.90	6.71	7.43	8.01	8.46	8.76	8.92	8.90	8.64	8.02	6.95	5.33	3.08		
42.....	1.05	2.10	3.14	4.15	5.09	5.96	6.72	7.36	7.86	8.22	8.44	8.48	8.28	7.72	6.72	5.18				
43.....	1.10	2.19	3.24	4.23	5.15	5.96	6.66	7.22	7.63	7.91	8.02	7.88	7.40	6.47	5.01	2.91				
44.....	1.14	2.25	3.29	4.26	5.14	5.89	6.51	6.99	7.34	7.51	7.45	7.04	6.20	4.82	2.81					



TABLE VII. (Continued.)

## TERMINAL RESERVES—DISABILITY INSURANCE.

Benefit \$10 a Month. Policy Renewable up to Age 60. Manchester Unity A. H. J. Group—Modified. Interest  $3\frac{1}{2}$  Percent.  
Waiting Period 13 Weeks.

Age at Entry.	End of Year.																		
	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39
20.....	15.43	15.88	16.30	16.71	17.09	17.40	17.63	17.75	17.73	17.57	17.25	16.74	16.07	15.17	14.00	12.42	10.33	7.66	4.27
21.....	15.38	15.82	16.25	16.65	16.98	17.23	17.37	17.39	17.25	16.95	16.47	15.83	14.96	13.82	12.27	10.22	7.58	4.23	
22.....	15.31	15.76	16.18	16.54	16.81	16.98	17.02	16.91	16.64	16.19	15.57	14.74	13.62	12.11	10.10	7.50	4.19		
23.....	15.25	15.69	16.07	16.37	16.56	16.63	16.55	16.31	15.89	15.30	14.50	13.42	11.94	9.97	7.41	4.15			
24.....	15.18	15.59	15.92	16.14	16.23	16.18	15.97	15.58	15.03	14.26	13.22	11.77	9.84	7.32	4.10				
25.....	15.11	15.46	15.70	15.83	15.81	15.62	15.27	14.75	14.01	13.01	11.60	9.71	7.23	4.05					
26.....	14.99	15.26	15.42	15.43	15.27	14.95	14.46	13.76	12.79	11.43	9.57	7.13	4.01						
27.....	14.81	14.99	15.03	14.91	14.62	14.17	13.51	12.57	11.25	9.43	7.04	3.96							
28.....	14.55	14.62	14.53	14.28	13.86	13.24	12.34	11.06	9.29	6.94	3.90								
29.....	14.20	14.15	13.93	13.55	12.96	12.11	10.86	9.14	6.84	3.85									
30.....	13.75	13.56	13.22	12.67	11.86	10.66	8.98	6.73	3.80										
31.....	13.19	12.89	12.38	11.61	10.46	8.83	6.62	3.74											
32.....	12.54	12.08	11.35	10.25	8.66	6.51	3.68												
33.....	11.77	11.09	10.03	8.49	6.40	3.62													
34.....	10.81	9.80	8.32	6.28	3.56														
35.....	9.57	8.14	6.15	3.50															
36.....	7.96	6.03	3.44																
37.....	5.90	3.37																	
38.....	3.30																		



TABLE VIII (Continued).

Age of Insured.		20	30	40	50	60
Number of cases of disability lasting	twenty-three years.....	17	29	68	98	170
" " " " " "	twenty-four years.....	17	22	65	86	140
" " " " " "	twenty-five years.....	16	14	62	76	110
" " " " " "	twenty-six years.....	16	14	59	67	80
" " " " " "	twenty-seven years.....	16	14	56	59	60
" " " " " "	twenty-eight years.....	16	13	53	52	40
" " " " " "	twenty-nine years.....	16	13	50	45	30
" " " " " "	thirty years.....	15	13	47	39	20
" " " " " "	thirty-one years.....	15	12	44	34	10
" " " " " "	thirty-two years.....	15	12	41	28	3
" " " " " "	thirty-three years.....	15	11	37	23	1
" " " " " "	thirty-four years.....	15	11	34	19	
" " " " " "	thirty-five years.....	14	10	31	15	
" " " " " "	thirty-six years.....	14	10	28	11	
" " " " " "	thirty-seven years.....	14	9	24	8	
" " " " " "	thirty-eight years.....	13	9	21	6	
" " " " " "	thirty-nine years.....	13	8	19	4	

TABLE IX.

CLAIM RESERVES.

*Benefit \$10.00 a Month. Manchester Unity A. H. J. Group Modified. Interest 3.5 Percent.*

Age at which Disability St.	Term Disability Has Run																	8 or More Yrs.	At. A.
	0 Wks.	1 Wk.	2 Wks.	3 Wks.	4 Wks.	5 Wks.	6 Wks.	13 Wks.	26 Wks.	1 Yr.	2 Yrs.	3 Yrs.	4 Yrs.	5 Yrs.	6 Yrs.	7 Yrs.			
20.	7.94	6.58	8.30	11.50	14.80	17.80	19.00	53.80	92.50	210.00	362.00	484.00	647.00	929.00	1104.00	1201.00	1251.00	28	
																	1272.00	29	
																	1281.00	30	
																	1272.00	31	
																	1242.00	32	
																	1201.00	33	
25.	8.88	7.73	9.58	14.40	17.80	22.80	25.40	64.90	145.00	277.00	397.00	556.00	731.00	957.00	1150.00	1214.00	1148.00	34	
																	1099.00	35	
																	1042.00	36	
																	994.00	37	
																	959.00	38	
																	929.00	39	
30.	10.20	9.02	10.60	17.30	23.60	29.20	31.90	74.80	179.00	343.00	513.00	650.00	782.00	888.00	955.00	971.00	904.00	40	
																	883.00	41	
																	867.00	42	
																	851.00	43	
																	837.00	44	
																	828.00	45	
35.	11.90	10.60	11.70	20.10	30.30	35.80	38.10	82.80	199.00	397.00	635.00	731.00	815.00	857.00	883.00	867.00	827.00	46	
																	827.00	47	
																	827.00	48	
																	827.00	49	
																	827.00	50	
																	827.00	51	
40.	13.90	12.60	13.30	22.60	36.00	41.50	43.70	88.40	202.00	427.00	737.00	794.00	829.00	828.00	827.00	827.00	826.00	52	
																	823.00	53	
																	816.00	54	
																	805.00	55	
																	796.00	56	
																	779.00	57	
45.	15.80	15.00	15.70	24.20	36.10	42.40	46.60	88.60	202.00	408.00	751.00	822.00	827.00	827.00	827.00	826.00	823.00	53	
																	816.00	54	
																	805.00	55	
																	796.00	56	
																	779.00	57	

TABLE IX. (Continued).

CLAIM RESERVES.

Age at which Disability St.	Term Disability Has Run																8 or More Yrs.	At. A.	
	0 Wks.	1 Wk.	2 Wks.	3 Wks.	4 Wks.	5 Wks.	6 Wks.	13 Wks.	26 Wks.	1 Yr.	2 Yrs.	3 Yrs.	4 Yrs.	5 Yrs.	6 Yrs.	7 Yrs.			
50.	18.90	18.50	19.30	26.50	37.30	45.40	51.30	89.80	202.00	372.00	726.00	823.00	816.00	805.00	796.00	779.00	772.00	58	
																	765.00	59	
																		759.00	60
																		753.00	61
																		749.00	62
55.	24.00	23.70	24.60	30.70	44.90	54.50	60.80	103.00	202.00	338.00	681.00	772.00	765.00	759.00	753.00	749.00	745.00	63	
																	740.00	64	
																	736.00	65	
																	730.00	66	
																	724.00	67	
60.	31.90	31.20	31.90	37.90	63.20	73.90	78.00	133.00	222.00	325.00	636.00	745.00	740.00	736.00	730.00	724.00	716.00	68	
																	707.00	69	
																	697.00	70	
																	685.00	71	
																	672.00	72	
																	656.00	73	
																	638.00	74	
																	618.00	75	
																	595.00	76	
																	568.00	77	
																	538.00	78	
																506.00	79		
																472.00	80		

## NON-CANCELLABLE ACCIDENT AND HEALTH INSURANCE UNDERWRITING PROBLEMS.

BY

J. M. LAIRD.

### I. DEVELOPMENT OF NON-CANCELLABLE INSURANCE.

Ten years ago not a single American company was issuing Non-Cancellable Accident and Health insurance and those few underwriters who even considered the possibility of ultimately granting such coverage were regarded as impractical idealists. In October, 1915, the attention of this Society was directed towards the possibilities of Non-Cancellable Accident and Health insurance but the discussion was apparently considered by practical insurance executives as largely academic.

Today at least nine American companies are issuing Non-Cancellable Accident and Health insurance and more and more salesmen are insisting that they must be in a position to give this coverage to their clients. At the annual meeting of the Bureau of Personal Accident and Health Underwriters in March, 1921, a joint report on Non-Cancellable Disability Insurance by two committees of underwriters and actuaries formed the chief topic of discussion and the recommendations contained in that joint report are now being studied by insurance executives in connection with their plans for meeting the new situation.

The Non-Cancellable policy has been issued by American companies since 1915, but its development has been most rapid in the last two years. In one company it first took the form of a Non-Cancellable Accident and Health policy providing monthly indemnity for total disability up to age 70, issued only in conjunction with Life insurance and with a deferred Annuity. Now the deferred Annuity is practically forgotten and although the Non-Cancellable Disability policy is frequently issued with Life insurance, it is also freely sold by commercial companies which have no Life insurance department. In the Non-Cancellable contract emphasis has been placed on indemnity for total disability but many



policies also provide a lump sum in case of death by accidental means and a few provide specific indemnities for dismemberment or loss of sight.

Some underwriters look upon the Non-Cancellable form as a dangerous innovation, removing from the insurance company its last defense against the fraudulent claimant and undermining public confidence in the well-established commercial business. Many regard it as a necessary side line which must be furnished to certain individuals who insist upon permanent coverage but they expect that commercial contracts will continue to be the mainstay of the Accident and Health business. Others are convinced that the Non-Cancellable policy fulfills a genuine public need, that it covers a slightly different field from the commercial policy and that it is destined to be one of the most important lines of personal insurance. The only question in their minds is—Will the new field be covered as Casualty insurance or as Accident and Health benefits with Life insurance?

## II. ACCIDENT AND HEALTH BENEFITS WITH LIFE INSURANCE.

The most striking improvement in the Life insurance contract during the last two decades has been the development of a Disability benefit as an integral part of Life insurance. Twenty years ago only one American Life insurance company issued a Disability clause. Today only two of the principal companies refuse to grant a Disability benefit and over 200 offer some form of Disability coverage with Life insurance. This growth has undoubtedly been due to two causes—first, as a selling proposition the Disability benefit offers the prospect something for himself; second, there is a genuine need for Life insurance which recognizes that loss of earning power by death is no more serious than loss of earning power by injury or sickness. In fact, however great may be the family need after the death of the wage earner, the need is even greater if he still lives but is deprived of his earning power and lingers as an invalid year after year.

Partly because of legal restrictions and partly because the Disability benefit has been considered merely an incident of Life insurance, the Disability clause has covered only *permanent* total disability; but the definition of permanent total disability has been continually liberalized. At the same time the benefits obtainable in case of such disability, occurring before a specified age, usually

60 or 65, have been greatly increased. Starting with a provision that, in case of total disability which has lasted one year and is then presumably permanent, future premiums will be waived, the benefit has been liberalized until now at least one company provides that any total disability which has lasted three months will be considered permanent within the meaning of the policy and that payments will begin even within the three months' period if the total disability is then classified as permanent. Under these conditions the disabled Insured receives \$10 a month per \$1,000 of Life insurance without reduction in the amount payable to the Beneficiary. Another company provides in certain states monthly indemnity of either \$10 or \$20 per \$1,000 with payments for the entire period of total disability with the exception of the first two weeks. It is, therefore, apparent that even now Life insurance companies have covered the major portion of the field of total disability.

At the same time Life insurance companies have introduced a provision that in case of death by accidental means before a limiting age, usually 70, the face of the policy will be doubled. This provision was at first attacked even more vigorously than the permanent total Disability benefit as a function of Life insurance but its popularity with the insuring public has swung company after company into line until now a majority of the Life insurance companies grant some form of Double Indemnity in case of death by accidental means.

Now that Life insurance companies provide additional sums for death by accidental means and cover permanent total disability with a comparatively short waiting period and with an increasingly liberal interpretation of what constitutes permanent total disability, the purchaser may obtain in one contract both Life insurance and the most essential portion of the coverage granted under commercial Accident and Health policies.

### III. COMMERCIAL ACCIDENT AND HEALTH INSURANCE.

Commercial Accident insurance as distinct from Health insurance has been successfully issued in this country since about 1864. It has proven satisfactory to policyholders and profitable to the insurance companies. As the companies have acquired greater confidence in their ability to underwrite this business on a reasonable basis, they have gradually liberalized the contracts. In particular, the period of total disability covered by the policy has been increased

from 26 weeks to 52 weeks and then to 200 weeks. Now, with the limit entirely removed, indemnity is payable for the whole period of total disability. A smaller indemnity, usually 50 per cent., is paid for partial disability for a period not exceeding a definite limit, for instance, 26 weeks. Specific sums are paid for loss of life, limb or sight. For certain favored accidents the benefits are doubled, tripled or even quadrupled, for instance, "if the injuries are sustained while a passenger in or on a public conveyance provided by a common carrier for passenger service."

Health insurance as issued by commercial companies dates from about 1897 and has not been entirely satisfactory to the public or profitable to the companies. Just as in the case of Accident insurance, the benefits have been liberalized and the coverage extended from 26 weeks to 52 weeks and finally to the entire period of disability. At the same time the conditions under which full indemnity is payable have been liberalized. A short time ago Health policies covered only total disability, full indemnity being payable for house confinement and partial indemnity for non-confinement with a limit of 52 weeks. Now policies are issued providing full indemnity for life for total disability, whether confined or not confined, and smaller benefits for a limited period for partial disability such as loss of one-half of the Insured's business time. The full effect of these more liberal provisions will probably not appear in the claim records until this business has become more mature.

Although most companies have made a profit on their commercial Accident business, commercial Health insurance has on the whole been unprofitable. Partly on this account and partly because of the Influenza epidemic of 1918 Health insurance premiums have been increased, but it is doubtful whether the increases in premiums have kept pace with the liberalization of the contracts. Most companies have refused to issue Health insurance except in conjunction with an equal amount of indemnity under an Accident policy and have usually encouraged the sale of Accident insurance as distinct from Health insurance by sales literature, contests and even extra commissions and bonuses.

Both Accident and Health policies on the commercial form have been issued for a term of three, six or twelve months subject to renewal at the option of the company up to age 70 for Accident insurance and age 60 or 65 for Health insurance. Under these commercial policies, even though the coverage runs for not more

than twelve months, the companies have felt obliged to protect themselves by reserving the right to cancel the insurance within the term. The principal causes of cancellation are:

1. Misstatement in original application,
2. Impaired physical condition,
3. Material reduction in earnings,
4. Repeated claims for recurrent types of disease,
5. Unsatisfactory moral hazard.

In case of cancellation the company pays in full any valid claim for disability incurred before the date of cancellation but avoids any liability for further claims on that risk.

Under both Accident and Health policies it is customary to review each case carefully at least once a year and to cancel those risks which do not appear to come up to the company's standard. In practice, this right of cancellation is exercised much less frequently under contracts giving only Accident protection than under policies giving Health insurance. Although this right to cancel the insurance is a privilege clearly reserved to the company in the contract and is exercised only when the company feels that the policyholder does not come up to its standard, the person who finds himself thus deprived of his insurance protection just at the time when he is most likely to receive substantial claim benefits may cherish a feeling of resentment against the company, its field representative and the Accident and Health idea.

Another weakness of the commercial policy as now issued is the high rate of voluntary discontinuance on the part of policyholders. Too frequently the insurance has been bought as a temporary sporting proposition and if no accident or illness occurs within a year or two, the policyholder, feeling that he has no permanent interest at stake, is liable to drop the insurance. Moreover, the policies have been sold at a flat rate regardless of age at issue and therefore a new contract can usually be secured in another company on just as favorable terms as the old policy carried.

In an attempt to make the insurance more persistent, some companies have provided that the benefits shall increase each year for five or ten years from date of issue without a corresponding increase in the rate of premium, but this movement has merely led to the issuance of "fully accumulated" policies giving the full benefits from the first year. In fact, the Accident and Health contracts

have been adjusted in such a way that it is comparatively easy for an agent or a broker to transfer business from one company to another without substantial loss to either the salesman or the policyholder. So far as the policyholder is concerned, the very ease with which a policy can be secured upon a simple application without medical examination makes it equally easy for him to forego the protection at a later date if his circumstances have altered even slightly.

Under these conditions the collection of a renewal premium may involve almost as much salesmanship as the securing of the original application and therefore the well-established practice is to pay the salesman practically the same rate of commission on renewal premiums as on first premiums. This has meant a comparatively high total expense rate and therefore a lower return to policyholders than would be possible if the business were more persistent.

In an effort to furnish the public with more permanent Accident and Health insurance at a lower expense rate, companies have now begun to issue Non-Cancellable contracts under which they guarantee to continue the protection up to the limiting age, usually 60 or 65, without the right to terminate the insurance even though the risk should in the meantime become seriously impaired.

#### IV. POLICY COVERAGE.

Partly on account of the newness of the problem and partly as a reaction from the "frills" found in so many commercial policies, an attempt has been made to limit the coverage under the Non-Cancellable form to the one great loss—total disability caused by either accident or sickness. The Underwriting Committee of the Bureau of Personal Accident and Health Underwriters recommends that the Non-Cancellable policy should not cover partial disability for either injuries or sickness and should not provide indemnities for medical or surgical attendance, hospital fees, dismemberment or loss of sight. Apparently the Committee is not in favor of granting double or triple indemnity for any accident.

Although Life insurance companies freely issue policies providing Double Indemnity in case of death from accidental means, the Underwriting Committee unanimously recommends that the Non-Cancellable policy should not provide a principal sum in case of death by accidental means. It is considered unwise to combine in one Non-Cancellable contract complete coverage for total disability

from either accident or disease and limited coverage for a principal sum payable only in about 10 per cent. of the total number of deaths, namely, "if death results from bodily injuries directly and independently of all other causes through external, violent and accidental means."

Loss of life is covered under the commercial policies but it is customary for the companies to cancel the insurance if it becomes known that the policyholder is suffering from any serious organic trouble such as heart lesions or diabetes. It is felt that under these conditions a slight injury is liable to result directly or indirectly in death and that occasionally a policyholder who knows that he has a serious disease may be tempted to terminate his life under circumstances which make it difficult to prove suicide.

In a great many claims for death by accidental means disease has been either a primary or a contributing cause and there is always a danger that a court may hold that the company is liable even though the policyholder was in a weakened condition from some incurable disease and a trivial accident merely hastened his death. If the accident caused total disability and the company could discuss the claim with the policyholder himself, it would have a chance to make a fair settlement, but the company is at a decided disadvantage when the claimant is the policyholder's comely widow represented by an astute attorney. Because of the chance of heavy claims and troublesome litigation with dissatisfied claimants, the Underwriting Committee recommends that payments for loss of life should not be granted under the Non-Cancellable policy.

The principal function of the Non-Cancellable policy is therefore to provide monthly indemnity in case of total disability. The word "Indemnity" implies that there must be some loss suffered by the Insured. What is this loss? It is not pain and suffering, but rather the business time of the Insured. Because the contract is one of indemnity and the loss insured against is the Insured's time, it is essential that we cover only those applicants whose time is valuable and can also be measured by some workable standard. That standard requires that the applicant be engaged in a gainful occupation, and that the policy should cover only the period of the applicant's natural business usefulness. It is not feasible to issue a Non-Cancellable contract providing benefits at the old ages where it is impossible to distinguish disability caused by accident or disease from mere cessation from active duties because of old age.

In discussing whether the limiting age should be 60 or 65, one prominent underwriter recalled that according to statistics of the American Bankers' Association out of 100 persons starting at age 25 in good health 54 will at age 65 be dependent on others. As many persons become disabled between age 60 and 65 and as many more might feign disability in order to draw a pension from the insurance company, the Committee recommends that no policy should cover disability beginning after age 60. If disability begins before age 60, then benefits will be paid as long as the Insured lives and suffers total disability.

Non-Cancellable policies have been issued covering from the first day of total disability and also excluding the first week, two weeks, four weeks or three months of total disability. Although commercial policies are almost invariably sold with coverage from the first day, it is felt that under the Non-Cancellable policy this presents too great an opportunity to the policyholder to make repeated claims, particularly if he can persuade his physician that his health requires him to spend a few weeks in Maine during the summer and in Florida during the winter. It is also felt that under a contract providing permanent protection the policyholder is fully able to take care of himself during the first two weeks and that the person who buys the contract in good faith will prefer a somewhat lower premium for a contract providing coverage after a reasonable waiting period. The Underwriting Committee, therefore, recommends that the policies be issued with a waiting period of two weeks, four weeks or three months. Although the policy with three months' elimination is practically unknown in the commercial field, it has proven popular on the Non-Cancellable form. Its purpose is not to cover temporary ailments but to indemnify for protracted illnesses or disabilities causing serious loss of earning power and heavy expense.

#### V. RATE OF DISABILITY.

Under commercial policies it has been customary to compare losses incurred with premiums earned but some companies have recognized that with benefits and premiums constantly changing, a better standard must be found not only for Non-Cancellable policies but also for the commercial. This better standard involves the "rate of disability" in number of weeks of disability per person per annum. Usually this rate of disability has been given according to the age attained while the person was disabled regardless of

when disability began. Strictly speaking, however, the disability should be arranged according to the age at which disability began and should show how much of this disability was experienced in each of the first 13 weeks after disability started, how much in the second three months, and how much in the first year, second year, etc. In American statistics now available comparatively little attention has been paid to the age of the Insured or to the time elapsed from the original date of issue. There is evidence, however, that under commercial policies as issued in the past the rate of disability due to accident has increased only slightly with the attained age and the rate of disability from sickness has remained almost constant up to age 50 and has then increased moderately to age 65. It is probable that under the more liberal commercial policies now being issued the rate of disability will increase more rapidly with the attained age, particularly on Health policies paying full indemnity for life whether confined to the house or not confined.

The development of Non-Cancellable insurance is so recent that no reliable American experience is available and we are tempted to try to estimate the rate of disability by comparison with the actual experience on commercial policies. As commercial policies are usually issued without medical examination and as the Non-Cancellable policies are issued with a strict medical examination in every case, the rate of disability on the Non-Cancellable policy in the first year or two after issue should be more favorable than on the commercial contract. As a partial offset to this advantage, however, it should be noted that even under the commercial policies a medical examination is required if anything unfavorable is revealed in the application or other sources of information, and that commercial health policies do not cover sickness beginning within 15 days after issuance.

The great distinction between the two contracts is of course the cancellation provision. In commercial policies this right to cancel has undoubtedly removed from the companies' experience a great many impaired lives, particularly at the older ages, and therefore under the Non-Cancellable policies the rate of disability will increase much more rapidly with attained age than under the commercial contracts. In order to estimate the rate of disability under a Non-Cancellable policy from the actual experience under commercial contracts, let us make the following assumptions:



1. That the rate of disability in the first year will agree with the experience on commercial policies.
2. That the company cancels 1 per cent. of its commercial policies each year because the risk is impaired. The late Mr. Messenger in a paper on the Rate of Sickness presented to the Actuarial Society of America in May, 1908, stated that the Travelers' Insurance Company at that time declined to renew from 1 per cent. to 2 per cent. of the Health policies when the year expired.
3. That the rate of disability on policies cancelled because of impairment will be four times the rate on the normal lives not cancelled. It is doubtful whether any company would be willing to insure these cancelled policyholders even at four times the normal premium.
4. That none of these impaired risks will drop their insurance and that the mortality in this class will follow the Manchester Unity Experience.
5. That the rate of discontinuance including deaths among unimpaired lives under the Non-Cancellable policy will be 10 per cent. each year for five years, then reducing by  $\frac{1}{2}$  per cent. each year to 5 per cent. at the end of fifteen years, and then continuing at 5 per cent.

Applying these figures to a graduated Disability table based on experience on commercial Disability policies adjusted to pay indemnity for life for total disability whether confined or not confined, we derive the following figures for a person entering at age 35 and for another person entering at age 50.

ONE YEAR TERM PREMIUMS FOR INDEMNITY OF \$10.00 A MONTH.

Age at which Disability Begins.	By Experience on Commercial Policies.	By Assumptions for Non-Cancellable Policies.	
		Age at Entry 35.	Age at Entry 50.
35.....	\$2.05	\$2.05	
40.....	2.09	2.51	
45.....	2.19	3.20	
50.....	2.76	4.74	\$2.76
55.....	3.91	7.54	4.65
60.....	5.98	12.72	8.58

As many of the assumptions in the above table are entirely arbitrary, the figures should be used with the utmost caution. They merely indicate that the rate of disability under the Non-Cancel-

lable policy may be entirely different from the rate under commercial policies and that under the Non-Cancellable contracts the rate of disability beginning at age 55 may depend largely on whether the policy was originally issued at age 35 or at 50.

Having failed to deduce any reliable rates of disability for Non-Cancellable policies from American Experience on commercial contracts, we naturally turn to the experience of companies in Great Britain where Non-Cancellable policies have been issued since 1885. These British companies have in turn based their premiums on the disability experience of a friendly society, the Manchester Unity, which has published the most elaborate and carefully prepared tables available on this subject.

Even though the conditions under which Non-Cancellable policies are issued in the United States may not agree with those of the Manchester Unity or even the British stock companies, it is essential that we have some standard Disability table as a guide and the only guide now available appears to be the Manchester Unity Experience which has proven its value in Great Britain and can be used in this country with perhaps slight modifications to make it more nearly conform to American conditions.

## VI. PREMIUMS.

Some companies, apparently influenced by the general practice under commercial policies, have issued Non-Cancellable policies at the same gross premiums for all ages at entry. Although this plan has worked fairly well in commercial business and the results on the Non-Cancellable form may appear reasonably satisfactory for a few years, while strict selection is still effective, it contains some of the inherent weaknesses of the old assessment plan of selling Life insurance, and because it means overcharging the young men and undercharging the old men, it must in time be abandoned in favor of a more scientific system of gross premiums based on age at entry, just as has already been done by American Life insurance companies in computing premiums for permanent total Disability.

As it is evident that the rate of disability under the Non-Cancellable policy will increase with the attained age, it is clear that the Company must either:

1. Issue the policy as a renewable Term with rate increasing at the end of each Term (for instance, one year renewable Term or five year renewable Term),

OF:

2. Issue a long Term contract at a level premium sufficient to cover the rate of disability to the age of expiry.

As the renewable Term contract with constantly increasing premium would probably be unsatisfactory and would tend to encourage a high rate of discontinuance, particularly among the better risks, the proper course appears to be to issue a long Term contract at a level premium depending on the age at issue. The gross premium for each age at issue will then depend on:

1. The rate of disability assumed for each year up to the age at expiry.
2. The rate of mortality.
3. The rate of interest.
4. The loading required for expenses, contingencies and profits.

If we assume that the rate of disability and mortality will follow the Manchester Unity or some similar table and that the company can reasonably count on earning  $3\frac{1}{2}$  per cent. interest for the entire duration of the policy, then the actuary will compute a set of net premiums which will be just sufficient to pay all claims if the company earns  $3\frac{1}{2}$  per cent. interest and experiences the rate of disability assumed in the table. The expenses can be determined fairly accurately by an examination of the company's commercial business with proper allowance for the new conditions introduced by the Non-Cancellable form. It is expected that the total expenses will be lower than on commercial policies but higher than on Life insurance policies.

The rate of commission on the Non-Cancellable policy is somewhat uncertain. Companies with an organization for selling commercial policies may pay the General Agent 35 per cent. the first year followed by nine renewals of  $17\frac{1}{2}$  per cent., but companies with a Life insurance organization may prefer to pay approximately 50 per cent. the first year followed by nine renewals of  $7\frac{1}{2}$  per cent. As the latter schedule is approximately  $7\frac{1}{2}$  per cent. lower than the first schedule, the company with a Life insurance organization, other things being equal, may feel justified in quoting gross premiums lower than those used by the company with a commercial organization.

The Underwriting Committee recommended a provision in the

loading to cover the General Agent's commission and in addition the following items expressed as a percentage of the gross premium:

	Per Cent.
First Year—Administration .....	15
Taxes .....	3
Claim Settlement .....	2½
Medical Fees .....	4½
Inspections .....	2½
Total .....	<u>27½</u>
Renewal— Administration .....	12½
Taxes .....	3
Claim Settlement .....	3½
Contingencies and Profits .....	10
Total .....	<u>29</u>

It seems doubtful, however, whether the 4½ per cent. allowance for medical expenses will be sufficient and probably this figure should be 7 per cent., making the total for the first year 30 per cent.

Using these figures for general expenses and assuming commissions of 35 per cent. the first year followed by renewals of 17½ per cent., the Committee obtained the following premiums:

NON-CANCELLABLE GROSS ANNUAL PREMIUMS FOR \$10 A MONTH  
FOR TOTAL DISABILITY BEGINNING BEFORE AGE 60  
SELECT AND PREFERRED RISKS.

Age at Entry.	Waiting Period.		
	2 Weeks.	4 Weeks.	3 Months.
20.....	\$3.75	\$2.98	\$1.96
35.....	5.79	4.79	3.32
50.....	9.48	8.22	6.03

For a commercial Accident and Health policy giving practically the same coverage (excluding partial disability, double indemnity and surgical fees), but containing the cancellation clause, the gross premiums would be approximately:

Perhaps the best confirmation of the gross premiums recommended by the Committee is found in the rates actually charged by British companies which have had years of experience on the Non-Cancellable form. In general their policies are less liberal than those issued in the United States but cover all total disability sustained up to age 65 instead of 60 with no payment whatever after

COMMERCIAL GROSS ANNUAL PREMIUMS FOR \$10 A MONTH FOR  
TOTAL DISABILITY BEGINNING WITHIN THE YEAR  
SELECT AND PREFERRED RISKS.

Attained Ages.	Waiting Period.		
	2 Weeks.	4 Weeks.	3 Months.
20-50.....	\$4.20	\$3.50	\$2.74
51-60.....	5.10	4.25	3.33

age 65, even though disability may have started before 65. One company which has had some experience with the Non-Cancellable form is considering an upward revision of its premiums. British figures are not available for policies with waiting period of two weeks, or four weeks, but for a waiting period of three months they are as follows:

BRITISH NON-CANCELLABLE GROSS ANNUAL PREMIUMS FOR \$10 A MONTH  
FOR TOTAL DISABILITY EXPERIENCED BEFORE AGE 65.

*Three Months' Waiting Period.*

Age at Entry.	Company A.	Company B (Old Rate).	Company B (Proposed Rate).
20.....	\$2.62	\$2.46	\$3.29
35.....	3.96	4.37	5.82
50.....	7.57	8.58	11.43

Part of the premium is for accident benefits, but by far the greater portion is for sickness benefits. As the rate of disability from accident does not increase materially with the age, it is felt that any extra accident hazard may be covered by a constant addition to the premium for all ages at entry. If, however, there is reason to suppose that in certain classifications the rate of sickness will be higher than is provided in the gross premiums for first-class risks, it is probable that this addition to the rate of sickness will increase with the age in somewhat the same way as the standard rate of disability, and therefore this additional hazard should be covered by a percentage increase in the premium.

With these principles in mind, the Underwriting Committee recommended the following additions to the gross premiums quoted above for Select and Preferred risks:

ADDITIONAL GROSS ANNUAL PREMIUMS FOR RISKS ENGAGED IN OCCUPATIONS  
CLASSED HIGHER THAN "SELECT" AND "PREFERRED,"

\$10 a Month for Disability Beginning before Age 60.

	Waiting Period.		
	2 Weeks.	4 Weeks.	3 Months.
Physicians, surgeons, dentists, osteopaths and chiropractors	50% of "Sel." and "Pref." Rate	50% of "Sel." and "Pref." Rate	50% of "Sel." and "Pref." Rate
"Extra preferred" (except physicians, surgeons and dentists) . . . . .	\$ 1.00	\$ .80	\$ .60
"Ordinary" (except osteopaths and chiropractors) . . . . .	2.00	1.60	1.20
"Medium" . . . . .	4.00	3.20	2.40
"Special" . . . . .	6.00	4.80	3.60
"Hazardous" . . . . .	8.00	6.40	4.80
"Extra hazardous" . . . . .	12.00	9.60	7.20
"Perilous" or "ex-spec. hazardous" . . . . .	16.00	12.80	9.60
"Extra perilous" . . . . .	20.00	16.00	12.00

#### VII. UNEARNED PREMIUM RESERVES.

Having once established that the rate of disability increases with the age and that the premiums should be higher at the old ages than at the young ages at issue, it follows that if a flat level premium is charged for a person commencing at age 20 and continuing his insurance to age 60 a part of the premium charged in the early years must be set aside as a reserve to take care of the additional disability at the older ages. Furthermore, if the rate of disability will be higher at the older ages, it is probable that the administration expenses, particularly for claim settlements, will also be greater and a sufficient reserve should be carried to take care of not only the actual claim payments but also the extra administration and adjustment expenses involved in those payments.

Under commercial policies the unearned premium reserve is usually taken as 50 per cent. of the gross premium. The theory apparently is that under a 12 months' policy the insurance has on December 31 been in force on the average six months and therefore one-half the premium has been required for expenses and claims already paid or incurred and the other half should be retained to meet expenses and claims in the succeeding six months' period. In practice, however, the company collects a premium of \$100 and at once pays out for commissions and other expenses approximately \$40. This leaves \$60 available for administration expenses and claims. If these items were evenly distributed throughout the

year, then \$30 would be required for the first six months and the remaining \$30 should be held as a reserve on December 31 to cover the administration expenses and claims incurred during the second six months' period. Theoretically, therefore, the unearned premium reserve on December 31 should be \$30, but it is customary to set aside \$50. The law has in effect called for a gross premium reserve although the theory of the contract would more properly provide a net premium reserve with an additional reserve for those administration expenses which are distributed throughout the current year. The extra \$20 does of course provide an additional margin of safety to cover any increase in the loss ratio at a later date when the business has become more mature.

Although the practice of setting aside a gross premium reserve on commercial policies is well established and has the sanction of law, it must be admitted that such a reserve is excessive and may cause unnecessary hardship to new companies building up a commercial business or even to old companies showing a large increase in premium income from year to year.

In developing an entirely new phase of the Casualty business such as the Non-Cancellable policy involving substantial reserves, it therefore seems much better to follow the actual incidence of expenses, particularly if the fundamental assumptions in regard to total disability and the rate of increase from year to year are conservative. The unearned premium reserve should, therefore, be based not on gross premiums but on net premiums with an extra reserve to cover those administration and adjustment expenses which go with a heavy rate of disability at the older ages.

#### VIII. CLAIM RESERVES.

Under commercial policies with benefits limited to not more than 52 weeks, it has been comparatively easy for the practical claim adjuster to estimate the value of future claim payments but under a Non-Cancellable policy giving full coverage for as long as disability lasts, it is probable that there will be a much larger proportion of both accident and health claims of long duration. For instance, a person who is totally disabled because of Insanity at age 30 may live 20, 30 or even 40 years.

In a company with only a few of these claims, it may be advisable to consider the cause of disability in each case and estimate the probable duration. In disability of a temporary nature where disa-

bility probably will not exceed six months, the Claim Department can make a fairly close estimate but in claims where disability may run for several years, the future payments should be valued by some actuarial table—for instance, Hunter's tables showing the value of an annuity on a life which is totally and presumably permanently disabled.

As soon as the total number of claims is sufficient to produce a fair average, it seems better, however, to value both short and long claims on some adequate experience such as the Manchester Unity. In fact, it is desirable that any company with a sufficient volume of business in force should use for valuation of claims the same assumptions as were involved in the original disability tables on which gross premiums were constructed. Provided the number of claims is sufficient, this will insure adequate reserves and will enable the company more completely and more accurately to compare its actual experience with the rate of disability assumed in the original table.

#### IX. SURRENDER VALUES.

Having determined that unearned premium reserves should be set aside on somewhat the same principle as used by insurance companies for their Life insurance benefits and also for their permanent total Disability benefits, the question arises whether any part of this reserve should be returned to the policyholder in case of discontinuance.

It seems reasonable to expect that as we acquire more definite knowledge in regard to the experience under these policies a part of this reserve will be given to the discontinuing policyholder either in the form of cash or as an extension of his insurance coverage for a term of years or months, but at present our knowledge of the exact conditions is somewhat limited and it is probable that persons lapsing their insurance will exercise an option against the company, inasmuch as poor risks will cling to their insurance and sturdy persons who are unlikely to be sick will drop their insurance. It, therefore, seems better at present to retain the entire reserve as a margin of safety to take care of the adverse selection against the company on the part of withdrawing policyholders and the suspended disability which may later be incurred on those who remain.



## X. INVESTMENTS AND EXCESS INTEREST.

As reserves on the Non-Cancellable policy will accumulate more rapidly than under commercial policies, the company's investment problem will be more important than it has been in the past and the funds should be invested with an appreciation of the fact that a large part of the money thus set aside is for use 5, 10 or even 20 years in the future.

Under commercial policies it has been customary to disregard interest in any underwriting statement and simply to compare losses incurred with gross premiums earned. The entire interest has been looked upon as an investment profit. Under the Non-Cancellable form, however, if the actuary assumes  $3\frac{1}{2}$  per cent. interest in his calculations of gross premiums and reserves, then the profit from investments will be only the excess of the actual interest earned over the  $3\frac{1}{2}$  per cent. assumed.

## XI. GENERAL UNDERWRITING PROBLEMS.

The problem of selling a large volume of Non-Cancellable Disability insurance on a profitable basis is most difficult. The underwriters have been trained for years to consider the insurability of the risk for a period of not more than one year and, in most of the mature business, claim payments at least on Health insurance have been limited to not more than 52 weeks, so that even if a mistake has been made by the underwriter, the experience is complete in two or three years and therefore any basic error can be adjusted without further loss.

In Life insurance most policies of long duration are issued on either the Life or Endowment form under which the reserve increases from year to year with a corresponding decrease in the company's net loss on any particular claim. On the other hand, a Non-Cancellable Disability policy issued, for instance, at age 30 resembles a 30 Year Term contract under which the reserve gradually increases to about age 50 and then decreases to nothing at age 60, the date of expiry.

Life insurance companies have in general refrained from issuing long Term contracts of this nature partly because the net amount at risk at age 59 is just as great as it is at age 30, and therefore an unfavorable experience in the later years would cause much heavier loss to the company than under an Ordinary Life policy or an Endowment with a smaller net amount at risk at age 59.

Under the Non-Cancellable Disability policy an unfavorable experience in the later years is even more costly because in the case of a claim beginning at age 59 the chance of recovery is much less than at age 30, and therefore the probable payments will be even greater than if the claim had occurred at an early age. It is, therefore, seen that although the Non-Cancellable policy resembles Life insurance in duration of the contract, there is this important distinction—in Life insurance the amount at risk in general decreases from year to year, and therefore the net loss on any one claim at age 59 on a policy issued at age 30 must be less than the net loss on a claim at age 30. In the Non-Cancellable policy, on the other hand, a claim incurred at age 59 will probably be more costly than the average claim incurred at age 30.

The Life insurance underwriter has the benefit of a fairly reliable mortality table for standard lives, for instance, American Experience or American Men, and he also has reliable statistics on sub-standard lives as well as the distinct advantage which comes through years of experience on the part of salesmen, medical examiners and company executives. The Non-Cancellable underwriter has hitherto been acting largely in the dark. It is suggested that he use the Manchester Unity Experience as a guide for standard risks but it is recognized that experience in this country may differ in a number of important respects. So far as sub-standard business is concerned, he has hardly any statistics of value. For commercial Accident insurance his guide has been the standard classification manual but the ratings in this manual are based on the experience of policies giving in general \$1,000 of death benefit with \$5.00 of weekly indemnity payable from the first day of disability. The manual is frequently unsuitable for a policy eliminating the death benefit and as it is based on an experience containing a large proportion of trivial claims for disability of short duration, it is not wholly reliable for a Non-Cancellable policy with a waiting period of two weeks or more.

In commercial Health insurance the field is singularly free from helpful statistics. Hardly anything is available to indicate the relative rate of sickness among various occupations or even among the various classifications covered in the classification manual. This absence of positive information in regard to the rate of sickness is particularly deplorable in a Non-Cancellable Disability policy under which accident claims will probably constitute not

more than 15 or 20 per cent. of the total and by far the greater proportion of the losses will be for sickness.

Still another important distinction between Life insurance and the Non-Cancellable Disability policy should be noted. Life insurance is now regarded by the public as a necessity and the proportion of poor risks among applicants is relatively small. Accident insurance, although sometimes purchased for speculative reasons, has a distinct appeal to the strong as well as to the weak. Health insurance even yet is to a large extent disregarded by the robust and sought by those who instinctively feel that they are not quite up to standard. In time it is probable that the need of both Accident and Health insurance will be just as clearly recognized by the public as is now the case with Life insurance or Fire insurance, but at present there is undoubtedly a selection against the company among applicants for Health insurance. This selection against the company is likely to be particularly marked in the Non-Cancellable policy as the one person who fully appreciates the value of the Non-Cancellable idea is the one who has just had a commercial policy cancelled because of some physical or financial impairment, usually reflected in an exaggerated claim for disability.

Companies issuing Non-Cancellable policies with both a two weeks' waiting period and a three months' waiting period report that applicants even exercise a selection against the company in their choice of waiting period. For instance, an applicant with history of asthma is likely to choose the policy with two weeks' waiting period as he contemplates further attacks of asthma of relatively short duration; on the other hand, an applicant with a tendency to tuberculosis prefers a waiting period of three months under which he can obtain for a small premium a large amount of indemnity payable during what will probably be a prolonged illness.

The effect of changing conditions from year to year or from decade to decade is difficult to determine in advance. In Life insurance fortunately the rate of mortality among insured lives, particularly at the young ages, has shown a marked reduction in the last twenty years, but it is not at all clear that there has been a corresponding reduction in the rate of disability. In fact, the experience of British friendly societies indicates that as the rate of mortality decreases, the rate of disability increases. This is illustrated by the following figures given by Mr. A. W. Watson in "An Account of the Investigation of the Sickness and Mortality Expe-

rience of the I. O. O. F. Manchester Unity during the Five Years 1893-1897.”

COMPARISON OF MORTALITY AND DISABILITY RATES IN MANCHESTER UNITY  
EXPERIENCE IN PERIOD 1866-70 WITH MANCHESTER UNITY  
EXPERIENCE IN PERIOD 1893-97.

Ages.	Rate of Mortality per 1,000 Members per Annum.		Rate of Disability in Weeks per Member per Annum.	
	M. U. 1866-70.	M. U. 1893-97.	M. U. 1866-70.	M. U. 1893-97.
16-19 ..	4.6	2.5	.54	.92
20-24 ..	6.4	3.7	.75	.90
25-29 ..	7.6	4.6	.81	.95
30-34 ..	8.2	5.5	.93	1.06
35-39 ..	9.8	7.0	1.06	1.27
40-44 ..	12.6	9.5	1.26	1.58
45-49 ..	14.3	11.7	1.64	1.99
50-54 ..	19.1	16.9	2.22	2.75
55-59 ..	24.9	24.2	3.05	4.02
60-64 ..	35.4	35.6	4.72	6.31
65-69 ..	52.1	54.1	7.24	10.59
70-74 ..	78.1	80.9	12.06	17.40
75-79 ..	99.5	120.4	16.87	25.15
80-84 ..	118.8	176.6	20.59	32.27
85-89 ..	196.1	232.6	29.63	36.12
90-94 ..		284.7		38.89
95-100 ..		440.0		38.57

The later experience shows a marked reduction in the rate of mortality at ages under 60 accompanied by an increase in the rate of disability at all ages. Commenting on this experience in conjunction with other tables, going back to the period 1846-48, Mr. Watson says: “Sickness rates are constantly rising whilst mortality rates except at the older ages are declining. This experience is unfavorable financially in two directions—not only is the sickness per member at each period of life heavier than was formerly the case but a greater proportion of members than formerly now survive into old age, the period of life at which sickness is at its maximum intensity.”

In issuing Non-Cancellable policies in the United States, we may reasonably count on an improvement in mortality which will in itself increase the amount payable for disability claims because a larger proportion of insured lives will survive to the older ages where the rate of disability is heaviest. It is not known whether the actual rate of disability at each age has been increasing from generation to generation in this country as has been the case among

British fraternal. The tendency towards shorter working hours, the greater use of preventives and the improvement in sanitary conditions accompanied by increased knowledge of medicine and surgery may reverse the tendency which has been so marked in Great Britain in the experience of the fraternal orders.

On the other hand, it should be noted that in recent years several new factors have been introduced into the problems of Accident and Health underwriting. For instance:

1. Increase in the hazard of injuries due to war or any act of war as illustrated by the world-wide war and particularly the losses to non-combatants—for instance, in air raids and in the sinking of the *Lusitania*.
2. The motor hazard which in itself is changing from time to time. For instance, the self-starter has practically eliminated accidents caused by cranking but the increase in power and speeds appears to have caused further hazard from reckless driving.
3. The influenza epidemic in the winter of 1918-19 and its recurrence in the early part of 1920. Fortunately most of the illnesses were of comparatively short duration but they had a most important bearing on the companies' experience in the last few years.
4. The aeroplane hazard.
5. The introduction of the radium and X-ray hazard in medical and dental work.
6. The Prohibition Amendment with its modifications of the drink and moral hazards.
7. A period of abnormal prosperity and inflated earnings followed most abruptly by a period of abnormal depression and greatly reduced earnings. A person whose income in 1919 might justify the issuance of a total Disability policy for \$1,000 a month might find his income in 1921 reduced to such a figure that a Disability policy providing more than \$200 a month would look like over-insurance.

In the light of these changes in recent years, who is bold enough to predict the rate of disability in the general population and particularly in certain classes 10, 20 or even 30 years hence?

## XII. SELECTION OF RISKS.

Having discussed some of the general problems involved in underwriting Non-Cancellable insurance, let us now take up the factors which must be considered in determining whether a specific risk should be accepted, having in mind that the underwriter must take into account:

1. What is the chance of the applicant becoming disabled?
2. Will the duration of disability probably be short or long?
3. Will there probably be a recurrence of disability?
4. How reasonable will the applicant be when a claim arises?
5. What is the chance of fraudulent claim and malingering?

With every application the company should secure a full medical examination and a reliable inspection report. The medical examination form should be entirely separate from the application form in order that the company may have two distinct viewpoints on the insurability of the risk.

*Source.*—It is well known that the character and loyalty of the salesman have an important bearing on the class of business secured in Life insurance and Accident insurance. This selection on the part of the salesman will probably be even more pronounced in the case of Non-Cancellable Disability insurance. If the salesman associates with the best class of people and eliminates from his canvass those persons who he believes are not the best risks, then his business will show a low rate of disability and the company will gradually acquire increased confidence in the character of his business. Some companies refuse to accept business from agents or brokers with whom they have only a remote connection and most companies agree that the best business is that secured through salesmen who are devoting practically their entire time to the interest of that particular company. The character and ability of the General Agent and salesman will have a most important bearing on the quality of the business secured. Furthermore, the companies should closely watch the experience on Accident and Health business secured from each General Agent and from each salesman in order to determine which men are securing good business. Salesmen with a consistently bad experience should be eliminated and those with a favorable experience stimulated to greater production.

*Age.*—The Underwriting Committee recommends that no policy should be issued under age 20 or over age 56. At young ages the

habits of life may not be fully formed and the ultimate occupation and the applicant's success in that occupation not yet determined, but policies for moderate amounts may be issued at ages 20 to 29. The best group of ages is from 30 to 45, as during that period the physical and business conditions are usually most stable. At ages 46 to 55 inclusive there may be a selection against the company in the case of an applicant who feels that his physical condition is beginning to deteriorate or that his earning power is becoming uncertain.

*Sex.*—Although some Life insurance companies grant their liberal permanent total Disability benefit to spinsters engaged in gainful occupation, it is generally conceded that the Non-Cancellable policy should be issued only to men as it is felt that among women as a class there will be a higher rate of disability and greater difficulty in securing a satisfactory settlement of claims.

*Nationality.*—The best experience will undoubtedly be obtained on white males born in the United States, Canada or the better parts of Europe. Only persons who can read, write and speak English should be solicited.

*Residence.*—The experience of the Travelers' Insurance Company on Health insurance as published by the late Mr. Messenger indicates that the best experience will be on persons residing in the northern and western parts of the United States and that the experience in the southern states will be less favorable. The underwriter must consider not only the present residence but former residence and possible future residence. Any recent change of residence should be carefully investigated as it may have been on account of poor health, or bad financial or moral record. Unless the policy clearly excludes any period of disability during which the Insured is residing outside Canada or the United States, the underwriter should refuse to cover anyone who is liable to go to any part of the world where the rate of disability would probably be higher than in the United States or where it would not be feasible for the company to make proper investigation of claims.

*Family History.*—Medical examination should give the history of the father, mother, brothers, sisters and *wife*, in the following form:

If living, age and condition of health;  
if dead, age at death and cause of death.

Particular attention must be paid to any record of tuberculosis, cancer, insanity or diseases of the nervous systems.

*Personal History.*—One of the most important points in determining the suitability of the risk is the applicant's personal history of accident or disease. Even with good faith on his part he is liable to forget some injury or illness which might affect his insurability, but if he is well known to the agent and the medical examiner, they may be able to supplement his statements with valuable information. If the record reveals any history of accident or illness, a statement from the physician in attendance at that time may be most helpful. In certain specific injuries such as dislocation of shoulder, there is liable to be a repetition of the trouble. In other cases the record indicates that the applicant is one of those unfortunates who apparently have a curious faculty for getting hurt. The personal history may indicate a susceptibility to recurrent illnesses such as asthma, grippe, pleurisy, bronchitis, and tonsilitis, or a tendency to prolonged disability due to such diseases as tuberculosis, insanity, paralysis, nervous breakdown or blindness. Specific questions should be asked in regard to recent association with anyone having tuberculosis.

*Physical Condition.*—The medical examiner should make a complete examination including blood pressure just as in an application for Life insurance. In addition, particular attention should be given to the eyes, ears, throat, teeth, varicose veins, and any serious deformity. If the applicant has lost one hand or one foot or one eye by accident, he should be charged an extra premium. If he has lost one eye by disease, he should probably be declined because of the danger of the other eye being involved, though possibly if the loss occurred some years prior to application, he could be insured at an extra premium.

If the applicant has hernia, he may be accepted provided the coverage is modified to exclude any disability due directly or indirectly to this hernia.

Light weight at the young ages, particularly if there is a personal or family history of tuberculosis, may be a serious impairment. Overweight, especially at the older ages, may be cause for rejection.

*Habits.*—It has always been difficult to learn how much men drink or how frequently they drink to excess, but with the advent of prohibition the difficulties have been increased. Furthermore, the kind of liquor now obtainable from certain sources may be



more injurious to health than the intoxicants formerly sold under government license and inspection.

It is equally difficult to obtain reliable information in regard to immoral relations, but there are indications that this hazard has increased in recent years.

Other factors to be considered in connection with a Non-Cancelable policy are: Overeating, insufficient exercise, recklessness, lawlessness and the use of drugs.

*Home Life.*—As prolonged periods of disability are frequently caused by worry, domestic troubles may tend to bring on a complete breakdown. On the other hand, congenial home conditions will make a favorable impression on the underwriter.

*Earnings.*—In a Disability policy giving full coverage up to age 60 the underwriter must consider not only the present earnings excluding income from investments but also the permanency of the business or position and the probability that the applicant's earning power will increase or at any rate will not diminish to such an extent that there would be a temptation for him to give up his business in order to draw the disability benefit provided by his insurance. In determining actual earnings, the company should consult the salesman's report, the inspection report and the commercial rating of the applicant's firm.

*Over-insurance.*—One of the greatest dangers is that some applicant may obtain insurance protection for an excessive amount. Under commercial policies if the company finds that an applicant has become over-insured, it can at once cancel or reduce his coverage, but under the Non-Cancellable form this privilege is absent. When the application is received, the company should consider the total amount of indemnity obtainable under all policies then in force, including commercial Accident and Health, Non-Cancellable Disability and the permanent total Disability benefit in his Life insurance. Even with all these precautions the company after issuing a reasonable amount of Non-Cancellable insurance may find a month or two later that the applicant has loaded up with additional benefits in some other Life or Accident insurance company. The original company is dependent on the subsequent action of other companies which may be more liberal in underwriting limits or may not know of all the previous insurance.

The Underwriting Committee of the Bureau, having this situation in mind, recommends that the companies co-operate to limit

the total amount of indemnity obtainable in *all* companies on any one life to \$500 a month. This does not mean that the limit for each company is to be \$500 a month, but that the applicant shall not be permitted to obtain a total of more than \$500 in all companies in which he is insured. It is doubtful, however, whether it will be feasible to apply this rule rigidly, particularly if the permanent total Disability benefit in Life insurance is to be included.

Quite apart from this absolute limit of \$500 a month, the applicant should not be insured for more than a certain percentage of his earnings. The Committee recommends a limit of 60 per cent. of his earnings on the Non-Cancellable form in all companies but it seems more reasonable to use a graded scale which will permit a higher percentage of earnings for those insured for small amounts and perhaps a lower percentage for those insured for large amounts.

The following scale is suggested:

Monthly Indemnity.	Maximum Per Cent. of Earnings.
\$100 .....	80
200 .....	70
300 .....	60
400 and over .....	50

*Occupation.*—In connection with occupation, the underwriter first thinks of the extra hazard from accidents and turns to the standard classification manual, but as indicated above, this manual should be used with the utmost caution for a Non-Cancellable Disability policy under which at least 80 per cent. of the claims will probably be due not to accident but to disease. For lack of a better guide, the underwriters have recommended that the Non-Cancellable policy be issued only to risks classified Select, Preferred, Extra Preferred and Ordinary and that the premiums in the higher classifications should be used only for pro rate purposes. There is just a chance that as the business develops the pro rate provision may be withdrawn from the Non-Cancellable form, but at present the underwriters wish to retain this protection, partly because of possible change in occupation but chiefly to guard against a misstatement of occupation in the original application.

In determining the Health hazard, the classification manual is of comparatively little help and the underwriter must be governed by his knowledge of the specific occupation under consideration, and this knowledge must be based on modern conditions as methods

of procedure in many industries are constantly changing. The company will be loath to accept an application on anyone exposed to septicaemia, dust, extreme heat or cold, dampness, lead-poison or other elements detrimental to health.

In certain occupations there is what might be termed a seasonal hazard. For instance, farmers whose main work comes in the summer months sometimes show a peculiar tendency to suffer an accident or illness during the winter season when comparatively little work has to be done. Similarly, teachers may develop disability about vacation time and nurses may be required to take a complete rest in the dull season.

In certain occupations there is what might be called a moral hazard, which puts the underwriter on his guard, for instance, in the case of a person who has been recently connected with the manufacture or sale of liquor or whose business is located amid undesirable surroundings. Similarly, an application may perhaps be refused because the applicant's place of business is in his residence and it might be extremely difficult to determine the actual period of disability.

In certain occupations there is a special hazard which will probably be reflected in the rate of disability. For instance, physicians with a general practice are likely to work for long and irregular hours and they are constantly exposed to contact with sick people. Dentists and surgeons show a high rate of disability, partly because even trivial injury may completely incapacitate such a person for work. A similar situation exists among vocalists, lecturers, actors or others where impairment of the vocal organs would constitute total disability. Musicians and barbers would be seriously handicapped by injury to the hand or even to fingers.

Sometimes the class of work is liable to bring on serious eye or nervous conditions.

In addition to these special classes, there are certain occupations in which there is no hazard that can be specifically mentioned, but experienced underwriters have found that they show a higher rate of disability and greater difficulty in securing satisfactory settlements.

Although the policy will presumably exclude disability sustained while in or on any vehicle or mechanical device for aerial navigation, the companies will probably refuse to accept a person engaged in aeronautics or one who contemplates so engaging.

The underwriter must consider not only the present occupation but also any former occupation and the interval which has elapsed since change of occupation, as there may be a tendency in case of failure in the new occupation to revert to some former occupation with perhaps a greater hazard.

### XIII. SALES ORGANIZATION.

So far, the Non-Cancellable policy has been sold as a side line of Life insurance or commercial Accident and Health insurance. In its appeal to the public it combines the coverage of Accident and Health insurance with the permanency of Life insurance. In the comparatively simple forms now recommended the Accident and Health salesman misses the frills he has used as talking points in pushing the commercial contract. In fact, in order to secure satisfied clients, he must point out that the Non-Cancellable policy does not cover from the first day of disability and does not cover partial disability, dismemberment and hospital fees. In place of these well known provisions, he must sell the Non-Cancellable idea. At first he may feel hampered by the necessity of a medical examination and by the use of a premium graded by age at issue, but he will soon find that a graded premium is a distinct help in closing a case before the age changes and that the requirement of another medical examination and a higher premium for a new policy taken at a later date will assist in holding old business in force. The commercial salesman has already learned how to select good risks for Accident and Health insurance and he is familiar with the use of the Occupation Manual and the need of clearly stating the exact duties of the occupation.

The commercial salesman who has been used to a high rate of first and renewal commission must be shown that he will in the long run build up a body of more satisfied policyholders and a more persistent business under the Non-Cancellable form and that therefore in the long run he will derive just as great a financial profit out of the new contract.

The Life insurance agent has been accustomed to selling a product which appeals primarily to the unselfish instinct, whereas the Non-Cancellable Disability policy is essentially a contract for the benefit of the man himself, but he has used the permanent total Disability benefit most effectively and he should be able to pass to

the Non-Cancellable policy which may be looked upon as a liberalization of the permanent total Disability benefit.

Sometimes in the past a Life insurance salesman has refused to write commercial Accident and Health insurance because he has dreaded the cancellation of the contract on some influential policyholder, but with this possibility removed, he can go forward confidently in the sale of the Non-Cancellable contract, with the firm conviction that the interests of his clients and of himself will be best served by a good combination of Life, Accident and Health insurance.

In the past, some companies have felt that no one man could successfully sell both Life insurance and commercial Accident and Health insurance, but the Non-Cancellable form resembles the Life insurance contract in so many respects that there is every reason to believe that a man may be successful in both these important lines of personal insurance.

#### XIV. CLAIM SETTLEMENTS.

Under the Non-Cancellable policy the work of the Claim Department will be somewhat modified. The company will still require an organization for settling claims throughout its entire territory. Where a large volume of business has been secured, the company will place experienced adjusters under Home Office supervision. At other points the claims must be adjusted through the General Agent or salesman.

It is essential that all these men should fully understand the exact coverage and be endowed with the happy faculty of explaining the coverage to the most obstinate claimant. Under the new policies giving complete coverage for total disability the adjuster will no longer be required to make a distinction between claims caused by accidental means and those caused by disease. Furthermore, the elimination of the cancellation clause will remove a source of friction between the company and its policyholder. On the other hand, the claim adjuster who has successfully settled one invalid or exaggerated claim will no longer be able to relieve himself from further trouble by simply recommending cancellation of the insurance. He may have to face the tenacious claimant year after year with repeated claims. Under commercial policies it is probable that through carelessness or a desire to have a clear record the applicant has frequently refrained from making claims for trivial

injuries or sickness. Under the more permanent forms of coverage now contemplated it is probable that the policyholder will gradually become more familiar with the possibilities of his policy and that some will form the habit of making claim upon the slightest provocation. Furthermore, under a permanent contract, particularly if it is linked up with Life insurance, the company will probably find it advisable to adopt a most liberal policy in settling claims in order that it may build up a large body of satisfied clients.

#### XV. THE FUTURE.

Because the Non-Cancellable problem is new and somewhat venturesome, it should be approached in a spirit of inquiry and co-operation.

Much has already been done through the Bureau of Personal Accident and Health Underwriters to place the business on a sound actuarial basis and to formulate reasonable underwriting principles. It is hoped that this commendable spirit of co-operation may continue in Non-Cancellable insurance and may be extended to commercial contracts. Plans should be made for keeping statistics showing the rate of disability by age at issue, duration of the insurance and classification of risk. As the total experience obtainable on the Non-Cancellable form for several years will be relatively meager, it is desirable that a uniform plan of keeping these statistics should be adopted by the principal companies in order that the total experience may be combined in more or less homogeneous groups.

In the meantime, salesmen should be given helpful instruction in regard to the possibilities and problems of the new coverage. Medical examiners should be furnished with an outline of the coverage under the Non-Cancellable form in order that in examining and making recommendations, they may more clearly distinguish between the Life insurance hazard and the sickness hazard.

Although emphasis has been placed on a simple Non-Cancellable policy giving merely protection in cases of total disability, there is a feeling among some underwriters that the sale can be greatly stimulated by the introduction of indemnity for partial disability and for specific losses, such as dismemberment, loss of sight, hospital fees and surgical fees. In spite of these secondary benefits the main appeal is sure to be on the ground of "income protection."

The successful business and professional man will more and more

freely purchase a policy which guarantees that even though he should be struck down by accident or sickness at the moment of greatest earning power, he will draw a substantial income as long as he is unable to work.

The field for this Non-Cancellable policy is wide and practically untouched. The possibilities appeal to the pioneer instinct. There is apparently a growing demand on the part of the public for permanent Accident and Health insurance which in conjunction with Life insurance will round out the complete circle of personal insurance.

With sound underwriting at the Home Office and aggressive salesmanship in the field American companies can popularize the new form of insurance and ultimately place it on the same plane as Life insurance in its scientific administration and universal appeal.

ABSTRACT OF THE DISCUSSION OF PAPERS BY MESSRS.  
CAMMACK AND LAIRD.

PREMIUMS AND RESERVES FOR NON-CANCELLABLE ACCIDENT AND  
HEALTH POLICIES—E. E. CAMMACK.

NON-CANCELLABLE ACCIDENT AND HEALTH INSURANCE UNDERWRIT-  
ING PROBLEMS—J. M. LAIRD.

*Editor's Note.*—By arrangement with the Bureau of Personal Accident and Health Underwriters the discussion of these papers was made a special order of business for the morning session on May 25, 1921. Members of both the Bureau and the Society participated in the discussions. The discussions appear in the order in which the authors spoke.

COL. S. H. WOLFE (CONSULTING ACTUARY):

Mr. Chairman and members, Mr. Cammack has stated the object of his paper in the following language: "The object of this paper has been primarily to call attention to the necessity of grading premiums for this class of insurance according to age at entry and of setting aside reserves in addition to the one-half a year's premium (customarily accepted as a correct reserve for a health policy) so as to provide for the increasing claims that will surely come after the effects of medical selection have worn off and as the age of the insured advances." I think I may say at the outset that in that statement we all are in accord. I think that expresses the necessity for the consideration of this in a way in which we can all agree.

Mr. Cammack has also referred to the fact that the Bureau of Personal Accident and Health Underwriters appointed a committee of actuaries to consider the subject, of which he was a member, and that they prepared a report. That report, as a great many of you know, differs very materially from the report which Mr. Cammack as a member of this Society, as an individual, has submitted, and I want to congratulate him upon his change of mind. It seems to me it is a manifestation of liberality and broad-mindedness on his part to feel that when he has made an error he wishes to correct it. In fact, I rather envy him the satisfaction which must come from that feeling. I say "envy" because I have never been placed in the position of making a mistake, and therefore have not been able to correct it.

Now, of course, we are navigating in an uncharted sea, as it were, and there is a necessity for cautious progress, but caution to



my mind doesn't mean the adoption of regulations or standards which are going to stifle a project which all are agreed meets a need in the insurance world. The main difference of opinion, as Mr. Cammack has pointed out, between those who have discussed the matter in the Bureau was in the selection of an experience table. Some actuaries believe the rates and reserves should be based upon the Manchester Unity Table. Mr. Cammack used that table, although he has frankly stated that it is not suggested that sickness rates in this country are likely to follow very closely the Manchester Unity. However, he points out that in the absence of any better standard he has used it.

He also points out that there is one point—and this is a caution we must all observe—to which attention should be drawn, viz.: that “the Manchester Unity Tables of sickness are aggregate tables, and even if they do fairly well represent the sickness rates likely to be experienced in this country, gross premiums based upon the net premium that I have deduced will be likely to be somewhat too high at the older ages.” Mr. Cammack's figures, which he feels may be too high, are considerably lower than those mentioned in the report of the Bureau.

Now, for a great many years in this country companies have been issuing total and permanent disability policies or riders or endorsements in connection with their life policies. The introduction of this new form, as you know, met with a great deal of opposition on the part of the actuaries, and it is rather interesting to read some of the discussions at that time in regard to the great danger resulting from a form of insurance which now is accepted, almost universally accepted, and which apparently is being operated on a safe basis. Non-cancellable coverage is becoming an important factor in the business, and of course the more business a company writes the more vital it is to have proper rates charged and proper reserves maintained, because if those safeguards are not observed, the failure spells ruin for the organization in the long run.

I may say that the New York Life—I don't know if Mr. Hunter is present or not—has issued total and permanent disability contracts for over ten years, and now apparently feels the need of a non-cancellable indemnity benefit to round out its coverage. They analyzed their experience and as a result adopted certain rates for non-cancellable insurance with a three-months' waiting period. These rates differ from those contained in the report of the four actuaries made to the Bureau and those used by Mr. Cammack in the paper he has now presented. The rates charged by the New York Life for this benefit issued with its ordinary life policies for each unit of \$10 a month are as follows: Age 25: \$1.45; 30: \$1.71; 35: \$2.03; 40: \$2.49; 45: \$3.09; 50: \$3.99; 55: \$5.45.

If you will refer to the report which was submitted to the Bureau, it will be noted that a loading of 37½ percent on the gross premiums

is required, although in another place it is suggested that this may be reduced by certain savings. Mr. Cammack in his paper uses only net premiums, but I have loaded his net premiums in accordance with the recommendation of the Bureau  $37\frac{1}{2}$  percent and find the following: For instance, at age 35 his gross premium is \$2.90 for a disability benefit of \$10 per month. For the same payment at that age the New York Life will give a monthly benefit of over \$14, and in addition to that the New York Life will waive the premiums on the policy in case of total permanent disability. Now, the value of that waiver of premium I have calculated, and I find it to be \$3.45 a month, so that for the same premium the New York Life apparently at age 35 will give \$17.68 as against the \$10 which apparently will be provided by the premiums suggested in the table. These figures which I have used for the New York Life I may say are not confidential inasmuch as they are published, and I shall not refer to any net premiums which the New York Life has used, because I should prefer that that phase of the discussion come from a representative of the company.

Following the same principle, I find that at the age of 50 for the premium recommended by Mr. Cammack loaded  $37\frac{1}{2}$  percent for \$10 a month, the New York Life, giving due weight to the waiver of premium factor, will give \$18.33. In other words, there is an increased benefit given at age 35 of over 76 percent and age 50 of over 83 percent. If we accept the reserves in this paper which has been presented, it seems to me to be impossible that the New York Life could maintain those reserves without infringing upon the surplus. Furthermore, I may say that the New York Life pays the same commission on this disability premium as it does on the insurance portion of the premium, and that commission, I think, is higher than the one which is now very generally used for disability income insurance.

The importance of Mr. Cammack's paper, it seems to me, rests in the fact that there are two principal considerations which must not be allowed to merge, because we may agree with one and yet differ with the other. It seems to me that there is not a great deal of difference as to the value of net premiums for the no-elimination period. They seem to me to be reasonable, but when we come to the periods of elimination it seems to me that due weight has not been given to the value of the elimination. I am not at this moment prepared to give any of the results of the elimination periods from any of the American companies. There is a gentleman in the room upon whom I hope the chairman will call, Mr. Maverick of the Continental Casualty, who is, I think, able to shed some light on the value of the periods of elimination; but it is quite evident that the periods of elimination in Mr. Cammack's paper have resulted not only from the employment of the Manchester Unity Table, but from certain modifications which have been made by him of the Manchester Unity.

In the first place, the Manchester Unity figures give no details of disabilities less than three months. The period between zero and three months has been derived by the employment of a formula devised by English Actuaries in connection with the National Insurance Act in 1912 and 1913, I think, and whether that is applicable to the American experience is something that I do not know. There has been another modification made in connection with the original Manchester Unity Table, which considered, as Mr. Cammack points out, disabilities which occurred during the same twelve months as one illness. In other words, a man might have been sick during the first month and then not sick for eight months and then ill again, and that has been considered as one illness. Now, that will have a decided bearing upon the elimination values. That has been corrected by the employment of a formula which Mr. Watson has pointed out is an approximation. Whether that approximation is applicable to our experience or not I am not prepared to say, but it is quite evident that we have employed a number of approximate curative factors to the original Manchester Unity Table, and it seems quite possible to me that has resulted in a failure to give due weight to the elimination periods, a very important factor, because the most of the business now is written on periods of long elimination with very little zero elimination whatever.

May I say that I was fully aware that the New York Life is willing to pay immediate benefits in those cases where it finds that there is no question as to the total and permanent disability? I purposely omitted that, preferring to err on the side of conservatism and feeling that it would be an offset to a point which I am very much surprised that neither Mr. Craig or Mr. Henderson has raised, and that is that the New York Life will not issue this policy in excess of \$250 a month benefit; that, of course, is another conservative factor. I assumed that would, as it were, overcome this fact which has been mentioned here. I also feel that perhaps a reading of the Bureau committee's report on the proposed commissions will indicate that the cost of the accident business will not be very much more than the life business as it is administered.

MR. R. HENDERSON (THE EQUITABLE LIFE ASSURANCE SOCIETY):

I do not feel that I can suitably discuss Mr. Cammack's paper without expressing my appreciation of the very valuable service which the author has performed both to the Society and to the business of Personal Accident and Health Insurance by the amount of work which he has evidently done in preparing this paper and by the very lucid exposition which he has given of his subject.

The first point which I desire to take up is the propriety of the basis which he has adopted for his tables. I think that he was well advised in finally settling upon the Manchester Unity Experience with as little modification as possible. The adjustment which he

has made, following the indications of Mr. Watson's article in Volume 35 of the *Journal of the Institute*, is probably justified, but in that connection we should bear in mind that off periods are not likely to be presented in exactly the same way where they are liable to mean the material postponement and possible entire loss of the benefit, as they would have a sufficient off period which would entitle the claimant to commence again on full benefit instead of receiving half benefit.

We should not, however, feel that the Manchester Unity Experience can be regarded as a very conservative assumption. We must remember that it represents the experience of a friendly society working on the lodge system under which each lodge was to a certain extent responsible for its own sickness claims, so that the members, particularly in the small lodges, had a direct financial interest in exercising a doubtless friendly but nevertheless strict supervision over the sickness for which benefits were being paid. The effect of this is clearly shown in a table given by Mr. Watson in the paper already referred to where he shows the results of an analysis of the various lodges of the order during the years 1891 to 1895, the sickness in each being compared with the previous Manchester Unity Experience and the lodges classified according to the number of members and each group subdivided into lodges showing a high sickness cost, those showing a normal and those showing a low cost. The percentage of lodges showing a high sickness cost increases regularly with the size of the lodge, only 41 percent of those having a membership of less than 80 showed a high cost, whereas 82 percent of those with a membership of 500 and over showed a high cost. Similarly 28 percent of those with a membership under 80 showed a low cost as compared with only 9 percent of those with a membership of 500 and over. The business of Health Insurance by incorporated companies is likely to be more like that of the large lodges than it is to be like that of the small, so that for this reason there is a possibility that our experience may be somewhat higher than that of the Manchester Unity.

There is one point brought out in this paper and its accompanying tables which in view of prevailing conditions will apparently bear further emphasis. This point is that the rate of sickness increases with the attained age of the insured, and that consequently the net premiums for that benefit either over a fixed period or up to a fixed age limit will necessarily also increase with the age. So far as the fact itself is concerned, it is probably unnecessary to reassert it. What I wish to do is to point out that it is not a fact which any of us can afford to merely assent to as an interesting academic theory, but is one which has a very vital relation to the welfare of every company transacting Non-Cancellable Accident and Health Insurance. To illustrate what I mean, I will ask you to refer to the comparative premium rates quoted in Mr. Cammack's

paper for the benefit of \$10 a month, payable as long as disability lasts, provided it commences before age 65, with no payment for the first two weeks of disability. We will suppose there are two companies transacting this class of business of equal strength and reputation. One company charges the rates of Company "A" and the other those of Company B, C and D. Further suppose that every case is a case of competition, with the facts clearly presented to the prospect. The natural result would be that Company "A" would secure all of the business up to about age 35, the other company would secure the balance. So far the process does not appear to be materially different from the ordinary results of business competition, but if the premium rates charged by Company "A" are the proper premium rates for the benefit at each individual age and those of the other company are merely the average premium rate which would be sufficient if a normal distribution of ages was secured, then Company "A" will not be seriously hurt by the selection exercised, as it will be receiving the proper premium for the particular section of the business which it insures, whereas the other company will be receiving a premium at the rate of \$6 per annum for business requiring a premium ranging from \$6 up to \$11 and over, and with no business requiring a premium of less than \$6 to balance it, and is necessarily suffering a loss. Of course, if Company "A" is wrong and the other companies are right, the situation would be reversed, and if the truth is somewhere in between they are both injured to a smaller extent by the counterselection for which they have given an opportunity. Where some of the companies transacting this business are using a graded scale of premiums and others a flat scale, each party would do well to examine carefully the propriety of the scale which it has used.

The author refers to the benefit of selection as negligible at the younger ages, but as producing an effect as much as 5 percent at the older ages, and suggested that this might be taken into account in the loading. Where an attempt is made to do so the high first-year expense cost and the shorter premium-paying period at the old ages should also be taken into account. It should not be assumed that any materially smaller percentage of loading could be used at the older ages than is used at the younger. This factor of expense would also affect the loading of premiums for policies with a longer period of exclusion. It is to be expected that the average premium required on such policies, if careful practices are followed in determining the amount of indemnity to be granted, will be materially less than where the exclusion periods are shorter, and consequently these policies with a longer period of exclusion would appear to require a higher percentage of loading.

The question of reserves is one which requires very careful consideration. The company with which I am connected has, in order to avoid undue optimism with regard to the results of its business, charged itself with reserves on the full net level premium mean

reserve basis wherever that basis exceeded the gross unearned premiums, using the gross unearned premiums up to that point. The consideration, however, with regard to the high initial cost is more important in connection with Non-Cancellable Accident and Health Insurance than in connection with Life Insurance, and it is possible that some form of preliminary term valuation will be found most appropriate for this business.

MR. J. D. CRAIG (METROPOLITAN LIFE INSURANCE COMPANY):

Mr. Cammack's paper presents a very interesting study of premiums and reserves for non-cancellable health policies and is of great practical value at the present time. The subdivision of the sickness rates as well as the number sick for different periods are very useful, while the claim reserves are the first published that have been based on any definite standard. The larger proportion of sicknesses for longer durations at the older ages has attracted considerable attention, but it would seem that the divergence in this respect between Mr. Cammack's figures and those reported by the Committee on Statistics of the Bureau of Personal Accident and Health Underwriters, as given by Mr. Cammack on the first page of his paper, is readily explainable. The committee's figures show that for claims running not more than one year 50 percent represented sicknesses for the first two weeks, 70 percent represented sicknesses for the first four weeks and 90 percent represented sicknesses for the first thirteen weeks. Compared with these, Mr. Cammack's figures show:

Age.	Percent of Year's Sicknesses Occurring.		
	Within the First 2 Weeks.	Within the First 4 Weeks.	Within the First 13 Weeks.
20.....	51	69	92
30.....	46	63	87
40.....	40	57	82
50.....	31	49	76

Where a policy has a cancellation clause the effect of its application would naturally be to reduce claims at the older ages, as the contracts expected to produce high morbidity rates would likely be cancelled, while under non-cancellable policies it would seem reasonable to expect that as the duration of the policies increased there would be a continually larger proportion of long-time claims.

As an underwriting proposition we have been interested in another aspect. The Manchester Unity Table shows the experience from 1893 to 1897. Mr. Laird in his paper compares these ratios with some earlier tables, but referring back to the British experience every table prepared shows a higher rate of sickness than its prede-

cessor. The Manchester Unity experience of 1866 to 1870 showed a sickness rate of 1.06 weeks for ages 35 to 39; the next experience covering the years 1871 to 1875 showed 1.15; the next covering the years 1876 to 1880 showed 1.24, while the last covering the years 1893 to 1897 showed 1.27. This last is an increase of 21 points, or practically 20 percent, over the first. What is the sickness rate going to be twenty or thirty or forty years from now? If a non-cancellable policy be written on a man age 20, under which, if he becomes sick prior to age 60, he is to receive compensation, provision must be made for the rate of sickness when he attains age 60, which will be forty years from now. Will his rate of sickness at age 60 be the same as the rate of sickness now experienced at age 60?

The trend of experience as well as common sense seem to indicate an increasing rate of sickness for the future, and we have prepared some rates in our office based upon the Manchester Table with a 13 weeks' elimination period, but assuming that the rate of sickness would increase one percent a year. An interesting fact is that the increase in the premium so derived is nearly a constant at the different ages.

At age 20 Mr. Cammack for \$10 a month with a 13-weeks' elimination period quotes \$1.04 and we computed \$1.35, which is an increase of 31 cents or 30 percent. At age 30 the effect of this one percent increase in the sickness rate raises Mr. Cammack's rate from \$1.51 to \$1.88—an increase of 37 cents. At age 40 it raises the rate from \$2.16 to \$2.54—an increase of 38 cents. At age 50 it raises the rate from \$3.24 to \$3.67—an increase of 43 cents. As the age advances the percentage decreases, but the increase itself is not far from a constant. As an act of conservatism in preparing premium rates it might be wise to provide for an increasing rate of sickness and, in addition, to use the most stringent mortality table available.

MR. MANTON MAVERICK (CONTINENTAL CASUALTY COMPANY):

I desire to express my appreciation of your courtesy in inviting me to discuss this subject, and at the same time I must say that I feel rather embarrassed so to do. I want to make a frank avowal at the start and ask for your most kindly consideration; I am not a mathematical actuary and I make no pretense of being one. I do not even speak the same language as the mathematical actuaries, nor am I capable of following all their intricate mathematical processes. That which I know—or rather that which I think I know—relative to accident and health policies has been learned in the hard school of experience. It has been learned by many attempts to create correct rates during the last twenty years—sometimes meeting with success, sometimes with failure. I, therefore, particularly wish you to bear in mind that I speak only from the standpoint of the practical working accident and health rate-maker.

The company with which I am associated is one of those which has been selling non-cancellable accident and health at a level premium irrespective of the age. It entered the field on that basis for reasons which seemed at that time to be sufficient. Expressing my own personal view and not intending at all to declare the policy of the company—although I think it will probably follow the view I am about to express—non-cancellable accident and health policies should be sold for a premium graded according to initial age. I am quite in sympathy with the views expressed to that effect. In fact, the Continental has already put out one policy upon a premium graded according to age. That policy is being sold only in two forms: a coverage with no excepted period and a coverage with one week excepted.

I was appointed one of the members of the subcommittee of the Bureau of Personal Accident and Health Underwriters to help devise a set of rates and reserves graded according to age, and I want to say I have the very highest appreciation of the work done by Mr. Cammack and the rest of the committee. I mention Mr. Cammack particularly, because I believe that the mathematical work is largely his. His paper which was presented this morning, and which I have had the opportunity of reviewing, differs very materially from the previous report of the committee. I believe the difference is a step in the right direction. I do not believe that it has gone far enough.

For my own satisfaction—and that is the test to which a thinking man must conform—I wanted to determine by the best means at the disposal of either the company or myself a table of proper term premiums for non-cancellable policies without an excepted initial period. I had nothing to guide me except the experience of the company, which was not distributed by ages and which was upon cancellable policies, together with such modifications as good judgment would suggest. I am about to tell you what I evolved from that, and again crave your indulgence that I do not present it as scientific work, but as practical work. Please do not hold me to this formula or that formula, because I do not know anything about them.

From my viewpoint in considering this question, there were two questions to determine: first, what I may call the relativity of the premiums by age; and, second, the absolute premium. The relativity was obtained from our own experience in the following manner: We subdivided into five-year age groups some \$6,000,000 of weekly indemnity, together with the correlative claims, which amounted in number to something over 100,000, so as to determine the relation between exposure and claims by ages. The results were plotted, the curves smoothed and interpolations made for intervening ages. Thus was produced a set of index numbers expressed in percentages of average claim cost which, while it correctly repre-



sented the relative value of ages, did not represent the actual value, but, on the contrary, needed the application of the factor representing the absolute average value. This factor was applied, and I am frank to say it was one of judgment, with most liberal, ultra-liberal, allowances for the difference between non-cancellable business and cancellable business. That gave a set of term premiums for a policy of no excepted period. I may say that the work was completed before Mr. Cammack's paper was available. The result of the work, when compared with Mr. Cammack's figures, shows a similarity which is very, very striking. I will give to you some of the figures at intervals of five years that you may see the comparison.

At age 20 Mr. Cammack gives a term premium of \$1.91; my figures were \$1.76. Then my figures rise rather rapidly, while Mr. Cammack's figures rise slowly, so that at age 25 his figures are \$1.99 and mine are \$2.32. At age 30 his are \$2.21 and mine are \$2.66. Mine continue somewhat higher than his, not a great deal, until age 45 is reached, at which point they cross. Mine do not increase as rapidly after age 45 as do most of Mr. Cammack's. For instance, at age 45 he has \$3.68 and I have \$3.70. At 50 he has \$4.76 and I have \$4.48. At 55 he has \$6.40 and I have \$5.94. At 60 he has \$9.92 and I have \$8.62. Personally, I think it is quite remarkable that those two sets of figures determined in absolutely different ways, each without reference to the other, should be in such close correspondence as is shown by this comparison. It is my personal view, speaking from the practical standpoint, that Mr. Cammack's term premiums for the ages, say, from 23, 24 or 25 up to 40 are too low. As I compare them with the rates at which we would be willing to sell a cancellable policy, and make due allowance for what I think is the extra cost for the non-cancellable, I am obliged to say that any company proceeding under my advice would not sell them for that rate even when given the usual loading, say 40 percent of the gross. But I do desire to make the point that by these two methods of calculation, one scientific and the other non-scientific—if you so wish to term it—or practical, premiums have been evolved in which there is no great variation.

The other factor that I wanted to determine was the value of the excepted periods, expressed in percentages of full coverage, and as I had no way of deducing it, as Mr. Cammack did, I went at it in this way. The Bureau some six or seven months ago through its actuarial committee made a tabulation of, I think, nearly 200,000 claims—something in that neighborhood—100,000 accident and 100,000 sickness, by periods of duration, and from those calculated the percentage value of an initial excepted period. That table was faulty to be used for purposes of this work for two reasons: first, it was not subdivided by age—and I think that age has a great effect upon it; and, second, it carried none of its claims beyond one year.

In my humble attempt to cure those deficiencies I made the arbi-

trary assumption that under non-cancellable policies there would be twice as many claims at the expiration of one year as there would be under the cancellable ones. I may say that that assumption, I have since learned, is borne out very nearly by a deduction made by Mr. Laird, although I have not had an opportunity to read his paper, as I did not get it until ten minutes ago; but I understand, nevertheless, that Mr. Laird has made some calculations as to the effect of the removal of the cancellable privilege policy on the number of claims that might be expected afterwards, and that his work supports my assumption. I also note that in Mr. Cammack's paper he shows that the claims of one-year duration upon the average may be expected to continue for about four years more.

Without having either of those pieces of information before me, I simply arbitrarily supposed the number of one-year claims under a non-cancellable policy to be double those under a cancellable policy and to continue for an average of four years each, and I applied that corrective factor to the table as prepared by the Bureau and got a new set of values correct so far as that these features were concerned, but not distributed by age. The Continental then made a special investigation and distributed a trifle over 80,000 claims by ages, half of them being sickness claims and half of them accident claims. I then applied the distributive factor as gained from that experience to the result of the Bureau table, and the result was what I then and now believe to be a fairly correct basis for determining the value of the various initial excepted periods.

I think this is a good time for me to say again: Please bear in mind that I am not advancing this as absolutely scientific. It was a practical way of answering my own inquiries.

The results of that tabulation are quite different—in fact, are very markedly different from the value of excepted periods as determined by Mr. Cammack. I will point out some of the variations. I have that table worked out here for periods of one week, two weeks, four weeks, eight weeks and thirteen weeks. Mr. Cammack only made it for two weeks, four weeks and thirteen weeks. He expresses his in absolute figures, but I have them reduced to percentages. At age 20 Mr. Cammack deducts 48 percent—I will ignore the fractions—as the value of two weeks' elimination. I advise the deduction of 39 percent. At 25 Mr. Cammack deducts 43 percent; I advise 38 percent. I will read by ten-year periods. At 35 Mr. Cammack deducts 34 percent; I advise 37 percent. At 45 Mr. Cammack deducts 26 percent; I advise 35 percent. At age 50 Mr. Cammack deducts 21 percent; I advise 33 percent. At age 60 Mr. Cammack deducts 13 percent; I advise the deduction of 29 percent. That is upon the two weeks' elimination period.

As I worked these figures out on the one, two, four, eight and thirteen weeks' deduction, this law was observable: that as the length of the period of elimination increases the difference between

the value at the younger ages and the value at the older ages became less. I think that is sound, because I think I can see a point that would be reached by lengthening the period of elimination until the result would be identical with either the young or the old.

In applying this same method to the thirteen weeks' elimination there is a much more marked difference. The figures prepared as I have stated show that upon the thirteen weeks' elimination there is not very much difference between its value at the young ages and the value at the old ages. I think that is reasonable. Remember, I am speaking of the relative value, the value as related to the term premium of no excepted period. I think it has been demonstrated that the young men either get well or drag along a long life. In the case of a young man who becomes blind or incurs any of the more common types of life disability, such as insanity, blindness, the loss of two limbs, the value of the three months' elimination is not great. On the other hand, in the case of a man of sixty years of age who becomes blind, insane or disabled for any other reason, the value of the elimination is pretty nearly as much as it was upon the younger man, because, although the frequency of occurrence is greater, the older man does not have as long to live. Remember, again, that I am speaking not of the absolute value of the elimination, but of the relative value between old ages and young.

Proceeding along those lines, I have found that the value of the elimination by age at three months' elimination period varied at the different ages from sixty-seven and a fraction percent to sixty-three and a fraction percent. Mr. Cammack's variation is from 86 percent to 30 percent. You see there is an enormous difference in our figures. Mr. Cammack is of the opinion that the three months' period of elimination is only worth 30 percent of full coverage at age 64 and 86 percent at age 20. I do not agree with him. The result of it all is that if you take this table of term premiums from Mr. Cammack's report, which is Table 4, and will start and draw a line about across there (indicating) up that way, roughly, it is a diagonal line, I think those rates from there up are too low. Over in this corner (upper right-hand corner), which I shall refer to more particularly in a few moments, I think it is absurdly low. I think it is so low that a company selling a cancellable policy at that rate would be committing suicide. In this other part of it I think it is too high. Perhaps it is right, but this part up here is certainly too low.

The extreme case comes at the value of the term insurance with 13 weeks' exception for age 20. The net premium is given as 26 cents. That means—being usually sold in units of \$100—that it would be \$2.60 for \$100, and if loaded 100 percent of the net, 50 percent of the gross, it would make a rate of \$5.20. I would ask any of the practical underwriters in this room—any of those who are making rates for accident and health policies—whether he

would sell to a man 20 years old a policy agreeing to pay him indemnity for life in the event of his total disability extending beyond three months for a premium of \$5.20, which includes 100 percent loading of the net? It can not be done, gentlemen. It is suicide.

Mr. Cammack, in conversation with me when we were discussing this feature—and you will pardon me if I anticipate what you may say, as I do not care to speak again—points out that that is cured when level premiums are made from these term premiums; that the level premium for the younger ages increases—and comes up to about what I would advocate as a level premium—because as you go down the line to the older ages the term rate increases very materially. That is quite true, and if the level premium were only to be considered, I would not quarrel as violently with his table as I do now; but although the level premium approaches the proper figure, the result upon the table of reserves is to create a reserve requirement in the early years which in my humble opinion can not be met when added to the claims that will occur without a drain upon surplus.

I think, gentlemen, that that is all I care to present. I hope you will pardon the many references to the "I," "my judgment," etc., because, as I told you at the start, I am unable to speak upon the subject from any other standpoint.

MR. B. D. FLYNN (THE TRAVELERS' INSURANCE COMPANY):

I believe Mr. Maverick is altogether too modest in his statement that he is not an actuary. His studies and work have been along the line of good actuarial work. He has taken the position that before accepting any experience which we might call foreign experience he should first be convinced as to the correctness of the statistics, so far as possible, by studies of American experience. I have great sympathy with his idea of using American experience wherever possible. In the early stages of workmen's compensation rate making in this country work along the line Mr. Maverick has followed was of real value in correcting erroneous ideas developed by the use of foreign statistics, the make-up of which was not fully understood in this country. The American experience modified the foreign statistics so that a safe working basis for rate making was obtained.

In studying this problem in committee, we have endeavored to utilize American experience which was available. In spite of the interesting and useful points which Mr. Maverick has brought out, my firm conviction is that American experience under cancellable policies can be of but little value in this problem, and that we must adopt the Manchester Unity table as the best available basis for rates.

The two important weaknesses of American experience under cancellable contracts which have been referred to so often, but which

I would like to emphasize here, must, in my opinion, throw such statistics out of consideration in working out this problem. The first weakness is the right of the company under American cancellable contracts to cancel or to decline to renew the policy. The rate of cancellation may be small, but, as Mr. Laird has pointed out, the effect upon the rate of disability may be great. There is no reliable way by which we can obtain even a rough approximation of the effect which this privilege of the company has had upon the disability rate.

The other important weakness lies in the fact that the American cancellable policies have had as a rule a limit of indemnity of 52 weeks, or a limit slightly greater than that term. Claims of probable long duration have therefore passed out of observation at the end of this comparatively short period. To place an estimated average duration of claims against the number of cases which have reached the limit of indemnity in an effort to approximate the complete period of disability is unsatisfactory, because many of the probable long-term claims were settled by lump-sum payment before the limit of period of disability had been reached. Further, as Mr. Cammack has pointed out, long-term disabilities have undoubtedly been avoided by the cancellation of policies of persons who have had repeated short-term claims before they have started on their permanent disability claims. To attempt to build up reliable statistics which will reflect the experience of an unlimited period of disability policy from the experience under a limited period of disability contract with a cancellation clause is, in my opinion, a hopeless task.

As stated before, the Manchester Unity experience seems to be our best guide, although in some respects it will probably not prove a reliable index of American experience under present non-cancellable insurance conditions. The benefit provided by the Manchester Unity was a small and decreasing one. It appeals to me that experience under the American contracts where very large benefits are provided will show much poorer results, particularly in the long-term contracts, where the deterioration of the risk due to change in habits or in moral or financial condition is possible.

This factor of over-insurance taken with deterioration of risk should be provided for by increasing the rates over those required by the Manchester Unity experience. I was much interested in Mr. Craig's rates resulting from an increase of 1 percent in the rate by age. The extra premium obtained is practically a constant addition by age. The companies should make provision for the cost of this factor in preparing their rates for non-cancellable accident and sickness insurance.

There is one other point with regard to Mr. Cammack's paper—bearing upon claim reserves—which I would like to speak of. Mr. Cammack presents a table of reserves for the valuation of individual claims based upon the same modifications of the Manchester

Unity table as were made in the preparation of the premium rates. Too much importance should not be attached to the usefulness of this table. It is presented simply as a rough guide to the reserve liability needed in average cases. Most companies will have but few long-term disabilities, however, under non-cancellable forms for several years and, clearly, not enough cases to permit the use of average values. It will be best to allow the companies to continue for some time to make individual estimates of the future cost of long-term claims. Certainly for an insurance department to adopt immediately such a table as a required basis of valuation of the longer term claims would be most unfortunate, in view of our present lack of American experience. The table should be an excellent guide to the claim adjuster in estimating individual cases; but no attempt should be made to *require* that long-term claims be valued upon it.

MR. E. B. MORRIS (THE TRAVELERS' INSURANCE COMPANY) :

As the writer did not have the opportunity of reviewing these papers until a day or two ago, he trusts that the members will pardon him if his remarks follow a rather rambling course.

Both of these papers are most welcome contributions to the subject of health insurance, a subject upon which very little constructive work has been done on this continent.

Several years ago The Actuarial Society of America appointed a committee to investigate and edit a textbook on the subject of health insurance for actuarial students. That textbook has not yet been written, for the committee appointed soon found this peculiar situation, namely, that the only health business done in this country at that time was written upon the cancellable form, and practically all without due consideration for age at issue; consequently, as far as this country was concerned, there was practically no real data on which to formulate a textbook, and all that the committee really could have done was to point out this fact and then describe more fully health insurance as practiced abroad. In other words, the mathematics of the subject related mainly to the practices in Great Britain. The papers of Messrs. Cammack and Laird are, therefore, most welcome as a real contribution in this country to the subject of health insurance.

My intent in the few remarks which I will make is to point out some of the similarities of the non-cancellable health contract to the life contracts of the old line companies.

There is, perhaps, one point in the development of accident and health insurance in this country which may be emphasized. The tendency until recently because of the cancellable form has been a development of the business from a strictly select point of view. In life insurance risks are selected through the medium of medical examination, but once an insurance is issued the continuance of the

contract is entirely in the hands of the insured, consequently under life insurances the group insured tend toward an ultimate mortality. In the casualty lines, however, there is a possibility of keeping the groups select through the exercise of the cancellation feature. Then again, as Mr. Laird has pointed out, the heavy lapse rate found in casualty lines tends in the same direction. The tendency has been in the casualty lines toward the quotation of relatively low premiums and broad coverages with the single exception of the cancellable feature. Undoubtedly had the development in this country of casualty lines been in an opposite direction, the development through the issuance of non-cancellable forms, premium rates would have been considerably higher, although necessarily the development of the business would have been much closer to the development of the life business.

The accident or health contract, therefore, offers a broad coverage at an exceedingly low premium, and, consequently, immediately introduces the greater problem of the moral or financial hazard much more emphasized than in life insurance. In life insurance, once a contract is issued, the rate can not be changed, even though the insured may change his occupation or his residence or become physically impaired. As far as life insurance is concerned, such changes may, however, tend to neutralize themselves and, as a matter of fact, are not of great moment, for even if the companies were able to increase the rates for life insurance with an increase in hazard, the percentage of the increase in premium would be relatively small. In casualty lines, however, because of the low premium charge, an increase in hazard because of, for example, a change in occupation, may materially affect the percentage of change in premium—a fact which the casualty contracts have recognized, and which practice is furthermore corrected through the yearly reissuance of the business. The point which needs special emphasis is this moral or financial hazard to which the casualty companies are exposed—that is, the possibility of a considerable risk by the payment of a relatively small premium—for there must necessarily ever exist the possibility of selection on the part of the insured.

For a number of years the life companies have been issuing a so-called permanent total disability provision which in a sense is an additional coverage along the lines of the non-cancellable health contract, but it should not be forgotten that this disability provision is issued in connection with and not independent of the life insurance coverage. Under a life contract an insured who is attracted by the disability coverage must necessarily pay the premiums for the life insurance as well as the extra premiums required for the disability provision, consequently there is not the probability of the financial hazard in life insurance that will be found in a separate non-cancellable health contract. Furthermore, the life companies have arbitrarily limited the amounts which any one company will

write for this disability coverage, namely, \$25,000 of life insurance, which corresponds to a monthly sum of \$250. The possibility of selection on the part of the insured is very much greater in the independent health contract which necessitates a considerably higher premium for the independent health insurance contract than would be necessary for a disability clause issued in connection with a life contract even when the benefits of the two contracts for disability are practically the same.

The disability benefits now issued by certain companies in connection with life contracts are practically the same, as a matter of fact, as the benefits contained in the non-cancellable health form and where the waiting period is at least three months. It is obvious, however, for reasons above stated, that an insured purchasing insurance from a speculative point of view would be attracted toward the non-cancellable contract rather than the life insurance contract with similar benefits.

In 1904 The Travelers' Insurance Company, when considering the adoption of its first disability clause which provided for waiver of premium in event of permanent total disability, considered the issuance of such insurance from two points of view—first, the plan adopted of issuing the coverage as a part of the life insurance contract, providing for the waiver of premiums in event of permanent total disability, and second, the issuance of an independent coverage on a non-cancellable form which could be so assigned as to provide for the protection of any life insurance contract in event of permanent total disability—that is to say, that if an insured in a certain company were totally and permanently disabled, The Travelers' Insurance Company by assignment would pay the premium thereon to the insurance company as long as the insured continued to be totally and permanently disabled. Had the company's decision at that time been for the issuance of such an independent contract, it is clear, I think, that the history of non-cancellable health insurance in this country would have been very different from what it is today. The issuance of the disability clause in connection with life insurance contracts has undoubtedly avoided some of the difficulties which would be found in the issuance of an independent health contract as well as certain of the restrictions necessary in the separate contract.

The non-cancellable health contract which is proposed provides for the payment of level premiums to a certain age—age 60—at which age the coverage ceases, although any benefits incurred prior to age 60 will, of course, be carried to completion. The premiums are payable as stated on a level basis each year, but cease at death, and in the compilation of premiums the mortality table must be used. We have here, therefore, the analogy to a level premium term contract found in life insurance. In other words, where the health contract is issued at age 20 we have a comparison with a



level premium 40 Year Term contract; where the age of issue is 50 with a level premium 10 Year Term contract. It is obvious, I think, that health insurance coverage could not well be extended for life, for, of course, such a contract would carry the insurance into the advanced ages where deteriorating diseases are more prevalent and where insurance protection is not so essential for the reason that the earning capacity of the individual is greatly lessened, or is nil.

The analogy between the non-cancellable health insurance form and term insurance, however, is interesting. As far as life insurance is concerned, the laws of certain States provide for surrender values where the term of the insurance is more than twenty years. The majority of life companies, however, write term insurances generally for a period of five or ten years, whether on the non-renewable or the renewable term plan, and thus avoid the question of surrender values altogether. It is quite possible that the question of surrender values on long-term non-cancellable health forms must sooner or later be considered, although it is evident from Mr. Laird's remarks that the accident underwriters do not feel that the time has yet arrived for the serious consideration of this topic.

The casualty underwriters, with the history of cancellable forms before them, have little data on which to estimate the probable lapse rate on the non-cancellation forms. It is interesting to note, however, that the cancellation rate, especially if surrender values are not provided, will in time have more or less effect upon the necessary premium rate itself. Life insurance companies have followed the practice, which is now required by law in certain States, of paying a heavy initial commission the first year with comparatively low renewals. For instance, life renewals are limited by law to 5 percent or  $7\frac{1}{2}$  percent, and for a period of nine years.

On the cancellable casualty forms it is customary to pay the same rate of commission upon each renewal. On such casualty forms we find a motive for the rewriting or twisting of contracts not found in connection with life insurance contracts. It is evident that the shifting of a life contract after issuance to another contract in another company is generally to the distinct disadvantage of the insured and is a practice which is frowned upon by all companies, and, in fact, is guarded against by the laws of various States.

With the adopting of the non-cancellable health contract, however, with premiums properly graded as to age, the matter of twisting at once becomes a real question to the casualty companies. It is clear that if the adoption of a non-cancellable health contract means in turn the elimination to a considerable degree of the twisting problem, then it may be expected that there will be a tendency for the experience of casualty companies to follow more closely the experience of life companies as to renewal and in general the same tendency to pay higher first-year commissions with lower renewals.

However, the situation is much more involved than in connection with life companies. In the casualty business there are certain companies which issue casualty insurance only. There will be found life companies which also issue independent casualty contracts. Certain of the latter companies issue casualty business for agents or brokers who do no life business, whereas certain life companies issue business only for agents whose contracts cover life business. It will be seen that the problem confronting these two classes of companies as to rates may differ considerably. It is very evident that a company which intends to pay a high rate of commission on renewals is at a certain disadvantage as to rate as against a company that pays renewal commissions more along the lines of a purely life insurance company and where the total commissions paid for such business will aggregate much less.

I have simply called attention to this analogy in order to point out the possibilities which are involved, for necessarily, as suggested, the lapse rate of the future on the non-cancellable health forms which is a part of this problem will have much to do with the ultimate rate which must be charged.

As heretofore stated, my object in these few remarks has been to point out more particularly analogies in this problem to those in life insurance for the reason that the non-cancellable health contract has much more in common with life insurance than has hitherto been the case in connection with health insurance as heretofore issued.

MR. W. M. JOHNSON (THE MASONIC PROTECTIVE ASSOCIATION):

This discussion, gentlemen, has to do with premiums and reserves, and therefore with contracts. You can not determine reserves without knowing the terms of your contract. The suggestions of Mr. Laird, and I imagine the report of the committee to Mr. Thompson's organization,\* is to the effect that the non-cancellable feature be limited to policies providing a monthly income only, and not providing death or dismemberment or other benefits. I presume the subject of non-cancellable insurance has come up because of public dissatisfaction with cancellable policies. The suggested form of contract, it seems to me, is one which is supplemental to commercial accident and health insurance, rather than one to take the place of it. I think the company which has issued the largest amount of this non-cancellable insurance under policies calling for a waiting period of three months uses it as supplemental to regular commercial insurance, rather than as a substitute for it; as a contract providing men who may become *permanently* disabled with an annuity throughout the period of disability, rather than as a form of accident and health insurance, which is sufficient as and of itself.

\* Bureau of Personal Accident and Health Underwriters.

It seems to me that there is a public need for a non-cancellable policy, not merely for the permanent disabilities which lay a man up for years, as does insanity or the loss of sight of both eyes, but to cover temporary disabilities. The difficulties I have found as a practical underwriter in dealing with the public have been largely of the nature which have arisen when a man who has paid to a given company ten or twelve years' premiums at \$60 or \$65 per annum, has an attack of appendicitis lasting ten days without operation, and then has his policy cancelled because the company foresees the possibility of a further attack and the necessity of an operation. That type of man is dissatisfied, not because he did not have a contract that would pay him an annuity provided he lost the sight of both eyes, but because the ordinary commercial contract was one which was so used—or the cancellation clause in which was so used—as to deprive him of coverage, not for permanent disability, but for temporary disability, or the disabilities of a comparatively brief nature.

You, of course, are all aware that a company which is issuing a large amount of non-cancellable insurance—The Equitable Life, of which Mr. Henderson is Actuary and with which I was formerly connected—is issuing that insurance on commercial forms rather than in the form of a monthly income without death or other benefit. It may not be without interest to you to know that some ten or twelve years ago I ran across the experience of an English company in issuing a five-year term non-cancellable policy. I procured their rates and policy forms, and considered at the time the use of such a contract in this country, but found that the standard provision laws as they then stood did not permit, according to the rulings of the Insurance Department, the issuance of a form omitting the cancellation clause. All that has since been changed, and within the past three years, in connection with a company which does business in a very limited field and which does not have, therefore, many of the problems which you have, we have introduced a non-cancellable policy not at all in the line of the one under discussion here, but one for which clearly there is a demand, and which seems to me to meet a legitimate need. You will recall that the commercial policy as used in the past, and as many of you now use it, provides for 52 weeks' indemnity for sickness. Simply leaving the limitations of the policy as they were (they differ slightly from that, but are approximately the same), we have made the policy non-cancellable to that extent. It can not be terminated until the insured has received weekly benefits for the full period stated. When that period is up—when the 52 weeks have expired (to apply it to your contracts), the policy continues at a reduced premium for death and dismemberment benefits. It is a non-cancellable contract within the limitations which have been customary to commercial insurance as to the duration of the period during

which weekly benefits will be paid for permanent or temporary disability. As an organization we deal in very small amounts of death indemnity. Our maximum death benefit is \$5,000, and our average death benefit last year was only \$3,000. We issued last year policies calling for upwards of a million and one-half in premiums on that form, and we will collect this year three million dollars in premiums on non-cancellable policies of that type, which are clearly not the type which are under discussion in Mr. Laird's paper or which have been suggested as the form in which the commercial companies should issue non-cancellable policies.

I call attention to it, for it seems to me non-cancellable insurance is being discussed today, because there has been a public demand for a policy which should not be subject to cancellation at will. That demand has reference not merely to the question of providing life annuities to permanently disabled patrons of the insurance companies, but to giving them a contract under which they will have—as they would express it in the language of the street—"a run for their money." You take a man who has paid twelve years under a given contract, paid a \$60 premium—\$720 in premiums altogether—and he puts in a claim for four weeks, gets a \$100 check back and a cancellation notice without explanation; he doesn't like it.

As for the use of the cancellation clause, we all understand about it, and I am not criticizing the clause. It has been a necessary clause in the development of the business as far as it has gone, but it seems to me one tendency of the business in the past has been to magnify death benefits and the double or triple indemnities which would be paid for death incurred in this fashion or that or some other, and thus put some considerable cost on the companies for the benefit of a comparatively few of their patrons, while ignoring what is in reality the true need of the public—that is, the need for weekly indemnity coverage. The man who at 30 or 35 in good health takes a policy and pays a premium year after year is neither an actuary nor an underwriter. He says: "I need health insurance; I am going to take this protection, and if I ever get typhoid fever or any other disease, I will have something to depend upon to help pay the doctor and the nurse." He goes along 15 years; he has perhaps a little claim of three weeks, and in your blank you ask the doctor if the man's health is impaired. He says "Yes" and cites the impairment, and the man gets a cancellation notice. Then arises what Mr. Laird calls "dissatisfaction with the health insurance idea." I think, therefore, we should consider this question of non-cancellable insurance from the standpoint of giving the broadest possible service to the public, not merely in connection with a certain type of disabilities which bring great loss through their being permanent and lasting over a long period of years, but in connection with those losses which arise from temporary disabilities against

which men wish to be protected, and the protection which they don't wish to have withdrawn just prior to their coming down with the sickness in question, as can be done on the ordinary commercial form through refusing to renew, or the use of the cancellation clause. Are we to develop non-cancellable insurance to cover the frequent needs of the great majority of our patrons, or merely the occasional (greater) need of a minority?

Just one more word—I presume, undoubtedly, when you discuss premiums and reserves, the minds of all of you are tending toward some statutory rules for the calculation of reserves on policies which are non-cancellable. That becomes perhaps of added importance, the reserves which should be maintained for the protection of the companies and their policyholders, in connection with taxation questions. I just want to leave with those who are responsible for the development of that subject the thought that there must necessarily be elasticity in the establishment of statutory reserves, whether you are dealing with your problems or the problems of such a company as the one I represent. Otherwise, you put yourself in a position where if you establish a given reserve for a given type of contract you can not alter your contract without altering your reserves, so if you have a fixed reserve, you can not change the general type of your contract.

If we had adopted in the accident and health business, or in the life insurance business, fifteen or twenty years ago, a standard form of policy, as has been here suggested—standard benefits in every respect—we might have thought at that time that we had learned all there was for us to know about insurance, and we could perfect a policy which would be ideal and establish it by law as a standard. To have done so would have been to put a stop to initiative and to the development of lines of service which have been most valuable to the public, as, for instance, in connection with this very permanent disability provision which we are indirectly discussing, as it has been embodied in contracts of life insurance.

We can not approach the question of proper reserves, or the establishment of the statutory reserves for a type of insurance different from that which has been issued in the past (because non-cancellable), without bearing in mind, of course, that if you get a rigid reserve, you will limit initiative when it comes to dealing with the development of non-cancellable business in the future.

It has been emphasized here that you are entering on an experimental field, with no past experience to guide you, and must surely play safe. That very situation points the need of flexibility of standards so that the business can be shaped to the public needs, as those needs are disclosed and experience justifies.

MR. A. P. WOODWARD (CONNECTICUT GENERAL LIFE INSURANCE COMPANY):

In listening to the gentlemen who have discussed these papers this morning it seems to me that they may be roughly divided into two groups, those who believe that the Manchester Unity experience should be adopted as the basis for premium tables for non-cancellable policies and those who think that the experience of the American companies under cancellable forms of policies should be the basis adopted.

In that discussion I have heard a great many references made to the cancellation factor. I believe the late Mr. Messenger in the paper prepared some years ago stated that the Travelers' experience indicated that the cancellation amounted to about 2 percent of the risks. Both Messrs. Laird and Cammack referred to that statement, and I think a moment or two ago Mr. Maverick said that while he had adopted Mr. Laird's suggestion, the experience of his company indicated that cancellations were materially lower.

With the exception of a reference made by Mr. Flynn, and which he did not develop, no one has touched upon another condition of commercial business which, it seems to me, has a material bearing upon the question—that is, that cancellations and those non-renewals which are equivalent to cancellations should be grouped together. Owing to the form of reports of commercial accident and health business no distinction is made between the policies that are discontinued at their expiration through some action of the insured and those policies that are discontinued because the underwriter does not wish to continue on the risk. The policy is written for a term of twelve months, terminating on the 25th of May, and some weeks before the 25th of May the underwriter reviews his experience on that risk; he reexamines the application; he may have an investigation or a medical examination made of the risk, and if for any cause he finds it impaired or undesirable, he does not continue. The company does not cancel it; the policy does not lapse. It simply terminates by expiry of its term. Again, many policies are neither cancelled nor terminated, but are modified at the insistence of the underwriter to restrict liability because of some physical impairment that has developed. That constant exercise of selection each year on the business I believe has a material effect in weeding out impaired risks, and especially the ones which might otherwise develop into serious claims running for long periods later on. From my experience I feel very certain that they amount in the aggregate to more than 2 percent of the risks. That factor is one I think that should be studied carefully if any attempt is made to modify the Manchester Unity experience by the experience of the American companies under their commercial policies.

I don't feel that I can add anything to the information which the industry of Mr. Laird and Mr. Cammack has marshaled for your

consideration, nor can I add anything to the conclusions which they have drawn from those facts. Mr. Laird says that this non-cancellable policy is a contract under which the payments for accident claims will represent 15 percent to 20 percent of the losses, and that the balance of the losses will be for sickness. I think this is an extremely conservative estimate of it. It is certainly 80 percent and probably more sickness insurance. I am reminded of a conversation I had several weeks ago with a prominent underwriter touching on this form of contract. He said: "You know, to have a claim under a life policy the Insured must die; under an accident policy he has to meet with an injury, but for a sickness claim all he needs is a policy." That is the crux of the situation. Sickness in a very large percentage of cases is a subjective condition. I say to you, "I feel so badly this morning I can not work," and, therefore, I stay home. You may think I am faking. You may believe that I am perfectly able to work if I only would, but that belief is very far from the measure by which facts are tested in a court of law. You can not prove that I am not sick, and being a subjective condition and not susceptible of tangible proof, it seems to me necessary for sound insurance practice that through some device the Insured be made either a co-insurer or that the carrier of the insurance must be able to exact some penalty if the Insured takes advantage of the situation. Under the commercial contract the penalty that has been exacted is the termination of the insurance if the underwriter believes that he has been taken advantage of.

When you deal with a form of policy that can not be terminated, that is to run for a long term of years, I feel that the only way that the policyholder can be made a co-insurer is to provide for some waiting period—that is, there must be some period of time where he must bear the full loss before the benefits under the policy shall be payable—and this, it seems to me, is necessary to eliminate the constantly occurring trivial claims which I think we are bound to expect under the non-cancellable contract providing full coverage from one day up.

It seems to me that we should keep constantly in mind that the first and highest duty of the underwriter is to guard the solvency of this institution of insurance, so that twenty or thirty years from now we can fulfill broadly and liberally the promises we are making today. I don't share all of the fears of that group of accident and health underwriters to whom Mr. Laird referred as looking upon this as a dangerous innovation, but I do feel that it is fraught with grave danger unless it is approached in a spirit of cooperation and study, and from a conservative point of view until we know more about it.

MR. ARTHUR WATT (SOUTHERN LIFE AND TRUST COMPANY):

I was asked to say something on these two papers. Unfortunately the papers were not received in time to permit me to prepare

any written discussion, but a few thoughts have occurred to me in listening to the previous discussions. I would like to make this general remark in regard to the papers—and I think it is true equally of both papers—that they give us for the first time something tangible, something definite regarding non-cancellable disability insurance to go on in looking to the future. I have read Mr. Cammack's paper with a good deal of interest, and I think that it is an exceedingly fine paper. I should say that it is entitled to be called a "classic," and in the future will probably be ranked as such. Mr. Laird's paper contains some very valuable underwriting hints. The practical side of the business appeals to me at least as much as the theoretical, and in my own work I try to have an understanding both of the actuarial and the underwriting problems involved. Mr. Maverick may draw a distinction in his mind between the skilled and the unskilled actuary, but I venture to say that in a large measure so far all that has been done is imperfect and of necessity at a later date will be susceptible of considerable revision.

The two most important questions we have to determine are: (1) What is an adequate gross premium rate to charge, and (2) What reserves should we hold? It is well to bear in mind that the coverage has been agreed upon. The policy contracts that are practically agreed upon by all the companies are broad in their terms and the underwriting practice is to be liberal. I feel that it is a safe principle under the circumstances to be conservative, in the beginning to take the benefit of the doubt, because, of a certainty, later on under those contracts we will have to be liberal in paying claims. I have had, perhaps, more experience with disability claims under life insurance policies than under accident and health policies, and I recall that when the disability coverage in the life insurance contract was largely the waiver of premium and instalment option the claims were few. When we changed that and added the annuity option, there was an appreciable increase in the number of claims. One thing that has struck me, especially in connection with disability under life insurance contracts, is the number of unreported cases brought to my attention for the first time when the policy became a claim through death. In a number of these cases the insured had been totally and permanently disabled for a considerable length of time, perhaps one or two years. He had the disability privilege in his policy granting waiver of premium and an annuity option and did not avail himself of it, chiefly because he had forgotten or was unaware of the fact that his policy contained a disability provision.

Now, after considering that and after considering our own experience on disability claims, I very much doubt if the disability premiums that we are charging to life insurance policyholders are adequate. It has been well said that there is a vast difference be-



tween disability coverage under a life insurance contract and the non-cancellable accident and health disability coverage. One is the main contract and the other is just a feature of a contract, and it is my opinion that the premium rates which may be deduced on the basis of the net premiums contained in Mr. Cammack's paper are really about the lowest that it is safe to charge. I am glad that Mr. Cammack did not recommend a table of gross premiums, because I am frank to say that I believe the rates of premium should be perhaps larger than we would think absolutely necessary. I am influenced by the consideration that the contracts are going to run for a good many years, and it is well in the beginning to play safe. The actuarial committee appointed by the Bureau of Personal Accident and Health Underwriters, after examining carefully all available American data, reached the conclusion that it was not sufficient to follow experience in this country in computing premium rates, because that experience was based on cancellable insurance with benefits limited to fifty-two weeks. The best experience available was found to be that of the Manchester Unity of Odd Fellows. Most, if not all, of the British companies writing non-cancellable insurance base their rates on that experience. The experience is very complete, and, while it may not suit conditions in this country exactly, it is probably as close to actual sickness experience in the United States as the American Experience table is to actual mortality experience among insured lives. If the Manchester Unity sickness experience is higher than is likely to be shown in practice under non-cancellable insurance in this country, the margin is not any greater than ordinary business prudence demands. We don't know what the future of this business is going to be. It may be something vastly different to any accident and health experience up to this time, and I think it would be well for us to err on the side of safety in the beginning. If it should ever be possible to reduce premiums, I think that would be all right, but it would be unfortunate if we should later on have to increase premiums. And so I am for a premium rate just as large as the "traffic will bear," and I don't think the premium rates that would be based on Mr. Cammack's net premiums would be too high in practice, particularly at the older ages. On that point I appear to differ somewhat from Mr. Cammack, who drew attention to the fact that the premiums might be too large at the older ages. I can not feel that way from my own limited experience both with disability under life insurance contracts and accident and health contracts. I feel that the premium rates ought to be full at the older ages. If there is any error, I would like to see the premiums err on the side of being smaller at the younger ages and larger at the older ages.

There are a good many points in Mr. Laird's paper which I believe we should study very carefully. Mr. Laird has "boiled down" some very wise ideas in regard to underwriting practice, and I feel

that it is sound in principle and a paper that I can personally study minutely and use to advantage in office work.

Now, as regards reserves, I do not pretend to know what is an adequate basis, but it seems to me from all that has been said that the only basis that we ought to consider for a minute is the Manchester Unity Experience. Whether that is going to be at all parallel to our own experience none of us, of course, know, but I do believe from practical considerations that the reserves are not too great, and that in all probability not more than enough to enable us to get by safely. I think it is important to bear in mind that as the business is rigidly selected in the beginning we will appear to make a profit, but that that profit should be scrupulously reserved as far as possible for future contingencies.

MR. MERVYN DAVIS (THE EQUITABLE LIFE ASSURANCE SOCIETY) :

As a member of the committee that collaborated with Mr. Cammack in preparing data for non-cancellable accident and health insurance, I find myself in full accord with those sections of the paper which refer to the determination of the premiums and reserves, and I find only one section which appears to me as calling for comment or criticism, and that is the section on page 11, entitled "Claim Reserves." It is perhaps a little unfortunate that Mr. Cammack has not given the same lucid exposition of the methods used in compiling this table of claim reserves as he used in the remainder of his paper, and it perhaps might be well to say a word on the possible way in which these tables were compiled.

The curve of sickness described by Mr. Cammack on page 6 is made up for each age, the ordinates of that curve representing the probability that a man of the age under consideration will get sick, and that he will be sick for the given duration, which is measured by the abscissa, the areas of that curve therefore representing the amount of sickness experienced in the time cut off by the two ordinates; and the ratio of the total area to the ordinate at any point will represent the expected length of the duration of the sickness which has already lasted for a certain given duration, and by that means the claim reserves can be constructed. When we come to take an actual case and try to construct that curve, we find that it slopes very rapidly at the beginning where the ordinates are large, and that with the increase of duration the ordinates are comparatively small. In other words, after durations of, say, two years the ordinates of that curve which furnish the fundamental facts for the construction of this table of claim reserves are very small.

Now, any small errors in that curve at these latter durations will have a very small effect on the premiums calculated for the contract, but they will have a very considerable effect on the claim reserves deduced for those durations, and this claim reserve table has, I believe, been criticized quite severely for showing too high reserves for

the longer durations. To my mind they show entirely too small reserves for those long durations. I think it can be pretty safely stated that any man who has been sick for more than two years is totally, permanently disabled, and I think that the claim reserves for claims of duration of more than two years should very closely approximate the reserves that have been put up by life insurance companies for total, permanent disability.

Mr. Cammack states that the table of reserves has been adjusted so as to merge in it an ultimate table for disabilities existing more than seven years, and that at the age of 35 this table departs but little from Hunter's Table. Now, I personally am of the opinion that Hunter's Table is not a safe basis for the calculation of the reserve under a totally disabled life, that has been totally disabled for two or more years. The rate of mortality among disabled lives depends a great deal more on how long the disability has run than on the age of the disabled life. It is very high in the first year, considerably less in the second, less in the third, etc., so that for the strict, correct calculation of disability benefits it is, strictly speaking, necessary to use a select table of mortality among disabled lives. That would mean that the calculation would become almost unworkable. Mr. Hunter found—as he stated in his paper—that substantially the same premiums for disability benefits can be obtained by using an aggregate table omitting the experience during the first year of disability, since that gives practically the same results. That means that Hunter's Table as used furnishes the correct reserve for a claim on a disabled life, at the time that claim arises, but at later durations, owing to the fact that the mortality among the disabled lives decreases with the duration, that reserve is not big enough. So my criticism of this table of claim reserve is that it is, as regards the reserves on the longer durations, based on figures which a small error would throw completely out, and that higher reserves should be maintained for these long durations.

It has been rather interesting to follow the development of the work done in connection with the calculation of non-cancellable disability rates. The first table as prepared by the committee met with a very strenuous objection as being practically worthless. The claim was made that the rate of disability among industrial workers in Great Britain under contracts paying 10 shillings a week would be entirely different to the rate of sickness that would be experienced under the contracts issued in this country, and the objection was raised to all the sets of rates prepared as being entirely too high. Now, apparently the attack is shifted, and it is admitted that for the no-exception policies these rates are practically all right, and if anything they are a little bit low, but that the amount allowed for the different exclusion periods is not enough, and that the present rates proposed for the two, four and thirteen weeks' exclusion period, particularly the thirteen weeks' exclusion period, are entirely too high.

Mr. Maverick has based the calculation as to the amount that should be allowed on the experience under a 52-week contract with an arbitrary addition to those claims which lasted 52 weeks, and I can not see where his figures can be taken as refuting the A. H. J. Table as adjusted by Mr. Cammack, particularly in view of the fact that, as pointed out by Mr. Craig, the value of the exclusions as shown in Mr. Cammack's Table II agree very closely in the younger ages with the experience actually developed under the commercial contracts.

MR. J. M. PARKER (AETNA LIFE INSURANCE COMPANY):

Mr. President, I appreciate your courtesy in asking me to write a discussion on Mr. Laird's paper, but I have been away on an extended trip and I did not receive that until yesterday. I have had no opportunity of studying it, and I am afraid I can offer no constructive criticism; so, also, in regard to Mr. Cammack's paper. Col. Wolfe has given Mr. Cammack the credit of the courage of his convictions in changing his mind and expressing some thoughts quite different from many of those embodied in the report of the Actuarial Committee on Non-cancellable Insurance. I have not had an opportunity of comparing Mr. Cammack's paper with the previous report.

There is one point, though, which impresses me and which I hope you gentlemen have not lost sight of: the point raised by Mr. Craig in regard to the increasing rate of sickness and what we may anticipate in the future. In the last three or four years we have all had a certain amount of experience in the payment of health claims. It may be well said that that experience is too narrow, and that it does not amount to much, but from the practical underwriter's point of view the money has been going out pretty rapidly, no matter what theory there may be as to the ultimate swinging of the pendulum back to normal. It seems to me that the underwriters and the actuaries should give most careful consideration to what may be expected in the rate of sickness in the future, no matter whether they have used the Manchester Unity experience as a basis or the American experience.

MR. JAMES F. LITTLE (THE PRUDENTIAL INSURANCE COMPANY OF AMERICA):

I don't know, gentlemen, whether after I have spoken you will think of the old adage, "Fools rush in where angels fear to tread," but while I can not claim the experience in accident underwriting that many of you gentlemen have had, I have had a little of it from time to time, and the discussion this morning has interested me and made me think of one or two little matters that I have come across which might perhaps throw a little sidelight on the matter under discussion.

The chief point seems to be the question as to what deduction from a coverage for the whole period of sickness should be made for paying no benefit for the first 13 weeks, and that gets us into the difficulty that we find where the item we want is the difference between two relatively large and not very unequal amounts. The result is that if we estimate correctly, say, the total sickness and make a 10 percent error in our estimate of the first 13 weeks, we will, at the younger ages, have perhaps nearly a 100 percent error in our estimate of the sickness that we propose to cover. That, in part, is why the differences in the suggested premiums are so radical.

Mr. Cammack, in speaking of the Manchester Unity experience, suggests that, although it was based on experience on industrial classes mainly, it would not prove inapplicable to commercial classes. I don't know that that is altogether justified. I had what might be described, from the point of view of an accident underwriter today, rather an alarming experience in England. I was associated with the late Mr. R. P. Hardy in valuing a number of Friendly Societies in England, and he never used for his actual final valuation anything but rates of sickness that were based substantially on the concern's own experience, for the reason that none of them was found to approximate closely enough to a standard table to render the standard table applicable. For the machinery of valuation he had developed an exceedingly skilful method. I remember one case that gave me considerable cause for thought. It was an experience of an association of law clerks, who would represent a high-class clerical force. This association's experience was taken out for a valuation that I made with Mr. Hardy, the experience being divided into the "first six months" at what was called full pay—not the full salary, but the full allowance; they call it full pay there—"second six months" at a reduced pay, and "remainder" at a still further reduced allowance.

Now, the law clerks in the first six months of sickness had an experience—I am sorry I haven't got the actual figures—but it was tremendously below the Manchester Unity. It was quite a low percentage. Possibly it was as low as 25 percent, but I can not be sure of the exact figure. I do know that it was exceedingly low as compared with the standard table, but when we came to the experience for the "remainder" after twelve months, it proved greatly in excess of the Manchester Unity. Now, then, if we assume that some weight should be given to this peculiar experience, you can see how enormously it would reduce the proportion of the total experience that was applicable to the first 13 weeks; and when I say that I doubted whether Mr. Cammack was entirely justified in claiming that the experience of the Manchester Unity, which is mostly an industrial experience, would be applicable to our commercial classes here, my feeling was that it might not be applicable

because it *overstated* the proportion of sickness that would be found in the first thirteen weeks. I am not expressing an opinion; I am merely offering as a suggestion the possibility that the proper adjustment of the Manchester Unity figures might be not in the direction that some of us have supposed.

Mr. Cammack has suggested that the Manchester Unity is a little too high at the old ages; firstly, because of some virtual superannuation being included; and, secondly, because an aggregate table had been used. We must remember, however, that while some excess sickness, on account of using an aggregate table, should be deducted at the older entry ages, an equal amount must be added at the younger *entry* ages for the older *attained* ages for the same reason. If we are to lower the rates for the older entry ages, we must increase the older attained age rates for the younger entry ages. In other words, a single rate of disability for any attained age, irrespective of entry age, will not suffice. As to "virtual superannuation" being covered by the Manchester Unity figures, I fear it is only too certain that the same condition will obtain under the non-cancellable policy.

I have had recently a suggestion that caused me to look up some disability material—the suggestion being that we should offer annuity bonds in convenient amounts so that they could be used for pension-fund purposes, it being obvious in such cases that there should be attached to the usual deferred annuity contract a proviso that the annuity would vest upon total disability. Now, when it comes to issuing total disability benefits on life insurance contracts just as a small incidental benefit, I have always been quite content to use Hunter's Tables, after studying carefully the manner in which they were made up; and after checking up with the experience of our own company, which is now quite large, I have no hesitation in saying Hunter's rates are quite sufficient. But when I was faced with the question of what we would charge for deferred annuity, I felt that it was a different thing; the amount of the deferred annuity will generally be greatly in excess of the average amount that could be derived from one percent per month (which is the usual disability income benefit) of the amount of a life insurance policy. Before fixing rates for disability under deferred annuities we decided to see what it would cost supposing these people retired, owing to disability, at the same rates as teachers. It developed that teachers' disability rates under these circumstances were, at the important ages, much in excess of Hunter's disability rates. This I regard as a perfectly natural result.

Take the case of my own company—the Prudential. Our average ordinary policy, the business being written mostly by industrial agents, is decidedly below that of a company writing only ordinary life insurance. We consequently expect to have a decidedly lower experience on this disability income than the purely ordinary com-

pany, because the great majority of these policies are for a thousand dollars with \$10 a month disability income. The lower the compensation, the lower the disability rate is likely to prove. A man can't retire on \$10 a month, but can on a hundred dollars a month. Now, to get a hundred dollars a month on a life insurance policy, he has to take out a \$10,000 policy at a premium seldom much less than \$300 a year, and it is not every man that can finance that. But if he takes a non-cancellable accident and health policy for \$100 a month, at the younger ages, the cost runs as low as \$20 per annum.

I will repeat, if those who were at the Actuarial Society's meeting last week will permit me to, some facts from the Prudential's experience that bear on the question of selection. We issued during the years 1913, 1914 and 1915 policies with a waiver of premium disability benefit, if applied for, and for which an extra premium was charged. Following the mutualization of the company, we decided during 1915 that from the commencement of 1916 these additional premiums would not be charged, and not only those policies that applied for the benefit, but all other policies, with few exceptions, would be put on the same footing. The disability benefits were also enlarged to include the payment of the sum insured in instalment upon disability. We have since investigated the experience on policies issued in those years, comparing the experience on policies on those who applied for the waiver of premium (which is a very small benefit) with those who hadn't applied, and the startling result was found that the experience on those who applied for the benefit is running close to three times as great as the experience on those who didn't apply for it.

Now, we have recently, like other companies, added in the disability income feature, for which we charge an extra premium representing the excess cost of this feature over the cost of the regular disability, as we call it, included in the policies generally. As we expected, we are having a higher rate of disability on policies with the disability income included. These facts are very pertinent to the question of selling a non-cancellable accident and health insurance policy, and the fact that we have a disability rate amongst teachers, who are a fairly high-grade class, higher than Hunter's disability, ought to be at least a danger signal when we are considering what may develop.

Some gentleman referred to the fact that in the Manchester Unity malingering was greatly reduced by reason of the fact that the individual members of the different lodges realize that the malingering costs them money personally, the English workmen's budget being a very closely figured affair. He often hasn't more than a penny a week margin, sometimes not that much, and he does look very carefully after the cases of malingering. But if you read up some of the cases under the Employers' Liability Act—the

Workmen's Compensation—you will read of many cases where the companies' doctors would decide there was no disability, but the man would claim some such trouble as a sore back—his back refused to stand the strain of the attempt at work—and it was almost impossible to get the courts to turn down the case. Ultimately it was often evident that the claim was fraudulent, but meantime the claim had been paid. The condition, you see, is very different where the payment is to be made by a company, and that is the condition that will be faced here on the policies we are discussing.

I think you will see where I am aiming. My own feeling in the matter is that the Manchester Unity rates can not be accepted as being quite sufficient to cover the risk. They might do for tentative rates, but I am strongly of the opinion that it is just as likely that they will prove far too low as that they will prove far too high, and in that I concur very cordially with Col. Wolfe when he said we are setting out on an uncharted sea. By the way, I might mention that in England it is assumed as a matter of course that where a stock company is selling this sort of insurance a higher rate of disability will be experienced than in the case of Friendly Societies.

Another feature that is very important is the fact that the Manchester Unity experience is one on reduced pay, usually after six months, with a further reduction to what is known as quarter pay, though not always exactly a quarter, after twelve months, and there is a very curious thing to be observed in this connection. If the reduction to so-called quarter pay leaves really substantially more than a quarter of the full allowance, the disability experience from long-continued sickness is apt to be relatively heavy. If it is made small—sometimes it is made arbitrarily small so as to offer no inducement to malingering—the experience on long-continued sickness will be light. With this in mind, we must remember that the policy we are talking about is a policy on which the compensation remains fixed for the entire period of illness.

Regarding Mr. Maverick's analysis of his experience, I certainly agree with Mr. Flynn, who said that not all the actuarial ability is included in the so-called actuaries. I wish I had been able a little better to follow Mr. Maverick, but I am not an expert accident and health man. It struck me that he had done a remarkably skilful piece of work. One thing, however, puzzled me a little, and that was in reading Mr. Laird's paper, which I saw only this morning, I noticed he stated that originally these cancellable policies were issued with a 52 weeks' maximum payment—I presume that was on account of any one sickness—later on that was extended to 200 weeks, and some have since been written without a limit. In making up an experience on cancellable policies it seems to me we should exclude anything with a limited period, because the amount of excluded sickness must be wholly unknown. It should be ob-



served that it is not merely when we cancel a policy we get rid of a bad risk. If a man knows his policy may be cancelled, and that by claiming the maximum he will probably have his policy cancelled where the claim is regarded as doubtful, there is a strong disposition to hold off from claims that are not absolutely justified; but if the insured knows that any claim, however preposterous, that he makes will not affect his right to make future claims, there will naturally be a considerable addition to claims, not merely under policies that would normally be cancelled, but on policies where with the cancellable provision the policyholders are careful not to claim too viciously in order that their policies will not be terminated. Of course, the extent of such additional claims is something we can not estimate. I think it was a very excellent thing that Mr. Maverick did to try and figure something from the available experience, because I have always in my own work tried to get the best data I could to work with, no matter how poor and insufficient it might be. The Manchester Unity is not, a priori, a table we should expect to fit conditions exactly, and any further light on the subject is very desirable.

Mr. Johnson drew attention to one point that is of consequence. He said that the cancellable accident policy has produced a great deal of dissatisfaction. And the reason is that there wasn't room enough in it for sufficient claims, a clear indication of the uninviting possibilities of the new form of contract. In conclusion, may I hope that the accident and health companies taking up this business have plenty of surplus funds on hand—they may need them.

MR. S. MILLIGAN (METROPOLITAN LIFE INSURANCE COMPANY) :

This Society is to be congratulated on having had presented for the guidance and education of its members such a paper as the one now under discussion. Mr. Laird has so completely and conservatively covered the subject that any remarks one may make can only be of a supplementary nature.

While the development of non-cancellable accident and health insurance has been comparatively recent in this country, it is interesting to find that this form of insurance, issued in conjunction with life policies, was in operation prior to 1870. None of the companies which granted such a combination seem to have made a very great success of the experiment, and they are mostly all now a matter of history.

The growth of the total and permanent disability feature in life policies has had as much to do with the revival of interest in non-cancellable accident and health insurance as any other cause. A few years ago waiver of premium was the only disability benefit in a life contract. The next benefit was one which provided for the payment of the face of the policy in installments in case of disability. This was followed by a provision for the waiver of premium

plus a disability annuity of a certain amount per month per \$1,000 of insurance. The first payment under this disability annuity being deferred until the end of six months, or longer, after receipt of due proof. Recently a further amendment has been made, where, in at least one company, a disability annuity of \$10 per month for each \$1,000 of insurance is payable at the end of the first month following receipt of due proof. It is further provided that if the insured is totally disabled for three months such a fact will be construed as evidence that the insured, as far as the policy is concerned, is totally and permanently disabled and the disability benefit payable. This latter benefit is practically a non-cancellable health and accident contract, with a three months' elimination period, the only difference being that under this contract, if total and permanent disability is proven before the expiration of the three months, payments commence as of that date.

It seems now as though the issuance of non-cancellable health and accident policies would become practically universal among the more substantial companies conducting health and accident business. If this is so, is it not possible that certain reserve valuation requirements will be made necessary by the various State Superintendents of Insurance, and that such a disability feature as outlined above will, even when incorporated in a life policy, be looked upon as a non-cancellable health and accident contract, which must be valued as such and reported through the miscellaneous blank? If it is argued successfully that it is not an individual health and accident contract within the meaning of the law, but that it is a part of the life policy, this would mean that it might be necessary to consider the reserve on such a feature in calculating the surrender value allowed under the life policy. Again, if the latter interpretation were adopted and a company issuing such a contract in connection with life policies also desired to issue a three months' elimination non-cancellable health and accident policy, it would be rather difficult to make the two premiums for two such similar contracts comparable, as the one issued with the life policy could be issued with very little expense, and would, therefore, require a much lower loading than the policy issued individually.

There is a tendency to assume that disability premiums for benefits issued in connection with life policies do not require to be as high as the premiums for similar benefits under health and accident policies. It is contended that if a loss is incurred there is sufficient margin in the life premium to make good the deficiency; also that the experience will be more favorable under the benefit issued as an incident of a life policy than under an individual health and accident policy. It does not seem correct to depend upon profit from one class of business to offset a loss under another, considering, also, that as the disability benefit under the life policy is extended, thus necessitating an increased premium, the insured must be canvassed

and sold on the disability benefit just as he is on the life coverage, the result may be that the insured, having a full knowledge of his rights under the disability clause, will not hesitate to make claim, and that the more favorable experience will not be realized.

It seems to me that the waiver of premium is the only disability benefit which it is logical to include in a life contract. The common disability annuity of \$10 a month per \$1,000 of insurance necessitates the carrying of such a large amount of insurance in order to give any sort of adequate insurance that its effectiveness in relieving financial distress in case of total and permanent disability is more academic than real. It would seem to me, therefore, that the best solution for a company writing both life and non-cancellable health and accident insurance is to confine its total permanent disability benefit in the life policy to the waiver of premium clause, and to issue in conjunction with the life policy a separate non-cancellable health and accident policy with a three months' elimination period, and confine the issuance of individual health policies without the requirement of a concurrent issuance of a life policy to those with a two weeks' or one month's elimination period. Another reason for this suggestion is that the premium for the three months' elimination policy is necessarily low and can not very readily stand a high acquisition cost. Also I am not yet convinced that the proposed rates for this form of coverage are sufficient, if policies are written separately with the attendant risk of adverse selection. Under policies with a two weeks' and a month's elimination the proposed premiums are higher, and theoretically, the writer thinks, contain a much larger margin of safety.

It was very interesting to hear of the experience of the clerical group in England, of which Mr. Little has just told us. This experience was very similar to that of the Metropolitan Life on a non-cancellable group policy issued on the lives of its own employees. This policy was issued in 1914. For the four years 1915 to 1918, inclusive, our actual male claims were about 71 percent of the expected by the Manchester Unity A. H. J. Table during the first three months of sickness; for the other periods, second three months, second six months, etc., the actual claims were considerably over 100 percent, running in some instances over 200 percent. The probability that the experience under the three months' elimination policy will not be as favorable as some of the speakers here today seem to expect was discussed by Mr. Little. In this connection the speaker agrees with practically everything that Mr. Little has to say on the subject, and in addition would like to repeat an observation made by Mr. Page, Vice-President of the Travelers, at a previous discussion of the subject, where he pointed out that under a three months' non-cancellable health and accident policy it would appeal particularly to those people who for some reason or other anticipated at some time in their life a very long duration of sick-

ness. He also drew attention to the fact that under the three months' elimination policy, if a man were sick for two months or two months and a half, and drew no benefit, he would be rather dissatisfied with the policy, and if he fully recovered from such attack would very likely cancel that policy and take a policy with a shorter elimination period. The man, however, whose physical condition was impaired by the sickness could not take a shorter elimination policy on account of the fact that he could not pass the medical examination, but would continue under the three months' elimination; thus after a few years the experience would likely be bad on account of the adverse selection against the company.

The present-day commercial accident and health contracts, while containing many good features, have many objectional characteristics which seem to be inherent in this form of business. The expense rate connected with them is very high. The cancellation clause is necessary if the cost is to be kept low, and competition has been so keen that one frill after another has been added until today there is very little profit in conducting this business. Just as term life contracts are unsatisfactory, so must also be cancellable health and accident contracts.

The insuring public are becoming better educated in insurance matters and it is only natural that they should demand a health and accident insurance contract which is non-cancellable except for failure to pay premiums. Such a contract can be made quite feasible and profitable (although it is admitted to be a most dangerous business) provided the companies that intend to issue such a contract make haste slowly. The life companies with a knowledge of mortality, which it will be many years before the other companies can duplicate in their knowledge of morbidity, are still quite contented to calculate their premium rates on tables of mortality which call for claims at least 30 or 35 percent more than the companies expect, and it would seem to be best for the companies now breaking into the non-cancellable health and accident business to charge rates based upon morbidity tables at least 25 percent higher than what may reasonably be expected.

It will be many years before a company can tell definitely whether or not its rates are sufficient. The loss ratio for the early durations will be low, but this must necessarily increase, as the natural increase in the morbidity rate will eat up in later years a larger proportion of the annual premiums.

Before the issuance of non-cancellable health and accident policies becomes universal it might be wise to study the present standard provisions with the thought in mind of making them more applicable to non-cancellable policies. Under standard provision 7, for instance, affirmative proof of loss must be furnished to the company within 90 days after the termination of the period of disability for which the company is liable. Under a policy where you have not

the right to cancel in case of excessive claims it would seem as though this 90-day clause was too liberal. Supposing a person recovered and went back to work for a few days and then became sick again, affirmative proof of the first sickness not having been sent to the company, would the insured not be tempted to forget the few days that he was back to work and treat the second sickness as a continuation of the first? The only safe basis would be to have proof of loss submitted to the company on the first day the insured returned to work, or as near thereto as practicable.

Mr. Laird advocates that if an applicant with a history of hernia is accepted there should be a provision in his contract modifying it so that it will exclude disability due directly or indirectly to this hernia. For this particular impairment this does not seem to be a very satisfactory solution. It may be a good plan under certain conditions, but it would seem preferable, for the present at least, to either give full coverage or reject the applicant altogether. In an investigation made recently into the mortality experience among policyholders with a history of hernia, those who wore a truss at the time of application had a mortality about 20 percent greater than the expected, while those that did not wear a truss had a mortality of approximately 100 percent greater; but the peculiar feature brought out was the very small proportion of deaths which were directly due to hernia.

I can not quite agree with the author where he states that the non-cancellable disability policy is essentially a contract for the benefit of the man himself. It would seem to me as though it was as much for the benefit of his dependents in case he becomes totally and permanently disabled.

MR. E. E. CAMMACK (AETNA LIFE INSURANCE COMPANY) :

My object in writing this paper was to invite a full discussion on the subject of "Premiums and Reserves for Non-Cancellable Disability Insurance." This object has been attained, and I want to express my gratification and appreciation to those who have participated in the discussion.

Both Col. Wolfe and Mr. Maverick raise objections to the use of the Manchester Unity tables, and I shall do nothing more than briefly to reply to the points they have raised, because practically all that I would have said has been said by others, and with greater authority.

They both claim that the tables in my paper depart very materially from the tables recommended by the committee recently appointed by the Bureau of Accident and Health Underwriters to report upon this subject. Now I feel that a false impression may have been given here. I find that if my net premiums are loaded 45 percent of the gross (and this does not seem an unreasonable loading, taking into account the necessarily high expenses in trans-

acting this class of business and making some allowance for possible unfavorable contingencies), there would result a scale of gross premiums almost identical with the gross premiums recommended by that committee. The reserves in my paper are, it is true, lower than the reserves recommended by the committee—very much lower for policies with a long waiting period. It would probably have been impossible for some years to put up the reserves recommended by the committee from gross premiums after deducting expenses and cost of insurance. In other words, reserve requirements would have resulted in a drain upon a company's surplus. The conservative may find no fault with this, and, indeed, some companies, in a class of business about which we know so little, may deem it advisable to lay aside reserves which experience may show to be more than necessary. In that way they are providing for unfavorable contingencies, while in the event of the experience turning out as well as expected at the outset the worst that has happened is that profits have been deferred. My own feeling was, however, that the reserves as recommended by the committee were rather too high as a minimum standard.

Col. Wolfe has laid great stress upon the New York Life premiums for the total and permanent disability benefit in their Life contracts. Several speakers have called attention to the fact that the experience under the total and permanent disability clauses of Life companies, where the benefit is limited to \$10 a month for each \$1,000 of insurance, is likely to depart very much from the experience under a Health policy issued independently of Life insurance and for a substantial amount. Col. Wolfe points out that at age 35 for a given premium some 75 percent more benefit will be granted by the New York Life than under my tables—he assumed a  $37\frac{1}{2}$  percent loading for my net premiums in arriving at this. When you come to consider how much lower the rate of expense of a Life insurance company is than that of a Casualty company (and I am surprised that Col. Wolfe should think otherwise), and when you consider the much higher rate of disability that we may expect under straight non-cancellable Health policies than under the disability clauses of Life policies, the difference in rates deduced by Col. Wolfe seems to be not unreasonable.

The main objection raised by both Col. Wolfe and Mr. Maverick to the tables submitted is that they are based upon the Manchester Unity experience instead of upon an American experience. I concur with them in their claim that the American experience should not be ignored. I think that Col. Wolfe is laboring under the delusion that American experience was ignored in the preparation of my tables. The fact is, I have used the Manchester Unity experience and modified it in the light of the scanty data we have in this country. As regards disabilities lasting longer than two years (and such cases may surely be considered as cases of total and per-

manent disability), Hunter's table was used for the older ages, and Hunter's is an American experience. At the younger ages no modification was made, nor was it thought necessary, since for long-term disabilities there was little difference between Hunter's and the Manchester Unity.

After a careful analysis of his company's experience under cancellable forms, Mr. Maverick comes to the conclusion that the net premiums that I have deduced for policies with no waiting period are reasonable ones for use in this country, but that more of the total sickness at the older ages occurs in the first thirteen weeks, and, consequently, less of the total sickness occurs after the first thirteen weeks than in the Manchester Unity. Common sense would indicate that the result of the cancellation clause upon morbidity must be to avoid a number of cases of prolonged sickness. As Mr. Craig pointed out, it is only natural that if in an experience under cancellable policies the proportion of total sickness that occurs in the first thirteen weeks of sickness is, let us say, 35 percent at every age, then it is only natural to expect that an experience under non-cancellable policies will show, at the extreme younger ages, that just about the same proportion of total sickness belongs to the first thirteen weeks, but that this proportion will grow less and less with advancing age. If you consider a group of persons insured at age 20 carefully selected at that age, the morbidity experience in the first year would surely be about the same whether those persons had cancellable policies or non-cancellable policies. But the sickness experience among that same group in the tenth policy year, let us say, may be expected to be quite different if they are insured under non-cancellable policies from what it would have been if they had had cancellable contracts. This is evident because in the case of cancellable contracts the insurance company would, no doubt, have terminated a good many policies upon impaired risks. It is evident that the effect of the cancellation clause must be to avoid cases of prolonged sickness, and that that effect grows greater and greater as policyholders grow older.

Mr. Maverick considers my One-Year-Term premiums at the younger ages for policies with a waiting period inadequate. He appeals to the practical underwriters with the naïve question as to whether they would write a policy at age 20 for a benefit of \$100 a month for a net premium of \$2.60 or a gross premium of \$5.20. Neither the practical underwriter nor what he terms "a mathematical actuary" would do any such thing. It is an axiom in Accident insurance that it is dangerous to give by itself a very large benefit for a very small premium. It was not intended that the One-Year-Term premiums should be used for the actual quotation of gross rates for One-Year-Term policies, but that they should only be used in the construction of level premium rates for long-term policies. Mr. Maverick does not show that the actual cost in the

first year under a level premium policy at age 20 would be less than the cost reflected in the One-Year-Term rates shown in my paper.

Mr. Maverick in his modifications of his cancellable experience to make it suitable for basing rates for non-cancellable insurance doubled the number of cases of disability that lasted one year and assumed that each such case would continue for another four years. This seems to me to be a very arbitrary assumption. Perhaps the absence of the cancellation clause might treble these claims or even increase them fourfold. At any rate, I fail to see why they were doubled. Furthermore, the increase should evidently be entirely different at the older ages from what it should be at the younger ages.

I was much interested in the tests that Mr. Craig made in which he showed that an increasing rate of morbidity would require approximately a constant addition to the premium for all ages. I think it might be advisable in constructing scales of gross premiums to use a constant and a percentage loading. This would be a practical way of taking care of this contingency.

Mr. Flynn has called attention to the moral hazard likely to arise under this class of insurance by reason of over-insurance. While this question is an underwriting one, I want to say that in my opinion no premiums will prove adequate to meet the results of poor underwriting which has ignored the moral hazard arising from over-insurance.

With regard to Mr. Davis's remarks upon the claim reserve table (Table IX), an explanation of how this table was deduced is given in the paper. The table follows mathematically the rates of disability shown in Tables II and III. A check upon the table can be made with the help of Table VIII, which shows that out of a given number of persons insured for given ages the number of cases of disability occurring in a year and how long each case lasts. For example, at age 40, out of 892,240 persons, there will arise within a year 12,150 claims lasting thirteen weeks. The claim reserve for a claim that has lasted thirteen weeks and which started at age 40 is \$88.40. Multiplying this by 12,150 and dividing by 892,240, we obtain \$1.21, which, by reference to Table IV, is seen to be the One-Year-Term premium at age 40 for a policy paying \$10 a month during disability with a waiting period of thirteen weeks.

Mr. Morris has called our attention to the fact that the Casualty companies usually pay the same rate of commission each year, while the Life insurance companies are likely to pay a high rate of commission on this class of business in the first year and a low renewal limited to nine years. I think a very important point has been raised here. The cancellable Health contract was strictly a One-Year contract, and I think we would be speaking more properly if we said it was rewritten, not renewed, from year to year. With the cancellable contract the agent has to rewrite the policy every year



and demands a commission each year. If the policyholder moves to another part of the country, the policy can be rewritten by an agent in the territory to which he has moved and the agent who originally wrote the risk ceases to draw a commission. But a non-cancellable Health contract is a long-term contract written at an annual premium—it can not be lapsed and a new policy taken out in its place without loss to the policyholder. If a broker or agent secures a risk in New York and the policyholder moves to California, it does not seem fair that the New York broker or agent should continue to receive commissions for the next twenty or thirty years with regard to a policy in which he can give no service. It is not to be expected that there will be the same amount of work to be done in collecting a renewal under a non-cancellable Health policy as in rewriting a cancellable contract written at a premium the same for all ages. It seems desirable, therefore, that the renewal commissions under a non-cancellable Health policy should be less than the first commission and should be limited to a fixed number of years in line with the practice in Life insurance. The renewal commission would be looked upon as deferred remuneration for securing the risk and the agent would be given a vested interest in it.

## LEGAL NOTES.

BY

RICHARD FONDILLER (OF THE NEW YORK BAR).

## ACCIDENT AND HEALTH.

SURGICAL OPERATION:—(Aetna Life Ins. Co. *vs.* Brand, U. S. Circuit Court of Appeals, Second Circuit, 265 Fed. Rep., 6.) The plaintiff's policy contained the usual clause insuring him "against loss resulting directly and independently of any and all other causes from bodily injury effected solely through external, violent, and accidental means." There was an additional provision that "this policy does not extend to nor cover any accidental bodily injury caused or contributed to, directly or indirectly, by sickness or disease."

The plaintiff had a hernia, for which he was operated upon. During the operation the surgeon punctured a certain artery which in the normal man is in a different position than in the plaintiff's person. The artery was not exposed to view and the surgeon had placed his needle while sewing up the wound exactly in accordance with his intention. The surgeon closed the puncture and the operation for hernia was successful. It developed that the puncture caused a blood clot in the artery, which subsequently made it necessary to amputate the insured's leg.

The insured claimed that the loss of his leg was due to the puncture by the needle, which was an external, violent and accidental means, and, further, that the loss was not caused by sickness or disease.

In affirming the judgment for the plaintiff, the court wrote:

"Was the surgeon's puncture accidental? Every suggested, and we think every conceivable, objection to answering this question in the affirmative, is summed up in the perfectly true statement that the surgeon put his needle just where it ought to have gone, and injury resulted solely because the artery was where it ought not to have been. At least one element of this statement is immaterial, for it plainly makes no difference that the impact or force preceding

the injury is designed by the person injured." (Quoting with approval *Lewis vs. Ocean*, reviewed in the *Proceedings*, V, 91.)

"For this case the important words of the authoritative definition of 'accidental' are that—

"If in the act which precedes the injury something unforeseen, unexpected, unusual occurs, which produces the injury, then the injury has resulted through accidental means."

"The thing that was unexpected and unusual in this instance was the perhaps congenital misplacement of an artery. We think that this element of the fact of sewing up the cut was, within the definition, as truly accidental as would have been the case had the surgeon's needle broken."

**PRESUMPTION OF ACCIDENTAL DEATH:—**(*Tuttle vs. Pacific Mutual Life Ins. Co.*, Supreme Court of Montana, 190 Pac. Rep., 993.) The insured went hunting during a snow storm in the mountains. He did not return and searchers failed to find him. His remains were found three years later, at which time it was impossible to determine how he had met his death.

Soon after the insured's disappearance the plaintiff (beneficiary) in a conversation with the defendant's local agent was informed that the latter would write for blanks. Six months later her attorney wrote the defendant of the insured's disappearance. After the finding of the insured's remains the plaintiff wrote to the local agent for proofs, which letter was forwarded to the home office of the defendant, who denied liability. In a later letter the defendant expressly stated that its letter was not a waiver of the policy provisions requiring both immediate written notice and submission of proof of claim.

The policy provided for immediate written notice of any accident, and for proof of death to be furnished within 120 days from the time of accident. These two provisions are held to be independent, in that the beneficiary must give immediate written notice, although she is not aware at the time of the circumstances surrounding the death of the insured. Giving oral notice to the agent is held not given to the company at its home office; such a provision is a condition sufficient under this policy, which required written notice to be given precedent to liability.

The court further held that the beneficiary was aware of the accident within a few days, at which time written notice should have been given to the company at its home office, although the cause of death could not have been determined, if at all, three years later.

The court rightly rejects those decisions holding that the time within which notice must be given does not begin to run until a full discovery of the facts.

The plaintiff's contention that there was a waiver of notice was not upheld. The policy provision that no agent had authority to waive, and that a waiver must be signed by an officer at the home office, is held to be a notice to the policyholder and an agreement by him, which binds his beneficiary.

There was ample proof that it was the insured whose body was discovered, but there was no evidence to establish death by external, violent and accidental means. The court quoted with approval the following from another opinion :

"The proof of accidental death is the essential prerequisite and condition precedent to the right to recover on an accident insurance policy. This is the distinguishing feature between accident policies and ordinary life policies. In the latter, to make out a prima facie case it is only necessary to show the contract after the death, . . . whereas, in the former, the condition precedent to recovery is not simply the natural death, but the death from accident. Hence in suits upon accident policies the burden of proof is upon the plaintiff (subject to the limitation that it is not presumed as a matter of law that the deceased took his own life or was murdered) to show that the death was caused by external violence and by accidental means. This is exactly what the policy or contract itself provides. . . . As mere proof of injury in a damage case will not entitle plaintiff to recover, but negligence of the defendant must be shown, so in a suit upon an accident policy mere proof of injury or death will not entitle the plaintiff to recover, but the injury or death must be shown to be due to an accidental cause."

The court directed a verdict in favor of the defendant company, concluding its opinion as follows :

"At the time the body was found it could not, of course, be ascertained whether there had been any marks on it. While there is no presumption that a man found dead has been murdered or has committed suicide, . . . it is equally true that no presumption can be indulged in that insured met death by external, violent, and accidental means.

"The insured, having contracted that the company should be liable only in case of death from injuries caused by external, violent, and accidental means, the burden of proving that the case is within the terms of the policy rested upon plaintiff, and this burden, in our opinion, was not sustained. Conjectural causes of death, which do not fall within the terms of the policy, as that insured died of

heart failure or apoplexy, are as reasonable, under the evidence adduced, as those which fall within those terms."

(See the case of *Buckley vs. Massachusetts Bonding & Ins. Co.*, reviewed in this number of the *Proceedings*, as to presumption of accidental death.)

**UNLAWFUL DEATH:**—(*Buckley vs. Massachusetts Bonding & Ins. Co.*, Supreme Court of Washington, 192 Pac. Rep., 924.) The insured was known to carry a large sum of money on the last night he was alive. The plaintiff claimed that the insured had either been murdered or had accidentally fallen into the river, from which his body was recovered, minus the money. His skull had been crushed by an instrument. The defendant admitted such possibilities, but urged there were equal possibilities that he had died naturally or that he had committed suicide.

The case had been tried before a jury, which had found in favor of the claimant. Upon this appeal the court held that the claimant had sustained the burden of proof to the satisfaction of the jury. This was sufficient, and it was not necessary for her to prove her case beyond a reasonable doubt.

"Death is accidental, within the meaning of an accident insurance policy, such as the one in question here, when it is the result of injuries inflicted by a third person without the fault of the person injured, but is probably not so, at least there is good authority so maintaining, where the injury was provoked by the person killed—where, for illustration, he was the aggressor in an assault, and was killed in a melee which followed. There is a seeming conflict in the cases whether the burden is on the plaintiff to show that the death in such cases is without the exception; but assuming that it is so, we think the plaintiff in this instance has met the burden. The presumption arising from the disposition and habits of *Buckley*, shown by the record, is against the conclusion that he would wilfully and wantonly assault another. On the other hand, there is a motive shown for a wilful assault upon him by another. He had a sum of money which it was the evident desire of that other to obtain."

In the case of *Tuttle vs. Pacific Mut. Life Ins. Co.* (reviewed in this number of the *Proceedings*), where there were no circumstances pointing to a sudden death, the court stated there could be no presumption that death was caused by accidental means. The weight of authority is *contra* to that view, however, when death is shown to

have been caused by a violent injury, the nature of which appears to be accidental in origin. The court wrote:

“There is a presumption against suicide, self-inflicted injuries, or intentional homicide; and, when the body of a person is found under circumstances pointing to a sudden death from injury or drowning, the death is presumed to have been caused by accidental means, rather than by the intentional act of the person himself.”

There was evidence to sustain the finding of the jury that the death was accidental, either through murder or falling into the river.

The policy required immediate written notice to be given, which should be given within a reasonable time; this is a condition precedent to recovery. Notice was not given until five weeks after death, during which time search was being made for the renewal receipt, which was not with the policy. It was a question for the jury to determine whether this was a good excuse for the delay. Again the jury found in favor of the plaintiff and excused the delay as not being prejudicial to the insurer. The court thereupon affirmed the judgment in favor of the plaintiff.

**TEMPORARY CHANGE OF OCCUPATION:**—(*Zantow vs. Old Line Acc. Ins. Co.*, Supreme Court of Nebraska, 178 N. W. Rep., 507.) The insured was classified as a farmer and held an accident policy for \$1,000. The benefit was \$3,000 in the event that death resulted while riding as a passenger in the inclosed part of a railway passenger car for the exclusive use of passengers.

The insured had sold some cattle and agreed to go with them as a cattle tender, because this entitled him to a free shipper's pass, which permitted him to ride in the caboose of the freight train. He was killed when the train was wrecked.

The policy had the usual clause that a change of occupation to one classified as more hazardous or doing any act under the more hazardous classification would reduce the benefits to those purchased by the premium paid. By reason of this clause the defendant company claimed the beneficiary was entitled to only \$300, under the classification “shipper tending in transit.” The court did not concur in this view, as may be seen by the following extract:

“The provision in the policy, providing for reduced benefits in case the insured should change his occupation to a more hazardous one, it seems to us, does not apply, since such provisions as these

only contemplate the actual substitution of one occupation for another, and not merely a temporary resort to other activities. It can not be said that the insured, a farmer, who, as incidental to his occupation, raised live stock for market, and would therefore at some time ship it to market, had, within the meaning of the clause just mentioned, changed his occupation from farmer to stock shipper by the one act of accompanying this stock in shipment, even though he had previously sold it to another. Temporary duties thus assumed should not be held to effect a change of occupation within a restricted and literal meaning of that clause. . . .

"The policy, however, goes further, and provides that the benefits shall be reduced if insured is injured while doing any act or thing pertaining to any such more hazardous occupation. At the time the insured was killed, he was riding in the caboose, seated with other passengers, who had paid their fares and who had been accepted, strictly as passengers, upon that train. The act or thing which he was then doing, riding upon a seat in this car, did not peculiarly pertain to tending cattle in transit. . . . It is the duties of the occupation, which cause an increased likelihood of accident, that this clause is obviously intended to guard against, and, when the insured is injured, not from a risk growing out of these duties, but from a risk common to other persons, not so employed, it can not be said that he was in the actual performance of an act peculiarly pertaining to an occupation creating an extra hazard, and that he should therefore lose the benefits of his insurance."

The beneficiary claimed that she was entitled to the \$3,000 benefit because the caboose contained passengers who had paid the regular fare. This construction was rejected by the court, which affirmed the judgment of the court below for \$1,000. The opinion concludes as follows:

"The caboose in this case can not be said to have been used exclusively for passengers. Though it carried some passengers, and might therefore be said, in a limited sense, to have been a passenger car for that reason and to that extent, and though some particular passengers may have paid fare, . . . still this car was nevertheless essentially part of a train which was loaded with live stock, and, as a part of that train, was furnished for the purpose of carrying the train crew, their accessories, and the cattle tenders who accompanied stock and were riding under contracts, restricting the obligation of the company towards them as passengers. . . .

"Here the car was not used strictly as a passenger car, nor for the exclusive use of passengers, but as an essential part of the freight train, and for the use of the freight crew and cattle tenders. . . .

"The insured, moreover, was riding on a stock shipper's pass, and, under our decisions, was a passenger in a restricted and modi-

fied sense only, . . . and it is our conclusion that he was not, when the accident occurred, 'riding as a passenger in . . . a railway passenger car . . . provided for the exclusive use of passengers,' within the meaning of the policy."

**BLOOD POISONING:**—(*Ramsey vs. Fidelity & Casualty Co.*, Supreme Court of Tennessee, 223 S. W. Rep., 841.) The deceased's policy defined blood poisoning resulting directly from a bodily injury, as being included in the term "bodily injury," which must be sustained through accidental means. The insured had a tooth extracted, at which time the gum was injured, producing blood poison from which he died.

The complaint did not allege that the tooth was pulled by accident, nor that there was any accident while the tooth was being pulled. The extraction was at the will of the insured, and the injury to the gum was the natural, expected result. It was the blood poison following the injury that was unexpected. The "accidental means" in the insuring clause does not cover such cases, and the weight of authority holds that there is no liability. In this case the death was accidental, but the means were not; the court consequently dismissed the complaint.

**TOTAL DISABILITY:**—(*Clarke vs. Travelers' Ins. Co.*, Supreme Court of Vermont, 111 Atl. Rep., 449.) The insured injured his foot and submitted a claim for total disability for a certain period and for subsequent partial disability. The proofs stated that he was still partially disabled. Payment was made by the company for the claim as presented, and a blank was sent to be used for any further claim. Thereafter the insured's foot was amputated and he brought suit to recover for the specific indemnity of loss of foot, as well as for total disability down to the date of amputation.

The first point upon which the court ruled was whether the proof of claim for partial disability barred the insured from showing that his disability had in fact been total. True, it was an admission against interest, but not absolutely conclusive against him. The jury took it into consideration when they determined that the insured was totally disabled for the entire period.

The facts showed that the insured had made business trips and attended to matters connected with his business, which the defendant claimed negated the idea of total disability. In the view of



the court, these were performed under circumstances which showed that the disability was total, physicians having been in attendance on those occasions.

“The rule of general application to policies of accident insurance is that their terms must be given a reasonable construction in view of the purpose for which the contract was made, and in case of doubt must be construed against the defendant. . . . At the same time the language employed should be so construed as to serve the purpose of guarding the insurer against fraud or imposition.

“The provision as to disability in such a policy as this can not be given a literal construction. To do so would be to hold in effect that the insurer would be liable in no case unless the insured by the accident should lose his life or his reason; for, so long as one is in possession of his mental faculties, he is capable of transacting some parts of his business, whatever it may be, although incapable of physical action. . . . The term ‘total disability,’ or its equivalents, is necessarily a relative term, depending in a measure upon the character of the occupation and the capabilities of the insured, and to a large extent upon the circumstances of the particular case. Ordinarily it is a question of fact, and not of law. It does not mean absolute physical inability to transact any kind of business pertaining to the insured’s occupation. . . .

“The weight of authority supports the rule that the insured is totally disabled, even under the terms of an accident insurance policy like the one in question here, if he is disabled from performing the substantial and material acts connected with his occupation. . . . The term as used in such a policy is sometimes defined as inability to perform all the duties necessary to the practical prosecution of one’s vocation or business, disregarding all trivial acts which are not material to the prosecution thereof, but which are merely incidental thereto.”

While filing of proof is a condition precedent to the insured’s right to benefits, the condition is waived by the company’s denial of liability within the time limit for filing proofs. Here the company refused to pay for the loss of the foot, for the reason that the insured, according to his own statement, was not totally disabled down to the date of the amputation. The policy provided in one classification for a specified amount for loss of foot and in addition a weekly indemnity for total loss of time. The waiver of proof of loss of the foot amounted to a waiver of proof for the entire classification. The court, therefore, affirmed the judgment for weekly indemnity for total loss of time and also for loss of foot.

**DELAY IN ISSUING POLICY:**—(Bradley vs. Federal Life Ins. Co., Supreme Court of Illinois, 129 N. W. Rep., 171.) An agent of the defendant company closed one Fraley for a policy of accident insurance and collected the first quarterly premium. Fraley, the agent, and the home office of the defendant, were all located in the State of Illinois. The agent neglected to send the application and premium to the defendant, consequently no policy was ever issued to the applicant. Fifty-eight days after the application had been signed Fraley was accidentally killed by a train, dying instantly. Had the policy been issued defendant would have been liable.

This suit was brought by the administrator of Fraley's estate to recover \$5,000, the amount of policy applied for. The defendant directed the attention of the court to the receipt for the first premium, which requested applicants to notify the company at its home office if a policy were not received within ten days from date. The defendant pleaded that Fraley had been negligent in not notifying it, in which event it would have informed him of the acceptance or rejection of his application.

This suit is not upon an insurance contract, since none had been issued, but in tort for defendant's negligence in failing to issue a policy within a reasonable time. During his lifetime Fraley had no cause of action, hence it could not survive to his administrator. No damages can be collected by his estate for the agent's delay.

The court further held that the delay of the company in passing upon the application could not be construed as an acceptance of the risk. The suit was dismissed.

**DEATH BY ROBBER:**—(Hessler vs. Federal Casualty Co., Supreme Court of Indiana, 129 N. E. Rep., 325.) The insured was killed by a robber, who came into the store where he was employed. The insured's policy insured him subject to all the provisions, conditions and limitations that were contained in and indorsed on the policy. The application, which was a part of the contract, was copied on the back of the policy; directly below a statement was printed that "the policy covers all bodily injuries caused by accidental means, such as . . . gunshot wounds . . . injuries inflicted by robbers or highwaymen . . . whether such accidents happen at home, in the office, store or shop."

On the face of the policy, on which appeared the signatures of the company's officers, there were eleven clauses, with a headline in

capital letters, stating the benefit in favor of the insured. There followed three clauses printed in small type and without any headlines; one clause (*m*) read as follows:

"In event of death, . . . due wholly or in part to, or resulting directly or indirectly from, injuries intentionally inflicted upon the assured by himself or by any other person, . . . injuries inflicted upon the assured by himself or received by him while sane, . . . then, in any such case referred to in this paragraph, the limit of the company's liability shall be 20 percent of the amount which would otherwise be payable under this policy."

Suit was brought for the principal sum (\$500) of the policy, since the defendant would only pay one-fifth of that amount by reason of the limitation expressed in clause (*m*).

The policy covered the death of the insured at the hands of a robber, the only question being as to the amount payable. The court held that in construing an accident policy words printed on the back which summarize it in the language of the insurer become a part of the contract. Thus any ambiguity between the face and the back of the policy will be resolved in favor of the insured. The doctrine of strict construction against the insurer who drew the contract was applied in this case; a judgment for the principal sum was ordered.

The attitude of the court is indicated in the following extract:

"The unequivocal statement on the back of the policy, presented in a manner to catch the eye of the insured, that 'it also covers all bodily injuries caused wholly by accidental means, such as . . . gunshot wounds . . . injuries inflicted by robbers or highwaymen . . . at home, in the office, store, shop,' etc., expressly referred to in the opening lines of the policy by the expression that the insurance is 'subject to all of the provisions . . . herein contained and endorsed hereon,' forbids that a limitation which purports to reduce the amount of liability in case of 'injuries inflicted upon the insured by himself or by any other person,' hidden away in small type, in clause (*m*) following, without further headline, other clauses placed under the headline in capital letters of 'SIXTY PERCENT ACCUMULATION,' shall receive a construction that will defeat the recovery in this case of all but 20 percent of the face of the policy."

"It will be observed that the enumeration on the back of the policy of what it 'also covers' does not suggest that in this particular it is subject to any limitations or conditions that would defeat or reduce the declared liability in case of an injury caused by gunshot wounds, inflicted by robbers in the store where the insured was employed. There is hardly room for doubt that, when the policy

with the quoted statement printed on the back of it was presented to the insured in soliciting his application for insurance and collecting the initial premium, he would understand that he was insured for \$500 against death inflicted by a gun in the hands of a robber who might invade his working place, and that the company printed those words below the application on the back of the policy with the intention that the insured should so understand his contract. The construction thus suggested to induce the execution of the contract and the payment of premiums must be adhered to in settling for a loss covered by the policy."

#### WORKMEN'S COMPENSATION.

PRE-EXISTING DISEASE:—(Glennon's Case, Supreme Judicial Court of Massachusetts, 128 N. E. Rep., 942.) An employee received injuries to his ribs which induced tuberculosis, from which he died. The evidence was ample to show there was an accident, which resulted in personal injury, and the only issue is whether the finding of the Industrial Board was warranted that death was caused by tuberculosis, induced by the injury. The court will uphold the finding, if there is any supporting evidence.

There was also evidence that the employee was suffering from tuberculosis at the time of the accident, which excited the disease to a fatal termination sooner than would otherwise have been the case. Even under this state of facts the court held the insurer liable and affirmed the award of compensation.

GOING FROM WORK:—(Kowalek vs. New York Consol. R. Co., Court of Appeals of New York, 128 N. E. Rep., 888.) The deceased was employed as a flagman during the day and as a train guard in the evening for overtime work. He completed the day's work and also an assignment as a train guard on one trip. The train dispatcher informed him there was no further work that evening, whereupon he signed up his time and left the former's office upon the passenger platform. A train left the platform a few minutes later in the direction of the employee's home and immediately thereafter his body was found about one hundred feet from the platform. He had been electrocuted by the third rail and also injured.

The court proceeds to differentiate this case from the class of cases falling under the general rule that,

"If an employee is injured on the premises of the employer, in

going, with reasonable dispatch and method, to or from actual performance of the specific duties of the employment, by a way provided by the employer, or reasonably used by the employee, compensation must be awarded. The going to and from the actual work and the risk involved in it are reasonably incidental to the employment."

Here the employee was on the passenger platform, on his way home from work. His employment had ceased. While his employer allowed him to ride on the trains without charge, it was not a condition or part of the contract of employment. He was not paid while being transported, and the transportation had no connection with his employment.

The death of the employee arose out of an accidental injury, but it did not arise either out of the employment nor in the course of the employment. The case does not lie within the Workmen's Compensation Law and the court reversed the award and dismissed the claim.

An extract from the opinion follows:

"The employment continues throughout the transportation in case the parties by their contract of hiring positively or inferentially so stipulate. If they do not so stipulate, the employee, when he enters into the process of the transportation, is not under the hiring or control or in the employment of the employer, and is not the employee. . . . The platform was open to and was occupied and used by the general public for that purpose. It was as public as the street which led to it. The decedent did not stand as an employee, even as he would not had he stepped from the office of the train dispatcher upon the street, and there stood for the purpose of taking passage upon a street car. The danger to which he was there exposed existed as to all persons who exercised the common privilege of going there for the purpose of being transported. It was neither connected with nor increased by the hazards of the actual duties of the employment. He had the right to be upon the platform and take the train for his home as a member of the public and the risks of injury in those acts were those to which every person performing them was subject. The risk to the decedent as an intending passenger, or as a passenger, was that to which he would have been equally exposed apart from his employment."

"The statute is not applicable to an injury which arises through a danger or hazard dissociated from or not inherent in the nature of the employment as its source and to which the employee would have been equally exposed apart from the employment. This conclusion is not affected by the fact that the employee would not, except for the employment, have been where such danger or hazard

existed. An injury does not arise out of the employment unless the hazard causing it is, within rational apprehension, an attribute of or peculiar to the specific duties of the employment. The fact that the contract of employment exists and necessitates the acts of performance may or will occasion for the employee risks not reasonably incidental to the character of the work or employment. For the injuries caused by or flowing from those risks the statute does not direct or permit compensation."

**CAISSON DISEASE:**—(Williams vs. Missouri Bridge & Iron Co., Supreme Court of Michigan, 180 N. W. Rep., 357.) The deceased was a caisson worker. He was brought to the top of the caisson, where he entered an airtight room, for the purpose of having the air pressure gradually reduced, preliminary to being released from work. The fellow employee in charge of the reduction of the air pressure allowed the pressure to be too quickly reduced, with the result that the deceased was instantly attacked by caisson disease. He fell and was killed.

The court is liberal in its interpretation of the statute and goes far to distinguish this case from previous cases arising within the State. It affirmed the award of compensation, concluding its opinion in the following language:

"Neither are we persuaded that the case should be classed among the occupational diseases. It is true that testimony establishes the fact that caisson disease develops by the slow process, the same as occupational diseases usually do. Had Williams contracted caisson disease in this manner and his injury and death had resulted therefrom, the argument of counsel would have great force, but the caisson disease, which was responsible for this accident, developed in a few moments as the result of the inattention and neglect of another. In this inattention and neglect we find the unusual thing—the happening—the accident."

**CONJECTURE:**—(Hafer Washed Coal Co. vs. Industrial Commission, Supreme Court of Illinois, 127 N. E. Rep., 752.) The claimant received certain injuries to his body and eyes while in defendant's employ. The undisputed evidence showed that he had soon returned to work at full wages and never complained nor received treatment for his eyes. At the hearing before the Industrial Commission the claimant expressed the opinion that he had lost fifty percent of the vision of both eyes, whereupon he was awarded compensation for loss of twenty-five percent vision of both

eyes, without an examination by the Commission's physician. The employer had attempted to secure an examination by his physician at his expense, as privileged by law, but without success.

In this view of the case the court reversed the Commission's award as being both contrary to the evidence and as being based upon conjecture. As a general rule, the determination by the Industrial Commission as to the preponderance of evidence is final, but such determination is reviewable where there are merely opinions by claimants that are not evidential in character. Here there was no expert evidence by any physician as to the loss of vision. The court remanded the case to the Industrial Commission for further hearings, stipulating an examination by an eye specialist selected by it or by the employer.

During its opinion the court wrote:

"Claimant testified that he could not see as well after the accident as he could before; that he could not read by electric light for any length of time because the print became blurred. . . . This evidence was competent to be considered by the commission in determining that claimant had suffered an injury to his eyes, and, if in the opinion of the commission there was sufficient evidence to justify an award, this court is not authorized to set aside that award because it would have reached a different conclusion from the evidence. On the other hand, the finding of the commission can not be based on mere conjecture, but must have some substantial foundation in the evidence."

**PRESUMPTION OF COMPENSATABLE DEATH:**—(Sparks Milling Co. *vs.* Industrial Commission, Supreme Court of Illinois, 127 N. E. Rep., 737.) A mill employee was at work near a window on the fourth floor of a building. A few minutes later he was found dying on the sidewalk, directly under the window.

The court adopts the established rule that where an employee is found dead on the premises of his employer, where there is no evidence of suicide or murder, the presumption against the existence of a crime is sufficient to warrant the Commission's finding that death resulted from an accident. It is clear, in such case, that death arose in the course of employment, so that the only doubtful question is whether it arose out of the employment. It will be so held when the accident results from a risk reasonably incidental to the employment. Facts may be proved by circumstantial as well as by direct evidence. However, where there is only conjecture upon

which the Commission bases an award, such award can not be upheld.

In this case it was proved to be the custom of the employees to go to the windows for fresh air and to secure relief from the heat and dust. Such an act upon the part of the deceased was therefore reasonable and incidental to his employment and the court affirmed the award.

DEPENDENCY:—(George A. Lowe *vs.* Industrial Commission of Utah, Supreme Court of Utah, 190 Pacific Rep., 934.) An award of compensation was made to the parents of a deceased employee by the Industrial Commission. The insurance carrier appealed from the award upon the following grounds: first, that the dependency of the claimants had not been established; second, that the commission made no finding as to deceased's average daily wage; third, that the award of \$3,199, payable in weekly instalments of \$11.25, was excessive.

The court wrote a unanimous opinion sustaining the award. Concerning the first contention of the carrier, the court wrote:

“All that may be said in this connection is that decedent was at the time of the accident capable of and was earning \$3.25 per day, that all of his life he had contributed his labor and earnings to the support of claimants, and that there is substantial evidence in the record tending to show that claimants were dependent upon decedent's labors and earnings for the support and maintenance of themselves and the members of their family. Dependency in this class of cases has been universally held to be a question of fact to be determined by the commission, not the reviewing court.

“Under the facts and circumstances of this case as disclosed by the record, we think partial dependency of the claimants was fully established within the purview and meaning of our statute. Further, the decision of the commission was final and conclusive on this question as well as all other questions of fact where there is some substantial testimony in the record to sustain it.”

The Commission failed to make a formal finding as to the daily wage, but since it is clearly established by the evidence, the court held the finding was not legally essential. Such an error is technical and not sufficient to deprive dependents of their compensation or to delay same.

As to the amount of the award, that was a question of fact to be determined by the Commission. Where there is some substantial



evidence to support the award, the law will not permit a reviewing court to disturb the amount of the award.

#### MISCELLANEOUS.

**CIRCUMSTANTIAL EVIDENCE IN BURGLARY INSURANCE:**—(Miller *vs.* New Amsterdam Casualty Co., Court of Errors and Appeals of New Jersey, 101 Atl. Rep., 810.) The plaintiff took out a burglary policy from the defendant company. Subsequently some jewelry was missed from the plaintiff's apartment, coincident with the disappearance of a servant. Notice was very promptly given to the defendant's local agent and to the police, as required by the policy. Liability was resisted on the ground that there was no proof of the loss.

The court reviews the evidence, all of which is circumstantial. Admitting that no direct evidence exists, the court resolves all doubts in favor of the insured, as may be observed from its opinion:

“We think, therefore, the facts thus adduced upon the principles of evidence to which we have adverted present a basis from which a rational mind, in the light of every-day experience (the credibility of the witnesses being conceded), might legitimately and logically infer that the jewels had been removed from the plaintiff's possession by theft.

“Such was the inference deduced by the trial court, and again by the Supreme Court from this congeries of fact; and, under the rule applicable to such situation, under our adjudications, this court recognizes a substantial basis of fact to support the judgment, will accord to it such a status of finality dispositive of the factual questions involved as we could accord under like circumstances to the verdict of a jury upon a writ of error.”

**WAIVER IN FIDELITY INSURANCE:**—(Bankers' Trust Co. *vs.* American Surety Co., Supreme Court of Washington, 191 Pac. Rep., 845.) The plaintiff held a fidelity policy covering a certain employee from September 1, 1913 to February 23, 1916, when it was terminated. Disclosure of loss was required to be made within fifteen months after termination. Twenty-one months after termination the trust company telegraphed that there had been a loss to the defendant's home office. The defendant telegraphed to its local manager, requesting him to furnish claim blanks to the plaintiff and inform the defendant of particulars. The local manager supplied claim blanks to the plaintiff on the following day.

Within ten days the defendant wrote the plaintiff, calling attention to the late notice which had been given, six months after liability had expired; the defendant denied liability. The plaintiff admitted both the cancellation of the policy and that by its provisions notice should have been given within fifteen months, but urged that the defendant had waived that provision by its conduct in furnishing claim blanks. Such conduct, it further urged, constituted an estoppel from denying liability.

The court makes the query that if it be admitted that the insurance company had made a waiver by implication, had that act caused the trust company to incur expense or suffer loss? A review of the evidence shows that no act of the trust company was done in reliance upon any waiver, since all its acts and expenses were for the purpose of ascertaining its financial condition, preliminary to merging with another bank. There had been a mutual mistake for a few days that there was a policy in force between plaintiff and defendant. To constitute an estoppel, it would be necessary not only to have a waiver by the defendant, but also to cause plaintiff to incur expense in reliance upon that waiver. Such was not the case here, in the opinion of the court, and it dismissed the suit.

COVERAGE OF COMPENSATION POLICY:—(Frint Motor Car Co. vs. General Accident Fire & Life Assur. Corp., Supreme Court of Wisconsin, 180 N. W. Rep., 121.) One Healey was a mechanic for the plaintiff and was killed while attempting to repair a car at an automobile race. This car had been entered for advertising purposes, and racing was considered by the plaintiff as incidental to their regular business of selling cars. This court affirmed an award of compensation to the widow; this case has been reviewed in the *Proceedings*, V, 314.

The employer, plaintiff herein, paid the award and demanded reimbursement from the defendant insurance company. The defendant denied liability on the ground that the compensation policy did not cover automobile racing.

The policy had the customary clause "all operations, necessary and incidental to the performance of the work herein described" which is broad enough, the court held, to cover the duties of the deceased; he had not been engaged expressly for racing. The policy had been drawn to cover all employees. The statute required

every employer to secure the payment of compensation to his employees. There was no prohibition in either the policy or statute against extending insurance to the kind of work in which the deceased met his death. In fact, the only exception in the policy applied to mining and blasting.

The defendant proved that it had not filed premium rates with the State Industrial Commission to cover employees engaged in automobile racing, and that no company writing workmen's compensation insurance would write insurance of that description. The court held that nevertheless the defendant was not relieved of the liability under its policy contract. In such case the well-settled rule applies, that there shall be a strict construction against the insurer who drew the contract. The court held that the coverage of the policy extended to the instant case and affirmed the judgment against the defendant.

**AUTOMOBILE THEFT INSURANCE:**—(Ballard vs. Globe & Rutgers Fire Insurance Co., Supreme Judicial Court of Massachusetts, 129 N. E. Rep., 290.) The plaintiff purchased an automobile under an agreement by which the seller retained title until the car was fully paid for. He insured it against theft. The policy stated the car was fully paid for and not mortgaged; there was a condition that the policy was void if there was only conditional ownership. At the time of the loss there was still a balance unpaid.

In handing down judgment for the defendant the court wrote:

“It was undisputed that the plaintiff was not when the policy was issued the sole and unconditional owner of the automobile. By the terms of the policy it did not become a contract binding on the parties, unless the plaintiff was at the time the unconditional owner of the property. . . . St. 1907, c. 576, § 21, providing that no misrepresentation or warranty made in the negotiation of a contract or policy of insurance by the assured shall be deemed material, or defeat or avoid the policy, or prevent its attaching unless such misrepresentation or warranty is made with actual intent to deceive, or unless the matter misrepresented or made a warranty increased the risk of loss, is not applicable when a condition, precedent to the policy becoming effective, is not performed. . . . The plaintiff can not recover because, as he did not unconditionally own the automobile when the policy was issued, the terms of the policy were not fulfilled and the contract of insurance did not take effect.”

ABSTRACT OF THE DISCUSSION OF THE PAPERS READ AT  
THE PREVIOUS MEETING.

DISABILITY BENEFITS IN LIFE INSURANCE POLICIES—

J. H. WOODWARD.

VOL. VII, PAGE 10.

WRITTEN DISCUSSION.

MR. A. H. MOWBRAY :

A descriptive and historical paper of the type of this one does not generally lend itself to formal discussion except to point out errors and omissions, if any, and Mr. Woodward does not write that type of paper. It is, therefore, not my intention to discuss the paper generally, but to call attention to an item that is to me of considerable historical interest.

Mr. Woodward points out the peculiar, almost "back-door" way in which this benefit has come into American life insurance, remarking that on reflection the strange thing is not that the benefit has had the development it has, but that its desirability was not sooner recognized. In Mr. Hunter's study, "Total Disability Benefits in Relation to Life Insurance," recently issued by the Actuarial Society of America, he says that the first policies containing this form of insurance appear to have been granted in Germany in 1876 and by American fraternal orders in the succeeding year, but that it was not until 1896 that any regular life insurance company adopted the benefit, and that it did not come into general use until 1907 and thereafter. A short while ago, in connection with some studies of sickness tables, I found in the *Journal of the Institute of Actuaries*, Volume VIII, page 112 and following, a letter from Mr. John A. Higham, dated Royal Exchange Assurance, May 30, 1857, and addressed to the editor of the *Journal*, then the *Assurance Magazine*, relative to Mr. A. G. Finlaison's sickness tables which had then just come out, in the course of which (page 115) appears this significant paragraph:

"The materials which Mr. Finlaison possesses for ascertaining the probability of chronic sickness must be highly valuable: perhaps it is not too much to hope that he may be induced to collate and publish them separately. Insurance companies will confer another boon on men who, in common with their families, depend on

their professional exertions, when, on sufficient data, they can afford the means of providing against permanent sickness—the only ill, legitimately within their province, against which they do not afford protection. The man who has insured his life, or contracted for an endowment or an annuity yet deferred, and who is disqualified by sickness from continuing his premiums and even from maintaining himself, is in sad case, and to this case we can at present apply no remedy.”

When we reflect that almost precisely half a century before American life insurance reluctantly adopted the benefit merely as a talking point in selling insurance one of the most eminent British actuaries of his day had realized the high social value of this benefit, its late introduction and development seem even stranger.

MR. B. D. FLYNN:

Mr. Woodward states that his paper was designed to give students an idea of the history and development of the disability benefit in life insurance policies, together with a general view of the many actuarial and underwriting problems met in studying this insurance feature. It is sufficient to say that he has accomplished his purpose in his usual clear and thorough manner. There seems to be no phase of the subject which has not been touched upon, and but little which can be added by way of discussion.

Mr. Woodward expresses the hope that some safe way may be found to insure in a permanent disability benefit “against total incapacity to perform the duties of an insured’s regular vocation as distinguished from total disability to perform any kind of work whatsoever for remuneration or profit.” I question if the disability benefit can be improved in a satisfactory and practical way along the line which Mr. Woodward has indicated. In the opinion of most accident underwriters, it is safe and practical to provide a benefit for incapacity to perform the duties of an insured’s regular occupation during a limited period after commencement of disability, let us say twelve months; but after the expiration of that period, when the disability ordinarily can be called permanent, the indemnity must be confined to the period during which the insured is disabled from performing the duties of any gainful occupation. If we consider an example, I believe we will concede the value of their opinion. A dentist may receive an accidental injury to his right hand and during a limited period he is disabled from performing the duties of his regular occupation. In all probability during the greater part of this period he would be disabled from performing the duties of any gainful occupation, at least there would be small prospect of his entering another occupation by which he could earn a living. If at the end of one year, however, the dentist be still disabled and likely to remain so—possibly a permanent disability—there would be a strong probability that he would enter some other

occupation. He might become a salesman and earn even more money in that occupation than he did as a dentist. In such an event, it would not be proper nor wise to have a benefit in the insurance contract which would provide full indemnity for his inability to continue as a dentist, in view of the fact that he was able to earn as much, or possibly more, in the new occupation. Other cases somewhat similar might be cited—as, for example, a lecturer or actor whose vocal cords were impaired and who might later take up some other occupation, but suffer no material impairment of income. The general conclusion seems to be a wise one, therefore, that when a disability can be considered of a permanent nature, the simple test as to whether or not the insured can continue in his regular occupation is not sufficient as a basis for continuation of total indemnity payment.

There seems to be a place in a disability benefit, however, for a provision for partial indemnity for partial loss of earning capacity. By partial loss of earning capacity I do not mean what is generally termed partial disability. It is now generally agreed among underwriters, I believe, that the attempt to give partial indemnity during a temporary period of partial disability from sickness has proved a failure. It is possible for a person to be disabled by accidental injury from performing one or more important duties pertaining to his occupation, but to determine partial disability from sickness, particularly in the preferred occupations, is most difficult, and contracts providing this benefit have caused considerable waste of claim money in questionable claims. If the injury or disease causes a permanent loss of part of earning capacity, however, regardless of whether the insured was obliged to change his occupation, it would seem most desirable to provide a benefit under the disability clause if a safe and practical method of administering it can be obtained.

In workmen's compensation insurance there is such a benefit, but ordinarily there is some court of appeal or claim determining commission which settles definitely and finally the difficult problems of ascertaining the degree of loss of earning capacity. Further, the referee can settle the case upon the basis of the claimant's *ability* to earn if he is loathe to take up a new occupation. There would seem to be small likelihood, however, in the absence of a referee, of the satisfactory adjustment of claims which depended for their settlement upon the determination of such a difficult point as the degree of loss of earning capacity by the claimant. Although such a benefit would undoubtedly be beneficial, it is the opinion of the writer that in view of the many difficulties involved, it will be some time before a company will undertake to provide such a benefit under its disability clause.

There has been a marked tendency of late among life insurance companies to cut down the "probationary period"—*i.e.*, the time which must elapse after the occurrence of disability before the bene-

fit begins. As Mr. Woodward states, in the early years of underwriting of this benefit—particularly the annuity benefit—many companies required that six months must elapse from the date of receipt of satisfactory proof before first annuity payment be made. At the present time more and more companies are making the first payment under the benefit immediately upon receipt of satisfactory proof, or on the first of the month following receipt of such proof. It has been found from experience that a certain period will elapse—about three months on the average—between the beginning of permanent total disability and the submission of proof by the insured. In all but a small percentage of cases the condition of the insured has developed to the point where the question of total and permanent disability can be safely admitted when the claim papers are submitted. There remains, therefore, only a comparatively small number which require some postponement of the final approval of the claim papers. The companies have learned, therefore, that as a practical matter there is no necessity for the waiting period following the receipt of satisfactory proof before the first payment of annuity benefit.

Another safeguard placed about the permanent total disability benefit by the companies in the early years—namely, that at least one annual premium be paid before the disability clause be operated—has been found by experience to be unnecessary and has been removed by most companies.

Mr. Woodward refers to a recent action by one company to begin the payment of the benefit as soon as satisfactory proof of total and permanent disability is obtained, or at the end of three months of total disability, whether or not it is adjudged permanent at the end of that time. One other company has fixed the period at six months instead of three months. Although this is a laudable liberalization of the total and permanent disability benefit in life insurance policies, such action should be followed by other companies only after a full appreciation of the many new problems which are opened up by the entrance of the life insurance company into this field—which is practically that of non-cancellable accident and sickness insurance, with a three or six months' elimination period. The effect of the incontestability clause of the life contract in handling improper claims, the increase in the number of claims and expenses of handling them, and the consideration of the necessary safeguards which are thrown about accident and sickness contracts are some of the points to be considered. The discussion of this new and important development of the disability benefit in life insurance policies is such a broad one, however, that clearly this is not the time to take it up.

## AUTHOR'S REVIEW OF DISCUSSIONS.

MR. J. H. WOODWARD:

As both Messrs. Flynn and Mowbray have intimated in the discussions which they have taken the trouble to prepare, the paper under consideration offers but slight incentive to remark. It was intended simply as a students' paper and contains little that is controversial.

In closing the discussion, however, I should like to refer briefly to some of the points raised by Mr. Flynn in his interesting and well-considered comments.

With reference to the possibility of extending the definition of what constitutes total disability, it is evident that I did not succeed in clearly expressing the thought which I had in mind. I quite concur with Mr. Flynn that it would be most undesirable to extend the benefit in any way which would fail to take account of the rehabilitation of the disabled individual or which would tend to discourage efforts on his part to find a new occupation in which his impairment would not be a serious handicap. It seems highly desirable, however, that the language of the contract should more nearly indicate what will be considered by the company to constitute a disability which is total. The three months' clause referred to has done much to remove doubt from the minds of laymen as to what disability will be construed to be *permanent*. It now remains to effect a similar clearing up of the atmosphere as to what disability will be construed to be *total*. It seems to me, and in this Mr. Flynn apparently concurs, that this should rest fundamentally on the loss of earning power, and there seems no practical basis for measuring such loss except in terms of money. Mr. Flynn points out that the situation in respect to the disability clause differs from that in compensation insurance in that there is no administrative or quasi-judicial body to determine the degree of invalidity. It seems quite true that in connection with a disability clause any exact determination of the degree of invalidity is out of the question.

It does not follow, however, that it would be impracticable to insert a provision in the contract specifying, for example, that where the impairment is such that the insured is able to earn less than a certain percentage—say 25 percent—of the amount which he earned prior to his injury or sickness, then such disability shall be construed to be total. It is not the intention of the contract that a high-grade business or professional man who becomes permanently disabled should be cut off from the benefit simply because it might be shown that he could acceptably perform the duties of such an occupation as, for example, a watchman or a park attendant. This fact, however, is not generally understood and might well be made clear in the contract. As a matter of fact, the companies do in



actual practice settle claims on a basis considerably more liberal than the terms of the policy suggest, and many disabilities are admitted to be total where liability might be denied under a technical construction. There would seem to be no sufficient reason why this liberality of treatment should not be availed of by the companies to make the terms of the contract itself more attractive.

The enumeration in the contract of certain specific dismemberments which will be in all cases construed to constitute permanent total disability has the drawback that it creates the impression in many minds that these disabilities are practically the only disabilities covered by the clause. This is objectionable from the sales point of view, as we know that as a matter of fact such dismemberments make up but a very small percentage of the total number of claims admitted. Again, certain theoretical inconsistencies arise which are well illustrated by the case of the dentist which Mr. Flynn takes to illustrate his remarks. The dentist has presumably spent many years and a considerable amount of money in preparation for his profession and has, let us assume, succeeded in building up a profitable practice. A permanently disabling injury to his right hand requires him to sacrifice all or most of the results of his professional training and experience, although, as Mr. Flynn points out, he may ultimately succeed in rehabilitating himself economically—but for such an injury he is not entitled to present a claim under his disability clause. If, however, he should be so unfortunate as to lose both feet, he might in many cases continue in his practice as a dentist, but he would nevertheless be entitled to full benefit under the policy terms.

It would seem to be a sound general principle that the loss of ability to earn more than a relatively insignificant proportion of the income previously received on account of personal services should be made in express terms the basis for a carefully guarded definition of what disability is to be construed as total. I gather from Mr. Flynn's remarks that he would probably concur in this general principle, and therefore it may be that we are not, after all, so far apart. I unqualifiedly agree with Mr. Flynn in his general conclusion "that when a disability can be considered of a permanent nature the simple test as to whether or not the insured can continue in his regular occupation is not sufficient as a basis for continuation of total indemnity payment." Any other view would, it seems to me, be distinctly contrary to public policy.

Mr. Flynn goes so far as to suggest that there seems to be a place in the disability benefit for partial indemnity for permanent partial disability regardless of whether or not the insured is obliged to change his occupation. This is a most interesting suggestion, a discussion of the ramifications of which would be far too extensive to be within the scope of these brief remarks. The difficulty which Mr. Flynn himself emphasizes, however, of providing some quasi-

judicial means of fixing the precise degree of invalidity, is so great that any actuary would probably hesitate to advise a company to liberalize its contract along these lines.

Mr. Mowbray's quotation from the letter of Mr. J. A. Higham, addressed by him to the editor of the *Insurance Magazine* in 1857, is most interesting and serves admirably to illustrate the point that the inherent merit of a proposal is likely to have much less to do with its general adoption than has its psychological timeliness.

CORPORATE BONDING—RALPH H. BLANCHARD AND GEORGE D. MOORE.

VOL. VII, PAGE 23.

WRITTEN DISCUSSION.

MR. A. R. SEXTON (SECRETARY, FIDELITY AND SURETY DEPARTMENT,  
AETNA CASUALTY AND SURETY COMPANY):

The paper is entitled to high praise for the thoroughness and clarity with which the subject has been briefly presented. The comments that I shall offer are accordingly few in number and largely result from the efforts of Mr. Blanchard and Mr. Moore to condense their subject, rather than from any fundamental inaccuracies.

#### I.

*Page 26: Paragraph on Judicial Bonds. Sub-paragraph on Credit Guarantee Bonds.*

The statement is made that these bonds "are generally required by law in civil proceedings, in case the principal has in his hands money or property which might be levied upon for the satisfaction of a judgment, and which he might misappropriate." The bonds referred to in this description are limited to those given by a defendant, whereas there are many credit guarantees in court proceedings that are executed on behalf of a plaintiff or complainant who is seeking to levy upon the property in the hands of some other party. Sometimes the complainant is seeking to obtain some remedy in which the payment of money is not involved directly, and, in such case, is not seeking to levy upon property in the hands of anyone. The following classes of court bonds, for example, would not come under the description of judicial credit guarantees, as given in the paper of Messrs. Blanchard and Moore:

Plaintiff's Attachment Bond, Garnishment, Replevin, Petitioning Creditors, Security for Costs, Execution, Injunction, and some others.

Although it is true that bonds written on behalf of plaintiffs are regarded from a practical standpoint as usually less hazardous than

those written on behalf of defendants, it is, nevertheless, true that they are credit guarantees or monetary obligations, and that they are written upon the basis that the applicant for bond possesses the necessary financial strength to pay any damages which may result from the commencement of the proceeding in which bond has been filed. Most of the bonds which I have listed are bonds which are used by creditors who are seeking to collect debts or enforce claims, but an injunction bond does not necessarily involve a debt on the part of either the complainant or defendant. Nevertheless, it may involve damages by reason of preventing the accomplishment of something which, but for the injunction proceeding, would have been done in a certain manner and within a certain time. Injunction proceedings are instituted under many circumstances, all of which it would be impracticable to list, such as injunction against the transfer of stock, the sale of property, the building of a road through certain lands by a certain municipality or county, the collection of a tax, etc.

As will be seen by the foregoing illustrations, the quoted definition of credit guarantee judicial bond should be amplified.

## II.

### *Page 28: Paragraph on Peculiarities of Bonding.*

I take issue with the statement that bonding is essentially insurance, and with subsequent references in the paper to this effect. I appreciate that undoubtedly Mr. Blanchard and Mr. Moore had clearly in mind the distinction which I shall point out and only employed the word "insurance" in a very broad way. I would have no objection to the employment of the word in that way if the essential distinction between suretyship and insurance were emphasized, but in the absence of such an explanation it is my belief that the employment of the word "insurance" with respect to bonding matters may result in confusion.

It is true that Fidelity Bonds, which simply guarantee the honesty of clerks, etc., are to a large extent rated upon an insurance basis, although the underwriting is frequently special; but the opposite is true as to Surety Bonds.

The difference in the method of determining the premium for a Surety Bond and a Policy of Insurance is explained as follows by Mr. Towner:

"A general peculiarity distinguishing premiums for insurance from premiums for suretyship is that insurance premiums are ordinarily calculated on the average risk for an entire class, whereas surety premiums ordinarily contemplate the coverage of only selected risks of their class. Thus life insurance rates at age thirty contemplate the insurability of all healthy lives at that age. Fire insurance rates on a specific class of dwelling or other fire hazards

contemplate the insurance of all structures within that class, Surety underwriting, however, proceeds upon a different principle, namely, that suretyship shall only be given for those selected applicants who are responsible and who are expected to fulfill an engagement, keep their promises and perform their contracts. These are the selected members of a class: not all of its members, as in the case of insurance. Surety rates can not be computed on the insurance average of all members of a class."

### III.

#### *Page 29: Paragraph on Peculiarities of Bonding.*

It is stated that the surety is not entitled to indemnification under a bail bond. This statement expresses the theory that the obligation of the surety is to produce the person of the individual bonded, and that, accordingly, anything which makes the surety indifferent to the obligation to produce the body of the defendant in court should meet with the disapproval of the court. Practically, however, bail bonds are almost never executed except upon the basis of indemnification, and this indemnification is usually in the form of cash collateral or its equivalent in the full amount of the bond. In jurisdictions where the court will not permit a surety to take collateral on a bail bond, a prudent surety will not sign a bail bond.

### IV.

#### *Page 29: Bonding Hazards.*

The second paragraph, beginning "The facts, varying in their importance according to the class of bond in question, are, among others," although it enumerates many of the principal considerations governing the execution of bonds, is so worded as to give undue emphasis to the special considerations governing the issuance of Fidelity Bonds, and it would appear to better advantage if it were rearranged so that first those considerations were enumerated which would apply to Fidelity Bonds, and then those which would apply to Public Official Bonds, and then Fiduciary Bonds, concluding with those applicable to Judicial Credit Guarantees and finally Contract Bonds.

### V.

#### *Page 30: Bonding Hazards.*

In describing the hazards under public official bonds, it is suggested that in addition to the considerations governing the issuance of a Fidelity Bond the capability of the principal should be considered. There is still another consideration: a public official is frequently an insurer of the funds which have been intrusted to him, and if in such cases he deposits money in a bank and the bank fails,

thereby causing a loss in whole or in part of the deposit, he must make good such loss, or his surety must make good for him, even though the public official has been absolutely honest and has deposited the money in a supposedly strong bank. Therefore, surety companies in such cases usually require the banks in which the public official places his funds to furnish depository bonds which indemnify against any loss of public funds resulting from the failure of the bank.

## VI.

### *Page 31: Paragraph on Premium Rates.*

The statement is made that "the loss ratio will be found to be highest in the Fidelity classes, which are underwritten with the expectation of a proportion of losses." If—as probably is the case—it was intended by this statement to indicate that Fidelity Bonds are written approximately upon an insurance basis in so far as loss ratio is concerned, whereby the insuring company expects to pay a loss ratio of normal size for the class of business, leaving available to the surety company, after payment of Fidelity losses, a sufficient sum to take care of all expenses and provide a fair profit over all expenditures, the statement is correct. If, on the other hand, it is possible to infer from the statement in the paper that Fidelity Bonds contrasted with other bonds are to be viewed as more hazardous, it is necessary to correct such an impression. In considering the desirability or undesirability of Surety or Fidelity Bonds, we, of course, should consider the general history of the business, and its probable future developments, rather than any unusually favorable or unfavorable very recent loss ratios, because business conditions prevailing today are abnormal and undoubtedly will greatly improve in the near future.

Generally speaking, Fidelity Bonds have been regarded as one of the most profitable lines of business written by surety companies, and although under present conditions the experience is not as satisfactory as formerly, and although under special Fidelity Bonds now written the loss ratio is high, it is not unreasonable to expect that with business readjustments, and with gradual revisions of some special recent coverages, this class of business will hold the favorable position in the regard of underwriters that, in the general history of the business, it has always occupied.

## VII.

### *In Conclusion.*

The paper written by Messrs. Blanchard and Moore was most carefully prepared and some of my comments have been covered by qualifications of general character found here and there in the paper. Nevertheless, it seems to me that their excellent presenta-

tion of the subject would be somewhat improved if the additional explanations which I have herein suggested were incorporated in the paper.

A SUGGESTED SYSTEM OF STANDARD NOTATION FOR ACTUARIAL WORK  
IN WORKMEN'S COMPENSATION INSURANCE—SANFORD B. PERKINS.

VOL. VII, PAGE 36.

WRITTEN DISCUSSION.

MR. A. L. KIRKPATRICK:

It is only necessary to take a hasty glance through our *Proceedings* to notice the multiplicity of symbols used by different writers in dealing with Workmen's Compensation Insurance. Each paper has symbols which are adapted to meet the needs of the situation at hand. Some writers even use the longhand method of writing out their formulae in words rather than symbols.

A few symbols have now come to be generally used as standard, although sometimes with slight variations. For instance,  $z_1$ ,  $z_2$ ,  $K_1$  and  $K_2$  as used in the experience rating formula are, I believe, generally recognized. Such symbols as  $P$  and  $\pi$  are usually used to represent premium of one kind or another and  $R$  to represent rate. Mr. Perkins's paper would qualify these by the use of subscripts to indicate premiums earned, written, unearned and ultimate. He has added a further qualification, using the method which he applied to losses, to indicate the State in which the premium was written, the year and classification.

Probably no one realizes the need for standard symbols more than those who have recently followed the development of a new schedule-rating formula. When a committee attacks a common problem and each member starts working in his own way and using his own symbols, the result is like a meeting of men speaking different languages. Until they all adopted the same language it was a rather difficult job to follow from one memorandum to the next.

For example,  $N$  was used to represent the number of employees in a risk. Somebody else decided to use  $N$  as the number of danger-points in the risk.  $R$  was used by one to represent manual rate; by another it was used to represent residuum or non-schedule ratable portion of the pure premium.

As soon as the work had progressed far enough so that there was an agreement as to fundamentals a standard set of symbols was adopted. It may be well to give them here. In the formula

$$\pi' = \frac{\epsilon'}{\epsilon} \left( R + \frac{N}{N'} \sum \frac{N_i' D_i'}{N_i D_i} \pi_i \right)$$

- $\pi'$  represents the pure premium for a particular risk.  
 $\epsilon$  represents the personnel factor for the average risk, and  
 $\epsilon'$  is the same factor for the risk in hand.  
 $R$  represents that portion of the pure premium produced by minor or uncertain causes and called residuum.  
 $N$  represents the number of employees in the standard plant, and  
 $N'$  the number in the plant being rated.  
 $N_i$  represents the number of employees exposed to cause of accident  $i$  in the standard plant, and  $N_i'$  the number exposed to the same cause in an individual plant.  
 $D_i$  represents the number of danger-points involving cause  $i$  in the average plant and  $D_i'$  the number in a particular plant.  
 $\pi_i$  represents the pure premium produced by cause  $i$  and entering into the manual rate.

One thing must be borne in mind in adopting standard symbols, namely, that it is more important to have symbols which are easily recognized and remembered than to have short ones. For this reason, it is my opinion that it would be better to use the ordinary abbreviations for States than to try to develop another set of symbols, even though they may be more simple.

This Society had at one time a committee on standard notation, but it has been discontinued. Now that Mr. Perkins has opened the subject, it might not be amiss for that committee to be revived and some efforts made toward the adoption of standard symbols, using his paper as a working basis.

MR. G. F. MICHELbacher:

Mr. Perkins's paper is timely, for even though all of us may not be ready to accept in detail the notation which he proposes, none of us can fail to appreciate the necessity for opening this subject for immediate discussion. We most certainly have reached a point in the development of casualty actuarial science where the lack of a simple, comprehensive system of notation is becoming extremely embarrassing. Rapid strides forward are being made in practically all the important branches of the business, and such notation as is being used in practice and in papers presented before this Society demonstrates rather clearly that because of our failure to attack this problem cooperatively we are creating several different systems of notation which it will be difficult to harmonize unless steps toward this end are taken without further delay. I hope, therefore, that one result of the discussion of Mr. Perkins's paper will be the development of appropriate plans for a thorough analysis of the notation problem as it affects, not workmen's compensation insurance alone, but every other branch of casualty insurance as well, and that this analysis will lead to the establishment gradually, if need be, of a simple universal notation which all of us can use in

our scientific work, irrespective of the branch of casualty insurance in which our activities may be applied.

Early in the history of our Society some thought was given to this problem, and, in fact, at one time our Council established a special committee on "Terms, Definitions and Symbols" for the express purpose of creating a satisfactory system of notation for casualty insurance. It was found, however, that scientific work in this field had not progressed far enough and had not become sufficiently standardized and it was decided, therefore, to drop the subject and to abolish the committee. Under the circumstances this action was undoubtedly justified, but there is every indication that the intention was not to drop the subject permanently, but rather to await a more appropriate time for the development of a uniform system of notation. With the progress that has been made in scientific work affecting particularly workmen's compensation, accident and health, and automobile insurance, there can be little doubt today as to the necessity for the prompt reestablishment of this committee. The committee, if it is revived, faces a difficult task, but this is an opportunity for the Society to make a most important contribution to the business of casualty insurance; an opportunity which we can not afford to overlook.

Turning now to Mr. Perkins's paper, I may say that what I have to offer by way of discussion is not based upon any detailed analysis of the problem. If I were to accept the fundamental basis upon which Mr. Perkins has built his notation, I doubt whether I would seriously criticize the details. There are individual symbols here and there which I might criticize, but these criticisms would be trivial and for the most part unimportant. I find, however, that I have a conception of what a proper and adequate system of notation should be, which evidently does not correspond with Mr. Perkins's conception of the nature of his problem. My contribution to the discussion will, therefore, deal with the subject in general terms rather than in terms of any exact system of notation.

Mr. Perkins's notation is highly pictorial. He has accomplished exactly what he set out to accomplish, viz., the reduction to terms of symbols of the process of constructing workmen's compensation rates developed by the National Council on Workmen's Compensation Insurance during the recent national rate revision. His notation is so designed that the entire rate-making process may be stated symbolically even to the point of enumerating such items as the identity of individual classifications, the years of issue represented by the available experience, the state for which rates are being made, etc. Such a system of notation undoubtedly has its advantages, but it strikes me that it also has its disadvantages, the principal disadvantage being that it must necessarily be extremely complicated if it is to tell the entire story. For example, the proposal that symbols representing state, years of issue and classification



shall be affixed to the basic notation designating losses, payrolls, pure premiums, rates, etc., means a duplication of these symbols throughout the entire analysis of a particular problem.

It is my thought that we should recognize a definite point beyond which it is impractical to reduce our problems to formulae; our notation should not be too descriptive. We should decide in advance that a certain amount of narrative description must accompany our scientific discussions. Thus if we are set the problem of developing a rate for classification No. 3632 for New York for 1921, and have as materials for this the experience for certain states and for certain policy years, I should say that the proper thing to do would be to preface our calculations with a statement of these facts and then to proceed with the problem, developing our formulae in terms of general symbols.

With such a conception of notation it is possible, I believe, to establish a few general symbols and largely to eliminate the necessity of using the same superscripts, subscripts and what-nots over and over again, for the purpose of designating certain factors that run through the entire calculation. Furthermore, I have the feeling that if this idea were developed it would be possible to apply practically the same notation to all branches of the business which in itself would be a great advantage.

My contribution, therefore, comes down in the final analysis to a plea for a *simple* and *universal* system of notation. I would not have one notation for workmen's compensation insurance and another for accident and health insurance if I could help it. The problem should be attacked fundamentally by determining what symbols are needed in the various branches of the casualty insurance business and by attempting to meet these requirements by a few symbols of wide application supplemented, if necessary, by a limited number of special symbols for individual branches of the business which require separate treatment because of peculiarities.

#### MISS OLIVE E. OUTWATER:

Those who have been in the work of compensation rate-making during the last three years have felt keenly the need of a uniform and well-known system of notation. Mr. Perkins is peculiarly well fitted to develop such a system because of his close acquaintance with the actuarial problems of compensation rate-making during the recent 1920 revision. His paper discusses the entire rate-making process and develops a comprehensive notation applicable thereto. The symbols are logical and he has adhered to a uniform system of subscripts, superscripts and prefixes.

Systems of notation are usually of slow growth, each term being chosen as the clearest and most convenient way of abbreviating an expression. As a result the symbol must be suggestive of its meaning, and in the development of a standard system for general use

clearness and practicability should not be sacrificed to uniformity. It is not necessary to adhere so strictly to a two-letter code for all States that one must remember, to use, for example, Hm for New Hampshire instead of the N. H. in general use. Again, the expression Yr is apt to be confused with the standard abbreviation for year, and, except for uniformity, is no improvement over the generally recognized N. Y. Such symbols are undoubtedly adapted to a coding system, but their use requires the memorizing of the entire system. Not only should the notation be logical and suggestive of the meaning represented, but it should also conform as far as possible to any standard well-known abbreviation. The code system has also been followed closely in the use of the symbols DC, IC and MC to represent death, indeterminate and medical, respectively. Apparently C is used merely to complete a two-letter code, and the confusion resulting from the use of a superfluous letter more than offsets the lack of uniformity which would result from its omission.

Those who will most frequently use a system of notation such as this must often issue memoranda involving its use. These memoranda must be typed, and here they encounter the difficulty of copying the Greek letters, which usually must be put in by hand. Greek letters are in general use in mathematical treatises, but it would seem that the practical difficulties arising from their use in the work of compensation actuaries make it advisable to avoid them if possible. This point has been well illustrated in the recent study of schedule rating which has been made by the National Council. The use of  $\pi$  might be avoided by using the symbol  $p$  with a superscript  $B$  to indicate the basic pure premium. L. R. has become generally known as an abbreviation for loss ratio and its use would obviate the necessity of using the Greek letter  $\rho$ . During the rate revision the Actuarial Committee of the National Council have used "a" to designate an amendment factor. It was originally intended for alpha, but because of the difficulty in typing became "a" in general practice.

In order to become well known a system of notation must be frequently used. If it contains too many complicated terms, many of which are seldom used, it tends to become confusing, especially to the beginner. It is doubtful whether even those actuaries who are constantly in touch with compensation rate-making will ever memorize so complicated or elaborate a system of notation. Such expressions as "Number of temporary total cases in the American Accident Table with the duration of disability of more than thirty weeks," the symbol for which is given as  ${}_{30}TT$ , will be seldom used, and because of that fact will never become well-known expressions. The purpose in developing such a system of notation is to secure abbreviations for terms and expressions in frequent use, and superfluous terms become merely an encumbrance.

Mr. Perkins has not designated any symbol for premium and loss development factors. Such ratios are used in developing projection factors and the present indications are that they will also be used in developing rates for other forms of casualty insurance. So far no abbreviation has been used for these expressions and it would be well if such symbols might be developed as a part of the standard notation.

AN AMERICAN ACCIDENT TABLE—OLIVE E. OUTWATER.

VOL. VII, PAGE 57.

WRITTEN DISCUSSION.

MR. E. H. DOWNEY:

The *American Accident Table* is constructed upon the same general plan, from materials of much the same sort, and by much the same methods as the famous *Standard Accident Table* of Dr. Rubinow. It presents, not the actual severity distribution of accidents in a given experience, but the hypothetical distribution of injuries in a synthetized experience.

Dr. Rubinow relied mainly upon European experience, had in different countries, under dissimilar laws, and compiled upon disparate plans. The compilers of the *American Table* confined themselves to American data, gathered from many States, accumulated under unlike laws and compiled in dissimilar ways. The synthesis in each case is effected by a species of interpolation, grounded upon the assumption that experience in any one jurisdiction is typical of universal experience, and that what is omitted from one statistical series may, without misgiving, be supplied from another. The close similarity of results in the two compilations may go far to justify the method.

Few of the American Commonwealths compile or publish accident statistics of any sort, and no two of these issue their statistics in comparable form. Dependable data are limited altogether to compensable accidents and the definition of compensable accident is far from uniform. To get over this difficulty the compilers of the *American Table* adjusted the number of compensable accidents in States with a long waiting period to the relative number reported in States with a shorter waiting period. Similar adjustments were made in the number of major and minor permanents and even of permanent totals. For it is obvious that few minor permanents will be recorded in a jurisdiction which compensates such injuries on the basis of temporary total disability only; that the number of major permanents, not dismemberments, will be greater in a jurisdiction which provides specific indemnity for such injuries than

under an act which allows compensation only for loss of earnings, and that the number of permanent total disabilities recognized as such will be greater where life pensions are allowed than when compensation is limited to four hundred weeks. Lastly, the relative number of major permanent disabilities is greater in a mature experience than in an experience of four or five years. These considerations doubtless account for the relative deficiency of serious injuries in the *American Table* as compared with the Rubinow Table.

Within the limits imposed by the data used and the methods employed the work is admirably done. No better compilation could be hoped for from the American data now available. Miss Outwater's presentation is likewise excellent.

Apart from shortcomings inherent in the incommensurable character of the basic statistics, a question may here be ventured as to the utility of any standard accident table which purports to cover all industries. For the purposes of a general survey of industrial injuries we need, not a sample, but the total experience. For the purposes of compensation legislation in a given State we need, not a hypothetical cross-section of country-wide experience, but the actual experience of the given State. And for the purpose of rate-making we need, not the severity distribution of accidents in general, but the severity distribution of accidents in particular industries. The number of fatalities per 1,000 compensable accidents in Pennsylvania experience (waiting period, two weeks) is 63 in anthracite mining, 60 in iron erection, 55 in stone quarrying, 20 in rolling mills, 10 in machine shops, 10 in silk manufacturing, 6 in cigar making. The number of major permanent disabilities per 1,000 compensable accidents, in the same experience, is 4 in department stores, 20 in machine shops, 42 in stone quarries, 90 in laundries. The relative frequency of the several permanent injuries is likewise variable—mostly eyes in quarries, mines and foundries, mostly hands in laundries, bake shops and sheet-metal establishments. So also with dependency distribution and remarriage rates—what holds for bituminous mining will not hold for the building trades nor the textile industry. There is even some reason to suppose (though the fact has not been ascertained) that the duration of temporary disability varies markedly from industry to industry. For most of the purposes which it may be applied, in short, a generalized accident table is rather calculated to mislead than to inform.

#### CARL HOOKSTADT:

Six years ago Dr. I. M. Rubinow published his famous Standard Accident Table which gives the severity distribution of any given 100,000 industrial accidents. This table, which has been extensively used in the formulation of compensation insurance rates, was based primarily upon European statistics, since little reliable accident experience in the United States was available at the time.

Since then sufficient American experience has developed to allow the compilation of an accident table based upon American accident statistics. Such a table has been constructed by Miss Olive E. Outwater, actuary of the National Workmen's Compensation Service Bureau. The severity distribution of this American Accident Table was determined from two sets of data. The distribution of the compensable accidents was based upon the returns made by insurance carriers to the National Council on Workmen's Compensation Insurance as shown by Schedule "Z," while the distribution of non-compensable accidents was based on the reports of certain State industrial accident commissions.

The following tabular statement shows the severity distribution according to each table:

Type of Injury	Probable Distribution of a Given 100,000 Accidents According to the	
	American Table (Outwater)	Standard Table (Rubinow)
Total .....	762	932
Permanent total.....	62	110
Permanent partial.....	3,788	4,765
Temporary total.....	95,388	94,193
Total .....	100,000	100,000

An analysis of the Standard and American tables shows a remarkable similarity of distribution of fatal, permanent total and permanent partial disability accidents. This is brought out more clearly in the following table, which shows the numerical relation of each group to the others:

Type of Injury.	Number of Accidents According to		Percent of Accidents of to	
	American Table.	Standard Table.	American Table.	Standard Table.
Fatal.....	762	932	16.5	16.0
Permanent total.....	62	110	1.3	1.9
Permanent partial...	3788	4765	82.1	82.1
Total.....	4612	5807	100.0	100.0

It will be noted that the percentage of permanent partials is exactly the same in each table, namely, 82.1 percent, while the percentage of fatals is .5 percent more and the permanent totals .6 percent less in the American table than in the Standard table. The American table, being based exclusively upon the accident data of insured employers, does not include a large proportion of the mining and steel industries, which carry their own risks. In these the

fatality and permanent total disability rates are proportionately high. Had the accident experience of all employers, insured as well as self-insured, been taken into account in constructing the American Accident Table, it might have produced slightly different results.

As regards the temporary total disabilities, the two tables show considerable variation. According to the American table, the ratio of the combined fatals, permanent totals and permanent partials to temporary totals is 1 to 20.8, whereas according to the Standard table this ratio is 1 to 16.2. The former table, therefore, produces a relatively greater number of temporary totals. This disparity between temporary totals and non-temporary totals is sufficiently great to raise the question of accuracy. Inasmuch as the ratios between fatals, permanent totals and permanent partials is practically the same in each table, it can probably be safely assumed that these ratios are correct, and that the error lies with the temporary totals. Either the number given in the American table (95,388) is too large or the number in the Standard table (94,193) is too small. In my judgment the American table produces too great a number of temporary totals as compared with all other accidents. This is due to the compiler's faulty method of computation, particularly to the use of inaccurate, dissimilar and uncomparable accident data in State reports.

As already noted, the distribution of compensable accidents in the American Table was based upon Schedule "Z" returns, while the distribution of non-compensable temporary total disability accidents was based upon the accident reports of State industrial commissions. To obtain the greatest possible exposure the data of every State in which the statistics were presumably comparable were used. The number of accidents under 14 days was based upon the data of five States (California, Ohio, Oregon, Washington and West Virginia), but the distribution of this total into days was made upon the California data alone, since no other statistics were available at that time. While it is essential that the exposure be sufficiently large to eliminate chance variations, it is even more important that the data used be accurate and comparable. Merely to increase the accident exposure by adding together an agglomeration of figures without regard to their accuracy or comparability does not necessarily increase its dependability. In fact, enlarging the exposure by the inclusion of inaccurate data decreases its dependability. The 95,388 temporary total disability accidents in the American table are stated to be tabulatable accidents—*i. e.*, those in which the disability extends beyond the day or shift on which the injury occurred—and inasmuch as these figures are based upon State accident statistics, it follows that the latter should also include only tabulatable accidents. Again, in order that the statistics of the several States may be comparable, all of the industrial acci-

dents which occur should be reported; in other words, there should be complete reporting. It is exceedingly questionable whether either of these two conditions obtain in the State data used. In some of the States the statistics in all probability include non-tabulatable accidents, while in one State, at least, undoubtedly a large proportion of the minor accidents are not reported.

The following table shows the percent of temporary total disability accidents of seven days or less:

State.	Percent of Temporary Total Disability Accidents Ending in		
	3 Days or Less.	4 to 7 Days.	7 Days or Less.
Massachusetts (1919).....	17	25	42
California (1919).....	26	22	48
California (1915-1918).....	—	—	49
Oregon (1916-1919).....	—	—	39 <sup>a</sup>
Washington (1913-1917).....	—	—	18
Ohio (1914-1915).....	—	—	54
Ohio (1915-1916).....	—	—	60
W. Virginia (1913-1914).....	—	—	47
Standard table.....	—	—	40
American table.....	25	22	47

It will be noted that the percent of accidents whose disability ends in 1 week or less ranges from 18 in Washington to 60 in Ohio. Massachusetts (42 percent), Oregon (39 percent) and the Standard table (40 percent) are approximately the same as are California (48 and 49 percent), West Virginia (47 percent) and the American table (47 percent). The great variation in Washington (18 percent) may be due to a low minor accident frequency rate in the State or it may be due to the fact, which is obviously the case, that a large proportion of these minor accidents are not reported. Oregon with similar industries shows 39 percent under eight days.

Let us examine in more detail the accident statistics of each State under consideration and see just what accidents are included. Massachusetts, as far as I know, is the only State in which non-tabulatable disability accidents are definitely excluded from its accident statistics. California excludes the no-disability accidents from its tabulations, but apparently includes all disability accidents whether tabulatable or not\*. Furthermore, California shows a large number of one-day disability accidents. When one considers that in Oregon and Indiana (the only other States in which such data are available) the number of accidents of one day's disability is less than those of two days' disability, there is a strong presumption in the belief that the California figures include accidents of less than one day's disability; in other words, it includes non-tabulatable accidents. In Oregon, which has no waiting period, all disability

\* 1916, 34 percent; 1917, 36 percent; 1918, 42 percent; 1919, 41 percent.

accidents are compensated and presumably reported. In Ohio, which shows the largest percentage of accidents under eight days (54 to 60 percent), all accidents requiring medical aid must be reported, whether or not such accidents result in time loss. Possibly the Ohio figures also include a number of accidents resulting in no disability and requiring no medical aid. There is nothing in the Ohio report which shows what accidents are or are not included in the tables used. In West Virginia all disability accidents are required to be reported. Since the accident report does not state whether the tabulations include only tabulatable accidents, it is probably safe to assume that these tabulations include all disability accidents reported, whether tabulatable or not.

In view of their dissimilarity the above figures can not be combined for purposes of comparison. It is like trying to ascertain the correct time by taking an average of several clocks; such an average can only be accidentally correct. Furthermore, any errors due to dissimilarity in the data used are magnified by the weighted nature of the data. For example, the two States of California and Ohio account for over 200,000 of the 223,000 accidents under eight days used in the American table. These two States show the highest percentage of accidents under eight days, and if they contain non-tabulatable accidents, as is apparently the case, their very preponderance will aggravate the error.

Another factor which will effect the distribution is the fact that the compensable accidents as shown in the tabulations of the State reports used have been adjudicated by the commissions and the non-industrial accidents have presumably been eliminated, whereas such non-industrial accidents or those not arising out of the employment have not been eliminated from the non-compensable accidents. The ratios based upon these figures, therefore, would not be accurate, since the non-compensable accidents embody certain types of accidents not found in the compensable classes.

Because of the inclusion, therefore, of non-tabulatable accidents the reduction or conversion factors used by the compiler of the American Accident Table are too large, and consequently the number of temporary total disabilities thus produced in this table is too large. In my judgment more reliable results would be produced if a smaller exposure were used, if such data is reasonably accurate and complete, than to use a large exposure composed of incomplete, dissimilar and incomparable data. I believe that the accident data of Massachusetts, which probably has the most complete and most accurate system of accident reporting, would produce more accurate results than the method followed in the construction of the American Accident Table. Incidentally it may be noted that the Massachusetts distribution approximates that of the Standard Accident Table.

The distribution of temporary disability accidents under two



weeks in the American Accident Table is based upon the combined data of the five States mentioned, but the distribution by days, as already noted, is based exclusively upon the California data, inasmuch as these figures were the only ones available. According to the California data, the one-day accident group is the largest, the number gradually decreasing up to the seventh day. I question whether such a distribution is in accordance with the actual facts. As already noted, the one-day group undoubtedly contains a number of non-tabulatable accidents. Furthermore, the Oregon and Indiana statistics show an increasing number up to the third day, while an analysis of the accidents in the iron and steel industry shows the number to increase up to about the seventh day. Usually in the case of a minor injury the workman will return to work the day following the injury, if at all possible. If the injury is severe enough to prevent the worker from returning to work the day after the injury, it is severe enough to disable him for three or four days, since it will require several days for the bruise or laceration to heal.

Another factor which perhaps will affect the accuracy of the American Accident Table is the fact that as far as compensable accidents are concerned the distribution was based exclusively upon the experience of the insured employers. A large bulk of the iron and steel industry and mining industries, for example, are not insured and consequently their experience is not incorporated in Schedule Z. Inasmuch as these industries have relatively high fatality and permanent total disability rates, their exclusion would produce a distribution in which the number of fatalities and permanent total disabilities would be too small.

The great variation in the severity distribution of accidents between coal mining and all other industries may be seen from the following table, which shows the accident rates per \$10,000,000 payroll by industry and by type of injury in Pennsylvania for the years 1916-1919.

Industry.	Accidents per \$10,000,000 of Payroll.		
	Death and P. T. D.	Major Permanent.	Temporary Compensable.
All industries except coal mining ..	6.9	5.2	223.7
Anthracite mining.....	50.6	14.9	675.0
Bituminous mining.....	27.0	12.5	531.0

I would also suggest that the distribution of temporary total disabilities be carried one week further and show the number of accidents in which the disabilities end in the twenty-sixth week. The American table stops just one week short of a half year.

The above suggestions and comments, needless to say, are not offered in a spirit of criticism, but in the hope that they may be of some assistance in the formulation of a more accurate and scientific American Accident Table.

## AUTHOR'S REVIEW OF THE DISCUSSION.

MISS OLIVE E. OUTWATER:

One of the fundamental principles of insurance is that losses shall be distributed among those exposed to risk. Not all those who are exposed will suffer loss, but premiums are allotted according to the value of the risk's expectation of loss, as nearly as that value can be determined. In the early days of insurance losses were distributed equally without regard to variations in hazard. As insurance advanced, attempts were made to distribute premiums in proportion to losses expected, and various degrees of refinement have been attained in different lines of insurance. We have not yet reached the point, however, where we can measure the exact hazard of any risk, and we are still compelled to use approximations and averages to a greater or less degree. In the process of rate making for workmen's compensation insurance an accident frequency table has been required and the American Table was compiled during the recent rate revision as an average table for all insured industries. Mr. Downey in his criticism questions the utility of any standard accident table which purports to cover all industries. An accident frequency and duration of disability table for each industry would undoubtedly be a great help in measuring the true hazard of classes of industry. But no one industry has yet produced enough accidents, complete records of which have been kept, to furnish a dependable accident table. The distribution of accidents as to nature of injury and duration of disability varies greatly from one industry to another. No accident table could possibly fit all industries. This point has been well illustrated in Mr. Downey's criticism. However, rate making and the accumulation of statistics have not yet reached the stage where it is possible to entirely avoid the use of an accident table, and because of the impossibility of compiling a table for each industry use is made of an average table. Until more statistics are available we must either use an average table or none at all. It may be that in the next rate revision we will be able to avoid the use of a formal accident distribution, but that time has not yet been reached, and the use of an average table until greater refinement can be secured does not conflict in any way with the principles of insurance.

In Mr. Hookstadt's criticism the accuracy of the American Accident Table is questioned because, as far as compensable accidents are concerned, it is based exclusively upon the experience of insured employers. Perhaps we did not make clear the purpose of the American Accident Table or its limitations. No attempt was made to compile a table which should be an average for all industries in the United States. As stated before, such a table would not fit any industries except those which approximate the average. This table

was compiled for use in the 1920 revision of workmen's compensation rates, and the average required was therefore not an average for all industries in the country, but rather for those industries insured in participating and non-participating insurance companies. The inclusion of the experience of self-insurers, were it available, would therefore tend to inaccuracy rather than accuracy for our purpose. Had the high fatality and permanent total rates of self-insured mines and iron and steel plants been included in the tabulation, insured industries would be charged with too high an average D. & P. T. D. rate.

Mr. Hookstadt believes that the number of temporary total disabilities given in the American Accident Table is too large and bases his conclusions on the use of "inaccurate dissimilar and uncomparable accident data in State reports." He questions these statistics first as to completeness of report and second as to the inclusion of tabulatable accidents only. His criticism is valid concerning the Washington data. We have the statement of Mr. Harris, statistician of the Department of Labor and Industries of the State of Washington, that prior to 1917 injuries resulting in two or three days' time lost were seldom reported. The number of cases in the Washington data was comparatively small and the effect of its elimination would be to increase rather than decrease the number of temporary total cases in the table. California, whose statistics make up nearly half of the total used in this compilation, does report non-tabulatable accidents, but they are reported as such and were not included in the tabulation used for the Accident Table. We have a statement from the Industrial Accident Commission of California that tabulatable accidents are defined as accidents resulting in disability which lasts beyond the day or shift on which the injury occurred. The figures given in Table B, if checked with the original figures in the California reports, will show that only tabulatable accidents are included.

We endeavored to get a definite statement from the Industrial Accident Commission of Ohio as to the exact extent of their reports, but were unable to obtain any information. The Ohio figures, however, do not vary widely from the California statistics.

Mr. Hookstadt refers particularly to the Massachusetts statistics as definitely excluding non-tabulatable accidents. At the time the American Accident Table was compiled all available Massachusetts reports included all non-fatal injuries in temporary total disability distributions. It was therefore impossible to use these figures which included disability in P. P. cases in making up a table of disability for T. T. cases only. However, since that time two Massachusetts reports have appeared giving the distribution for temporary total only. Combining the data for California and Massachusetts, two States producing a dependable volume of experience and concerning whose statistics there is no doubt, the following distribution is secured:

Duration.	California.	Mass. 7-1-17 to 7-1-19.	Total.	Percent.	Percent in American Accident Table.
1-3 days.....	54,311	23,538	77,849	22.6	25.4
4-7 days.....	46,456	36,617	83,073	24.1	21.7
8-10 days.....	20,628	13,746	34,374	10.0	9.3
11-14 days.....	18,825	11,504	30,329	8.8	9.2
2-4 weeks.....	29,487	24,568	54,055	15.7	18.0
4-8 weeks.....	23,077	19,100	42,177	12.2	10.7
8-13 weeks.....	7,405	6,377	13,782	4.0	3.2
13 wks. or over.....	4,346	4,550	8,896	2.6	2.4
	204,535	140,000	344,535	100.0	99.9

It will be noticed that the addition of the Massachusetts figures decreases the percentage for the first three days, but increases it for the fourth to the seventh days, leaving the total percentage for the first week almost exactly the same as that in the American Accident Table. On the whole it seems highly satisfactory that the combination of the statistics of two States so widely separated in nature of industries, as well as geographically, should show so little variation from the figures of the American Table.

One question still remains, however. Should the distribution curve increase for the first two or three days, as Mr. Hookstadt seems to believe, or should it constantly decrease from the beginning as does California? The Oregon and Indiana statistics to which Mr. Hookstadt refers are too limited in extent to prove anything, nor do we know the exact nature of the reports. The Massachusetts statistics are not given by days, but they indicate a different-shaped curve than California. It may be that this difference is due to the difference in industries between the two States. Our table purports only to be an average table and as such can not follow exclusively either curve. Moreover, time lost varies with industrial conditions and is undoubtedly different for periods of high wages and plenty of work than for periods of low wages and much unemployment. Since no State for which Schedule "Z" was reported had during 1916 and 1917 a waiting period of less than one week, the reduction factors used to obtain tabulatable from compensable accidents would not be affected by this question, and I see no reason for believing that the number of T. T. disabilities in the frequency distribution is too large. The fact that it is larger in proportion to number of serious accidents than is that given in the Standard Table is quite to be expected. If extensive safety campaigns, the accident prevention work carried on by safety experts, and the guarding of machinery in our American factories have been of any avail, the severity as well as the frequency of accidents should have decreased.

Suggestion is made that the distribution of temporary total be

carried out for one more week, thus completing the half year. This was not done originally, because the available statistics gave us no information as to number of accidents terminating in the twenty-sixth week. However, a value has since been interpolated by Mr. Dorweiler for use in the construction of his disability tables. He assigned 40 cases to the twenty-sixth week, leaving 569 cases for the period greater than six months.

GROUP HEALTH INSURANCE—JAMES D. CRAIG.

VOL. VII, PAGE 78.

WRITTEN DISCUSSION.

MR. WALTER I. KING:

As Mr. Craig's paper is a résumé of general principles underlying the writing of Group Health Insurance, it doesn't lend itself to criticism, constructive or destructive, yet I believe that it is a valuable paper for the members of this Society, and our appreciation is due him for the able manner in which, in his customary way, he has filled a need.

The underwriting of Group Insurance is a distinct science about which we still have much to learn. There are certain general principles which, if followed, will save considerable loss during the constructive period. These are very well outlined in the paper.

In addition to the background given Group Insurance in the opening paragraph of this paper, I would like to add my own ideas as to the economic, or the philosophic, if you please, basis of Group Insurance.

In workmen's compensation laws we recognize that the cost of industrial accidents, and under certain circumstances industrial diseases, are a legitimate charge against the cost of production. This theory, in its broadest sense, says that the family that furnishes the worker to an industry is entitled to compensation through adverse circumstances, provided the causes of circumstances arise out of the industry. More enlightened management is beginning to realize that other adverse circumstances over which the employee or his family has no control are worthy of consideration, and to a certain extent the cost is a legitimate charge to production. Chief among these are unemployment, sickness and death. Group Insurance cares for the last two—*i.e.*, sickness and death—Group Disability Insurance the former, and Group Life Insurance the latter. Group Disability Insurance, then, continues the wage to the employee's family during the sickness of the wage earner and Group Insurance after his death, and to this extent, therefore, they are one and the same thing, and as such the underwriting rules appli-

cable to one would likewise be applicable to the other. They are both Employers' Insurance granting insurance coverage to groups of employees, and the laws which govern the morbidity rate on the one hand, or the death rate on the other, are laws found only in groups of employees. If we are to have its true morbidity experience, therefore, Group Insurance should only be written on employee groups where its true function can be performed. Any other group of people not all employed by one employer would give a different rate of morbidity or mortality, because there would be many extraneous influences affecting the rate, and a company writing such insurance would experience an entirely different cost than is ordinarily found in Group Insurance.

Mr. Craig has pointed out that the rules limiting Group Disability Insurance are very similar to those limiting Group Life Insurance. The reason for this is obvious in light of the above explanation.

One of the chief characteristics of Employers' Insurance of employees, therefore of Group Insurance, which affects the rate of morbidity or mortality is the absence of self-selection on the part of the individuals insured. As a rule, the insurance is given by the employer to his employee. He makes all decisions in regard to it as to the amount of coverage and the time of coverage, thus eliminating any personal selection and its adverse effect on morbidity or mortality. In the event of a joint contribution between employer and employee the matter of personal selection of necessity enters. It is therefore necessary to eliminate, as far as possible, the adverse effect of this selection. Such an attempt was made by requiring that if any group is to be covered on a contributory basis at least 75 percent of the eligible employees be so covered. This is quite as necessary in Group Disability Insurance as in Group Life Insurance. This fundamental principle must be adhered to, as any deviation from it will markedly affect the cost of the insurance. It seems more necessary to bear down on this point in connection with Group Disability Insurance than with Group Life Insurance, as the rate charged for Group Disability Insurance is uniform at all ages, and therefore this form of insurance more readily lends itself to a joint contribution basis, and is more often sold on that basis.

In charging a uniform premium at all ages it is quite necessary that we watch it for the extremely high age groups. These are bound to give a high rate of morbidity and should be more carefully selected.

#### *Contingencies Covered.*

This division of the subject can only be intelligently surveyed by taking into consideration the function which Group Disability Insurance attempts to perform. If the purpose of granting Group Disability Insurance is to continue the wages of disabled employees, or at least a portion of them through period of disability, it is nec-

essary to make the coverage broad enough to cover this want effectively, but not so broad as to grant unemployment insurance under the name of Group Disability Insurance. Thus, while we must be open-minded and broad-minded in the rules regulating the contingencies covered, it is the one place where the results of the moral hazard will more quickly react against the company, if not closely guarded.

In commenting upon the various features of the contingencies covered mentioned by Mr. Craig, I would like to call attention to his statement that the disability must be contracted during the term of the policy. I do not believe that we can be too technical in insisting that the disability be contracted during this period. If an employee be working at the time the insurance contract is consummated, even though he has in incubation the germs of typhoid fever, scarlet fever or any other disability, I believe when this disability occurs it is an obligation which the insurance company must meet. We can not be too technical in the handling of our Group Disability Insurance.

#### *Coverages.*

It may seem to some of us that limiting the amount of coverage granted under Group Disability Insurance to two-thirds of wage is a hardship and not sufficiently broad-minded. It is perfectly true that the expenses of the working man increase while he is disabled, and from that viewpoint his income, in reality, should be greater. At the same time, human nature is such that no premium would be adequate to cover the cost of a policy which would pay a man more during a period of disability than he was able to earn while well. Our own experience is perfectly clear that the rate of morbidity increases in direct ratio with the coverage granted under a policy. The groups paying a \$10-a-week benefit, irrespective of wage, have a much lower morbidity rate than the groups paying 80 percent of wage, the maximum ordinarily granted. In other words, at the present time, at any rate, we have not a sufficient control over malingering to allow the insurance business to bear full cost of loss of wage arising from disability. This loss must be born by the employee and the employer jointly if we are to eliminate malingering. It seems quite necessary, therefore, especially in view of the fact that in Group Insurance one has no check upon the other amount of insurance carried, to limit the group disability coverage to two-thirds of wage.

#### *Adverse Selection.*

In considering the subject of adverse selection, Mr. Craig has viewed it more from the point of adverse selection exercised by the individual in the risk. There is an adverse selection exercised by groups which is worthy of consideration. This may be conscious or unconscious, but among groups of apparently the same class we

find wide variance in the rate of morbidity or mortality. We can only conclude, therefore, that the peculiarities surrounding the individual groups need our careful consideration not only at the inception of the contract, but throughout its history. This point can well be illustrated by two cases—one a store in Massachusetts and the other a manufacturing plant in Connecticut.

In the case of the store the management had worked out a bonus system whereby the clerks received a certain percentage of all sales made during a week over a certain amount. Under this scheme it was quite possible for some of them to earn an extra bonus of \$100 a month if sales were good or if business was good, and they were actively on the job. We covered this case for Group Disability Insurance and had practically no labor turnover and absolutely no malingering, not on account of the Group Insurance, but on account of the bonus system adopted. It is needless to say that the morbidity rate of this case was very low.

To offset this we had a very high morbidity rate on a manufacturing plant in Connecticut which, to all appearances, was a model plant, and we could not understand at first why we had this high rate. Careful investigation, however, revealed the following facts: It was a contributory case, the employer and employees each contributing 50 percent of the cost, the employer deducting the employee's contribution from his wage, the management collecting from the employees a month in advance. Therefore on every case of termination of employment the management really owed the terminated employee a month's premium which had been deducted on the insurance, as the insurance was supposed to cease with termination of employment. Instead of returning this money the employer maintained the employee's name on the payroll, as far as insurance was concerned, for another month, and the insurance company was consequently paying for unemployment insurance during that time.

These illustrations bring out clearly the necessity of understanding the idiosyncracies, so to speak, of each group, if we are to have a more or less uniform rate of morbidity in our groups.

#### *Commission.*

In this connection I wish to commend the attitude of the companies in their attempt to keep acquisition cost at a reasonable basis.

In furnishing Group Insurance the companies can, and are, performing a great public benefit, provided they return service rendered for each \$1 expended. I believe, as a whole, it is essential to return in claims at least 70 percent of premiums collected. Otherwise the insured could better afford to carry this insurance himself. If we are to return so large a percentage, then all expense must be kept at a minimum, paying reasonable compensation for services rendered. I believe the companies are doing this on



the scale of commissions adopted and hope they will continue along the same lines.

MR. J. H. WOODWARD:

We are indebted to Mr. Craig for bringing before us a subject of far-reaching possibilities and concerning which little or nothing has been hitherto contributed to the proceedings of this or other actuarial societies.

In his introduction Mr. Craig shows how group health insurance is a more or less logical development of workmen's compensation insurance on one hand and group life insurance on the other. It grows out of workmen's compensation insurance, because the legal requirement that the employer shall provide indemnity for his employees for disabilities arising out of the employment leads the more enlightened employer to the thought of providing indemnity for his employees for all disability whether arising out of the employment or not. On the other hand, the form of contract and the methods of underwriting follow the lines of development of group life insurance which, in turn, has been strongly influenced as to its technical structure by the fact that it has been introduced and underwritten by companies primarily engaged in the business of individual life insurance.

It is pointed out by the author of the paper that any number of persons affiliated for a certain purpose might conceivably form a group for the purpose of being insured against disability. He then proceeds to explain why the interests of sound underwriting are generally best served when only those groups consisting of employees of one employer are taken as the insurable units. The fundamental reason for this is because, as in the case of group life insurance, group health insurance operates more successfully when the basis of the affiliation of the individual with the group is a more important or fundamental one than that of merely securing insurance and where, therefore, the motive for joining or leaving the group does not have to do primarily with the securing of the insurance. For this reason it is more satisfactory to underwrite groups consisting of the entire number of employees in an establishment than groups consisting of benevolent or mutual benefit associations—whether they are establishment associations or not—which have been formed primarily for the purpose of securing insurance. In the one case we reduce adverse selection on the part of the individual to a minimum; in the other conditions invite such selection both with respect to joining the group and to withdrawal therefrom. There are, however, exceptional groups which are in every way insurable, but which, nevertheless, do not consist of employees of one employer. It is not always easy to formulate reasons why insurance should be denied to such groups.

Experience with group life underwriting has demonstrated that non-contributory groups are more desirable in practice than are groups where the insurance is partly paid for by the employee and where inclusion in the group is voluntary on his part. It is unfortunate that in the field of group health insurance there should be so considerable a demand for groups on a contributory and therefore voluntary basis. The reason for this, however, seems quite natural. Many employers feel that some contribution on the part of the employee is advisable in order that he may not feel that he is being made the object of philanthropy, and that he may fully appreciate the benefits that he is to receive from the insurance. That the employee must pay for a thing if he is to set a proper value upon it is one of the perhaps not unreasonable beliefs of the average employer. His objection to non-contributory schemes is not so much an evidence of parsimony as it is a matter of principle. His insight into the technique of insurance is naturally superficial and he usually fails to give sufficient weight to the disadvantages attending the contributory plan. Another source of the demand for non-contributory plans is the fact, pointed out by Mr. Craig, that many establishments have mutual benefit associations, some of which already undertake to pay sickness benefits, and it is desired to continue the insurance through the instrumentality of the association. It is to be expected that practical experience with the working out of insurance plans and the gradual development of a less individualistic point of view will ultimately tend to increase the demand for groups on a non-contributory basis.

The author states (page 80) that "the contract should be issued to the employer, who should pay a substantial proportion of the premiums, in order to eliminate malingering by making the employee's return to work a matter of pecuniary interest to him." It is not clear how the interest of the employer in the employee's prompt return to work is in any way affected by the question of who pays the premium. It would seem that a better reason for having a substantial portion of the premium paid by the employer is to prevent adverse selection and a dwindling away of the group, by making it as attractive as possible for employees both to come in and to remain in. Further, although the rate of premium charged is the same for all ages, the true rate of disability increases materially from age to age, with the result that there is a considerably greater inducement for the older employees to enter and remain in the scheme than for the younger. Even where the employer contributes a substantial proportion of the cost there is a certain amount of inequity under a contributory plan where the young men pay the same as do the old for their insurance. The parallelism between a contributory group and an old-fashioned assessment association is so obvious as to suggest the dangers to be avoided.

That these dangers are not to be regarded as merely academic is evident from a consideration of the increase in the sickness rate from age to age, as shown in the Manchester Unity experience. Thus the sickness rate in weeks per annum (M. U., 1893-97) for certain age groups is as follows:

Ages.	Rate of Sickness.
20 to 24.....	.90
30 to 34.....	1.06
40 to 44.....	1.58
50 to 54.....	2.75
60 to 64.....	6.31
70 to 74.....	17.40

If, as Mr. Cammack found, the average effective age of the group business is age 40, then where the premiums are being paid half by the employer and half by the employee, the employee at age 20 is really paying for very much more than half the value of his current protection. Membership in the group being voluntary, we need not be surprised to find that the plan makes a greater appeal to the older employees, that the average age may gradually increase, and that we may presently find ourselves confronted by some of the insidious troubles of assessmentism. On the other hand, the fact that the contribution of the employee generally takes the form of an authorized deduction from his wages tends to make withdrawals unlikely once the employee has elected to come in.

It seems particularly important during the early stages of development of a new type of insurance that the terminology which is allowed to grow up should be as far as possible consistent and unambiguous. On page 82 the author refers to the time which is required to elapse after the commencement of employment before the employee comes within the coverage of the contract as the "waiting period." On the previous page Mr. Craig has also used the term "waiting period" to describe the preliminary period of disability in respect of which no indemnity is provided. It would appear desirable to limit the use of the expression "waiting period" to instances of the latter description and to refer to the period which is required to elapse before employees come under the policy coverage as the "probationary period."

On page 89 Mr. Craig refers to some of the difficulties which are encountered where this insurance is written on a payroll basis—that is to say, where the benefit is quoted as a specified percentage of the wages and the premium computed as a percentage of the payroll—and indicates a method for adjusting the premium to take proper account of the probationary period. He says, "some companies, therefore, make a flat reduction of five percent if there is a one month's waiting period, ten percent if there is a three months' waiting period, and fifteen percent if there is a six months' waiting

period." It may well be questioned whether so arbitrary a rule will produce satisfactory results in practice. The purpose, of course, is to reduce the bookkeeping labor which would be involved in separating the insured payroll from the uninsured payroll. Where such a separation, however, is for the purpose of bringing about a reduction in the premium payable, we do not find the same disposition on the part of the employer to lay stress on the amount of labor involved as would be the case where an increase in the premium would be the result. It is evident that such percentage can be only the roughest kind of an approximation and will vary materially according to the rate of labor turnover which is being experienced. It would seem to be a fairer and more satisfactory method to go to the necessary trouble of excluding the payroll actually uninsured.

The possible danger arising through the "risk of other insurance" is referred to in an interesting way. After pointing out the impracticability of reducing the indemnity under the group contract because of additional amounts of indemnity which may be payable to the employee from other sources, it is stated that if this should result in abnormal claims the premium should be increased or the dividend reduced. In view of the relatively small amount of sickness benefits which are generally carried among the industrial classes, the question is an academic one. Mr. Craig's solution, nevertheless, should, it seems to me, be challenged as a matter of theory on the ground that it would tend to encourage malingering, and that it appears to assume that excess losses due to lack of insurable interest may be viewed with indifference provided the insurance company receives proper compensation by way of premiums. It would seem that if the question ever assumed dimensions which would make it of practical importance, the solution suggested by Mr. Craig must necessarily be regarded as contrary to public policy.

Mr. Craig concludes his comprehensive survey of the subject by appending the complete text of a form of policy for group health insurance. There are a good many interesting features in such a contract. Not the least interesting is the fact that the contract purports to be perpetual. At least that is Mr. Craig's interpretation of it. He says (page 84): "There is no cancellation clause. The group policy must be renewed at the option of the employer, but the company reserves the right to adjust the premium rates each year." The policy itself says, "This policy may be renewed from year to year for a further term of one year by and with the consent of the company at such premium rates as may be determined by the company." Assuming that the contract really is perpetual, in case the employer cares to make it so, the same question arises as under group life policies, namely, whether the right to readjust the premium is tantamount, from the standpoint of practical underwriting, to the right to cancel or decline to renew.

Under such a clause it is merely necessary that the legal existence of the employer should be continuous, even though in other respects the enterprise or industry may have absolutely changed in character. This might easily lead a company into a position where it would be compelled to renew a policy on a risk, the character of which was such that, if presented to the company anew, it would not be considered on any basis whatever. For example, an enterprise which at its inception involved nothing more than a clerical office hazard might develop a coal-mining, stevedoring or other hazardous business of very considerable proportions, and a company which would not care to issue disability insurance on such risks would find itself in the position of having one on its books. The practical difficulties of charging and collecting an adequate rate on some risks should not be overlooked, particularly when it is borne in mind that the courts might decline to sanction an increase in rate which to the judicial mind seemed prohibitive or confiscatory. Again, there may be reasons for wishing to cancel the contract which are entirely apart from the question of the adequacy of the rate, such as in the case where a group dwindles in size owing to the cessation of active business operations, and the number of employees becomes far less than the number contemplated under the general theory of group insurance.

In general it would seem that the business of group insurance is still too recent a development, both as respects group life and group disability, to permit it to be known whether non-cancellable policies which may be renewed in perpetuity—even though they reserve to the insurer the right to readjust the rate—will prove to be free from annoying and perhaps embarrassing conditions arising out of contingencies entirely unforeseen at the time the contract was entered upon.

The employees covered under Mr. Craig's contract are determined by what is described as the "formula." It is to be noted that this coverage is independent of whether or not there has been a failure on the part of the employer to furnish to the insurance company the names of all employees as they become eligible for new or additional insurance. This is a desirable provision for the reason that in any event it would be impracticable and unsatisfactory to deny liability in respect of an employee who should have been included, but who, through error, was not reported to the company.

On the other hand, one of the practical difficulties with this kind of insurance is to secure prompt and accurate statements from the employer of the new eligible employees and of increases in insurance on old employees. Failure to secure this information promptly may mean a serious loss of premium income. Some employers are notably careless and delinquent in such matters and the subsequent provision in the policy permitting the company to inspect the payroll or other records of the employer for purposes of verification is an excellent one.

The liberality of the benefit clause, its simplicity and its freedom from restrictions, indicate the high social value of group disability insurance. It is only within comparatively recent years that any insurance company would have had the courage to issue such a contract. After stating that the employee must be "wholly and continuously disabled and prevented from performing any and every duty of his or her occupation," it is further provided that the benefit will continue "until the insured is able to engage in some suitable occupation or employment for wage or profit." This is a liberal provision, indeed, and it would be interesting to know to what extent it tended to increase the duration of disability during periods of industrial depression when there is much unemployment and when it is more than usually difficult for the convalescent employee to find "some suitable occupation or employment for wage or profit."

The contract under consideration has no provision under which the company undertakes to issue for delivery to the insured employee an individual certificate describing his insurance protection. Mr. Craig does not state in his paper whether it is the practice of his company to issue such certificates in the case of group disability insurance, but it would appear to be obviously convenient not to prescribe such a practice in the contract, but to follow it voluntarily where such certificates were desired. In the case of contributory groups especially it may lead to misunderstandings to have certificates outstanding where the employee has not left the employment, but is no longer insured because of the fact that he has discontinued his contribution.

Mr. Craig's remarks on the subject of commissions are of wide general interest. The solution reached of the commission problem in group insurance, both disability and life, is a hopeful factor which augurs well for the permanence and continued success of these lines of coverage.

In developing an appreciation of the high social value of group disability insurance, however, much educational work remains to be done, not merely among the employers who purchase the insurance and the employees who are its beneficiaries, but also among those actually engaged in the business of insurance. Past results with individual health insurance can not be said to have proved brilliantly successful when the tremendous insurable values which are involved are taken into account. It is peculiarly true of group health insurance that in the exploitation of this new field the social viewpoint must be kept constantly in mind and every case considered not merely as an isolated phenomenon, but also after carefully weighing the effect which is to be produced upon the ultimate development of group disability protection. The seedling requires culture different from that given the mature plant and it is possible to kill the development of a new departure by expecting too much

of it or burdening it with too many restrictions at the start. This is not said with any intention of encouraging unsound underwriting, but merely to emphasize the thought that we should approach these matters with as large a vision as possible and not close our eyes to everything beyond the obvious merits and demerits of individual cases.

The fine spirit of cooperation and mutual helpfulness which has been manifested by the companies competing for this line of insurance is a noteworthy achievement. It is in this spirit that Mr. Craig's paper has been prepared, and it will doubtless prove to be an extremely useful means for promoting education on a subject where it is so greatly needed.

#### AUTHOR'S REVIEW OF DISCUSSIONS.

##### MR. JAMES D. CRAIG :

Mr. King's remarks are really a valuable addition to the paper, and the detail given by him of some of the problems should be carefully studied by those interested in the subject.

His conception of Group Health Insurance as providing indemnity to a man's family while the man is incapacitated, with the Group Life Policy fulfilling the same function after death, illustrates how the two forms of contract supplement each other.

What has been said about the detail emphasized in Mr. King's remarks applies also to those of Mr. Woodward, but in studying these elaborations Mr. Woodward's closing remarks should be borne in mind where he says that "the seedling requires culture different from that given the mature plant, and it is possible to kill the development of a new departure by expecting too much of it or burdening it with too many restrictions at the start."

It is this attitude on the part of the underwriters that creates certain of the conditions about which Mr. Woodward gives warning. If a liberal contract can be written at a safe premium which is satisfactory to the company, the employer and the employees, too much emphasis need not be put upon the technical aspects. The 5, 10 or 15 percent reduction rule for the different waiting periods was decreed on this principle. The actual calculation would, of course, be more accurate, but if the other method gives satisfaction and relieves the employer of a great amount of expensive work, why insist upon the more technically correct method? The same principle applies to Mr. Woodward's remarks on other insurance; until experience proves that other insurance exists in such volume as to be detrimental to the public welfare, it is much more simple, and apparently more satisfactory to ignore this feature.

Underwriters are, of course, always cognizant of the dangers of over-insurance, and should the future require more stringent regu-

lations in this respect, hearty cooperation of employers can undoubtedly be anticipated.

The reasons why employers should contribute substantially to the cost of the insurance are well brought out by Mr. Woodward in discussing the statement appearing in the paper that this should be done in order to make the employees' return to work a matter of pecuniary interest to the employer. Mr. Woodward gives several reasons why the employer should contribute, but does not just see wherein the early return to work of the employees is of pecuniary interest to the employer under the Health Policy. We had in mind the thought that the cost of the contract as affected by dividends or experience ratings would be a matter of interest to the employer, and that he would be much more satisfied at receiving a dividend or a reduction in the premium for the next year than if no dividends were received, but, on the contrary, the premium rates were radically increased.

The comments on the renewal clause, coupled with the rate-making condition, are interesting, and it may be that conditions may arise under a group policy which would make the group unacceptable as a new risk in just the same way as an individual insured under a Life Policy might find himself in such a physical condition that no life insurance company would issue to him a new policy; but is this any reason why the existing policy should be cancelled?

We note Mr. Woodward's remarks: "Best results with individual health insurance can not be said to have proved brilliantly successful when the tremendous insurable values which are involved are taken into account." But whether or not a business proves brilliantly successful, or whether there are practical difficulties to be overcome, they hardly seem to offer sufficient reason for refusing to renew a contract, provided the other party performs his obligations.

The business is still in its early stages and we do not wish to encourage unsound underwriting, and are therefore very glad that Mr. Woodward has mentioned the points which occurred to him, in order that they may be given the careful consideration to which they are entitled.



## REVIEWS OF PUBLICATIONS.

RALPH H. BLANCHARD,

BOOK REVIEW EDITOR.

*Review of State Accident and Compensation Statistical Reports.*

For a number of years the Committee on Statistics of the International Association of Industrial Accident Boards and Commissions has endeavored to promote the standardization of industrial accident and compensation statistics in the several States. With this end in view the committee has formulated standards in accident reporting, classification of industries and causes, and methods of presentation. Though every year finds the statistical reports of industrial commissions more accurate and reliable, there still exists much room for improvement. The primary weakness of State reports has been (1) the incompleteness and inadequacy of the data itself and (2) the diverse and slipshod methods of presentation.

No State commission has a record of all the industrial accidents occurring within the State. The nearest approach to complete reporting is perhaps found in California and Massachusetts. In most of the States only employers under the compensation act are required to report accidents. Some States require all accidents to be reported, some require only tabulatable accidents, and others require only compensable accidents. Again, in some States the published statistics include those accidents received during a given period, irrespective of the date of their occurrence; in some they include the accidents occurring within the period covered, irrespective of when they were reported; while in other States they include only cases which were closed or settled or adjudicated during the period, regardless of when the accident occurred or when the reports were received. Several States attempt to give the total compensation and medical costs incurred within the year, but most of the commissions, in so far as they give any data as to cost at all, give only the compensation losses paid during the year or the amount awarded on closed cases, and practically none gives the total medical costs either paid or incurred. So much for the data itself. As regards methods of presentation, the same chaos and

lack of uniformity exists. The various and varying classifications of industries and causes of accidents in the several States have made futile any attempt at comparison. As a consequence most of the State accident statistics have been neither reliable nor comparable. As a matter of fact, most of the industrial commissions, immersed in details of administrative and judicial procedure, have had little time for statistics. The increasing demand, however, for exact information as to the prevalence, cause and cost of industrial accidents in the United States has induced the commissions to devote more attention to statistical work.

The fact that the accident reporting provisions of the compensation acts in many States apply to all employers, whereas the compensation provisions do not, makes the compilation of complete and comparable accident statistics difficult. The California Commission in presenting cost data uses only compensable injuries, but in its cause and industry classifications all tabulatable injuries are included. Such a policy is recommended for all States in which the accident reporting and compensation provisions are not co-terminous.

In the following pages an analysis and evaluation of the accident statistics as published in a number of recent State compensation commission reports is attempted. In order to obtain a clearer conception of the adequacy or inadequacy of these statistics, there is also presented what may be considered the minimum requirements in the way of statistical presentation of accident and compensation data.

1. All accident statistics should be given by year of occurrence, preferably the calendar year—*i. e.*, the number, severity and cost of all accidents which occurred within a given period should be treated as a unit. This is essential if accurate comparisons are to be made. If the cases closed, adjudicated or reported within the year are taken as the unit, as they are in most States, it will impair the comparison of one year with another and will make it impossible to compute reliable accident rates.

2. The total annual number of industrial accidents in the State should be classified by extent of disability. By extent of disability is meant the number of deaths with and without dependents, the number of permanent totals, permanent partials, separated into dismemberments and loss of use, the number of temporary totals classified by period of disability.

3. The total incurred compensation and medical costs should be classified by extent of disability.

4. The annual number of accidents in each industry should be classified by extent of disability.

5. Accidents should be classified by cause and extent of disability.

The foregoing requirements may be regarded as the minimum. In addition, it is desirable that the medical and compensation costs for each industry be shown. It is also essential to show accident frequency and severity rates by industry in order to ascertain (1) the relative hazards in the various industries and (2) to show the trend of the hazard. In other words, it is extremely desirable to measure and evaluate the effect of workmen's compensation laws and the efficacy of safety work in preventing accidents.

To what extent the State accident reports measure up to the above requirements may be seen from the following analyses. The States taken range from Colorado, which has practically no accident statistics, to California and Nevada, whose statistical tabulations probably approximate more closely to the recommendations of the Committee on Statistics than any other States. Unfortunately two of the largest industrial States (New York and Ohio) have published no accident statistics whatever for the past five years.

#### *Colorado.*

The latest report of the Colorado Industrial Commission devotes 111 pages to workmen's compensation, but 88 of these pages are taken up with a description of the compensation awards which contains the claim number, the names of the parties in interest, the disability involved, and the amount of the award. As far as any practical statistical value is concerned, the whole 88 pages are useless. The report contains a single conglomerate table showing the total number of accidents received, the number of claims, awards, compensation agreements, types of injuries, average weekly wages, etc. There is no table showing the total number of accidents classified by extent of disability or the cost of such accidents, neither is there any table showing the classification of accidents by industry or cause.

#### *Indiana.*

The report of the Indiana Industrial Board contains numerous detailed tables classifying accidents by industry and cause, but

owing to the haphazard and unscientific character of the classifications practically no use can be made of these tables. The so-called industry classification embraces 273 separate classifications arranged in alphabetical order. No attempt has apparently been made to separate classifications into broad industrial groups, nor is it possible in many cases to determine whether the items refer to manufacturing, trade, or personal service. Industries and occupations are run together helter-skelter—*e.g.*, the industry classification includes aeroplanes, dentists and dental supplies, dairy products, physicians, fire-proof articles, hardware, newspapers, and musical instruments. It is impossible to know whether the items “aeroplanes” or “musical instruments” mean their manufacture, sale or operation. Furthermore, in a large number of classifications (*e.g.*, boots and shoes and lumber) manufacturing and dealers are combined in a single classification. Again, many synonymous industries, such as “iron and steel” and “steel and wire,” “newspapers,” and “printing and publishing,” are given separate classifications.

The cause classification table is also hopeless. This table is divided into ten main classifications, which represent the manner of occurrence rather than the cause. The item “belts” is found seven times, but no total for belts is given, nor does the table contain any subtotals for each of the main classifications.

The report also contains tables showing classifications of accidents by nature and location of injury, wage and age, but no totals are given in any of these tables. In order to obtain the number of fractures, for example, one must add up all the individual items.

Another table shows the duration of disability by days, but in over 50 percent of these accidents the period of disability is not given. This is due to the fact that the accident report is coded and punched when received, and if the disability has not terminated when the report is received the disability period is not punched. This practically means that only the short-term disability accidents are included in the classified table, and the results consequently are not only inaccurate, but absolutely misleading. Another item in the table which is quite meaningless states that 223 “quit work at time of injury.”

Both the industry and cause classifications give merely the total number of accidents for each classification. All the tables show distribution of accidents by months—a detail that is unnecessary.

The report contains no table showing the total number of accidents classified by extent of disability, nor does it contain any data as to incurred compensation and medical costs. It does show, however, the amount paid out on closed cases during the year.

*Washington.*

The latest report of the Washington Industrial Commission contains numerous tables showing costs and classification of accidents by industry and cause. Three financial statements are given, one each for the reserve fund, accident fund and medical-aid fund. In each statement the experience by industrial classes is given. The reserve fund shows the amount of compensation paid and reserves set up for each class, while the accident fund shows the amount of claims paid and premiums received during the year. The medical-aid fund, showing the amount of medical benefits paid and medical premiums received, is kept separate from the compensation fund. None of these tables show the amount of earned premium or incurred losses for any given period. They merely show the number of premiums *collected* and compensation losses paid during the year.

Another series of tables shows a number of accidents and the amount of compensation incurred, classified by nature and location of injury, but the tables do not show what period is covered.

Another table classifies the total accidents by cause and industry. There is no particular value in such a classification, especially if the accidents are not classified by extent of disability.

A further table shows the wage loss by industry. There is nothing to show, however, whether or not the waiting period has been included or whether the wage loss given covers temporary total accidents only or also includes permanent partials; nor is the amount of compensation given in order that this might be compared with the wage loss.

The best table in the report shows the cost and severity of injuries by cause. This table is in two parts; part one dealing with injuries due to mechanical causes and part two dealing with injuries due to non-mechanical causes.

The Washington report is deficient in that it does not contain the following information:

(1) The total number of accidents occurring during the year classified by severity. (2) The incurred losses during the year for each

industry. Only the amount paid out and reserves set up on claims adjudicated during the year is given. (3) The earned premiums during the year for each industry. Only the premiums collected during the year irrespective of the period for which they were earned are given. It is impossible, therefore, to correlate the earned premiums with the incurred losses. (4) Classifications of accidents by cause and severity. (5) Inadequate headings or captions to the several tables to denote just what accidents are included and what period is covered.

### *Oregon.*

The accident and compensation statistics contained in the latest report of the Oregon Industrial Commission are exemplary from the standpoint of method, but deficient from the standpoint of data included. A basic compensation table shows for each industrial classification the payroll, total number of days worked, premiums received, premium rate, claims paid and awarded, administrative expenses, pure premium per \$100 payroll and pure premium per work day. The table is deficient in that it does not show the earned premiums or the incurred losses for a given period. It merely shows the premiums collected and the compensation losses awarded and paid during the year. As in the case of Washington, it is impossible, therefore, to correlate earned premiums with incurred losses.

The report contains a number of accident tables showing the classification of accidents by cause and extent of disability. All of these classifications, however, are based upon cases closed during the year, and not upon the accidents happening during the year. It is impossible accurately to compare one year with another. In one respect the Oregon Commission is to be particularly commended. It is one of two States (Nevada being the other) which has computed accident frequency and severity rates for each industry classification. Unfortunately, however, these rates are based upon closed cases and consequently it is impossible to compare one year with another. Other tables show the compensation and medical costs by extent of disability, duration of temporary total disability in permanent partial disability cases, causes of accidents by extent of disability, and remarriage of widows.

*Wisconsin.*

The accident and compensation statistics published by the Industrial Commission of Wisconsin, as in the case of Oregon, are excellent as regards the form and method of presentation, but are criticisable on the ground that they are based upon closed cases rather than upon the accidents occurring within a given period. Moreover, in Wisconsin only compensable accidents (over 7 days) are reported, the commission having no record of non-compensable accidents. In this respect Wisconsin differs from all of the other States here considered.

The basic compensation table shows the distribution of accidents by extent of disability and the compensation and medical costs for each type of injury. The medical cost, however, does not include the cost of non-compensable accidents. As already noted, this data, as well as the tables which follow, are based upon closed cases. Other tables published by the commission include the following: Classification of accidents by cause and extent of disability; classification of accidents by industry and extent of disability; classification of permanent disabilities, not dismemberments, by degree of disability, showing the number and amount of compensation and medical aid paid in each case; number of dependents in fatal cases and wages.

*Nevada.*

The Nevada Industrial Commission has been one of the first to publish accurate and usable accident and compensation statistics. It was the first State to undertake the computation of accident rates by industry. The basic compensation table shows for each industrial class and subclass the number of full-time workers, payroll, earned premiums, incurred compensation losses in the case of death, permanent disability and temporary disability, the average compensation incurred per case and the pure premium per \$100 of payroll. This table, however, does not show the medical cost, that being presented in another table, because of the provision in the law which created a separate medical-aid fund. Other tables show the accident frequency and severity rates by industry. These rates are stated both in terms of full-time workers and payroll. The Nevada Commission has published no classification of accidents by cause.

*Massachusetts.*

The Massachusetts Industrial Accident Board is one of the few compensation commissions which from the beginning have given serious consideration to the question of accident statistics. While some of the statistical tables and classifications in the earlier reports are subject to criticism, the latest report follows closely the recommendations of the Committee on Statistics. The board itself compiles no data as to compensation costs. It does, however, publish an annual statement, based upon returns made by insurance companies to the board, showing the amount of compensation and medical losses paid and outstanding on injuries reported during the fiscal year.

All employers in Massachusetts, whether under the compensation act or not, must report all accidents to the Industrial Accident Board. The various tables showing classification of injuries by industry, cause, etc., therefore include all tabulatable accidents reported, and are not limited to those under the compensation act. The following accident tables and classifications are given in the report: Number of accidents classified by industry and extent of disability; number of days lost on account of accidents classified by industry and extent of disability; classification of accidents by location and nature of injury; classification by location, nature and extent of disability; classification by cause and extent of disability; sex and age classified by type of injury; wage by industry; and conjugal condition and dependency in fatal cases classified by industry.

An improvement might be made by combining the two tables showing the number of accidents and number of days for each industry. This can easily be accomplished by combining in one column the deaths and permanent totals and curtailing the number of temporary total groups. The present tables show for each industry the number of temporary total disabilities of 1 to 3 days, 4 to 7 days, 8 to 10 days, 11 to 14 days, 2 to 4 weeks, 4 to 8, 8 to 13, 13 to 26, 26 to 52 weeks, and over 1 year. It would seem sufficient, as recommended by the Committee on Statistics, to reduce these 10 groups to 3, as follows: 1 week and under, over 1 to 2 weeks, and over 2 weeks. No particular value is gained by showing for each industry such minute distribution of temporary disabilities. On the other hand, it would be desirable to show the distribution of



temporary totals, *as a whole*, by days up to 14 days and then by weeks up to 26 weeks. It is to be hoped that the Massachusetts board will find it possible also to ascertain the number of employees in each industry in order that accurate accident frequency and severity rates may be computed.

### *California.*

The California Industrial Accident Commission, in its latest report, follows the recommendations of the Committee on Statistics as regards the classifications and tabulations of accidents more closely perhaps than any other State. Two tables as to compensation costs are given. One shows the amount of compensation incurred on account of compensable injuries occurring during the calendar year classified by extent of disability. The other shows for each insurance carrier the amount of incurred compensation on account of compensable injuries by extent of disability. Neither table, however, shows medical losses. In fact, this data is not shown anywhere in the report. In the tables showing classification of injuries by industry and cause all *tabulatable* accidents are used. The tabulations include the following: Classification of accidents by industry and extent of disability; classification by cause and extent of disability; classification by location and nature of injury; permanent partials classified by degree of disability and temporary totals by day and week periods; fatal cases classified by age and dependency. Frequency and severity rates are not given. A particularly commendable feature of the California report is the inclusion of explanatory notes which show what data is included in the tables and the period covered.

An examination of the accident and compensation statistics in the foregoing State reports shows the greatest needs to be the following:

1. Adequate headings or explanatory notes which should show just what is included in the various statistical tables and what period they cover.
2. In the presentation of accident and compensation statistics the unit should be the year of occurrence—*i.e.*, all the accidents which occurred within a given period, irrespective of the date of reporting or adjudication, should be treated as a unit. In no other way can accurate comparison be made of one year's experi-

ence with another. If necessary the disability period or outstanding losses in open cases should be estimated.

3. In presenting compensation costs the total incurred losses (paid and outstanding) should be given. Merely to show the amount paid out during or for a given period is of little practical value and, in addition, is likely to be misleading. Showing compensation costs of closed cases only prevents accurate comparison of one year with another. Compensation and medical losses should be shown separately.

4. In presenting compensation costs only compensable accidents should be used, but in other tabulations all tabulatable accidents should be included.

5. A distribution table by extent of disability should be given of all accidents occurring within the year.

6. In tabulating accidents by industry and cause it is essential that they should be classified by extent of disability—*i.e.*, the number of deaths, permanent partials, temporary totals, etc., for each industry or cause should be given. Merely to show the total number of accidents occurring in each industry without taking into account the question of severity is misleading and of little value.

7. The standard classifications and tables formulated by the Committee on Statistics of the International Association of Industrial Accident Boards and Commissions should be followed. The reports of the Committee on Statistics containing these tables and classifications may be found in Bulletin 276 of the United States Bureau of Labor Statistics, copy of which may be had upon request.

CARL HOOKSTADT.

*Public Health and Insurance: American Addresses.* Sir Arthur Newsholme, K.C.B., M.D., F.R.C.P. Johns Hopkins Press, Baltimore, 1920. Pp. 270.

Dr. Newsholme's book will be of service to American insurance students in two important respects: First, there is a lucid description of the actual working of the British National Health Insurance Act, an impartial statement of both favorable and unfavorable aspects of this piece of experimental legislation; second, it invites these students, whether they be actuaries interested primarily in rate-making problems, statisticians, sociologists and publicists concerned with the social functions of insurance, administrators en-

gaged in the financial and underwriting departments of the business, or specialists in insurance medicine, to examine critically any similar plan offered in America and to see that health insurance does not impede the development of public health work and the orderly progress of medicine, nursing and the allied arts and sciences devoted to the prevention of sickness, the relief of suffering and to the prolongation of human life.

Dr. Newsholme's lectures are a plea for a catholicity in point of view which will restrain the enthusiasm of narrow professionalism in handling the health insurance problem in America. If the several groups of insurance specialists who have approached health insurance discussions in this country in recent years master thoroughly the substance of Sir Arthur's American addresses, there will be a greater tolerance by any one group toward the others. It will then be seen that the sociologists and actuaries advocating health insurance measures must understand and cooperate with the statisticians, the publicists, the public health administrators and the medical profession. Public health workers have, through long experience, learned that a special problem may be solved only by considering all the facts and bearings of that problem; the administrative procedure for the suppression of any disease must take into account the special facts of the natural history and characteristics of that disease. Health insurance can not be established simply by constructing a manual of rates and by establishing administrative and underwriting machinery as in life insurance or in personal health and accident insurance. It has special social, political, medical and psychological aspects which must be evaluated by the statistician or student of social policy before any program worthy of legislative action can be prepared. Regarding the serious hazard of ignoring, for one thing, the aims and purposes of public health work and of medicine, Dr. Newsholme says:

Insurance against sickness is a praiseworthy and valuable provision against future contingencies; and on its non-medical side free from drawbacks. Neither on its medical nor on its non-medical side, however, is it an alternative to prevention of disease; and the National Insurance Act in England must be held in the main to have delayed the public health reform which would have been secured had equal effort been devoted to it, and the money lavished on insurance given in the form of central public health grants conditional on the active cooperation of local authorities (pages 33, 34).

Dr. Newsholme then details critically the provisions for sana-

torium and maternity benefits and emphasizes the disparity between the promises in the act for medical treatment and the results actually achieved. The chapter on "Medical Aspects of Insurance Against Sickness," pages 103-119, will repay thoughtful reading. It contains the details of Dr. Newsholme's indictment against the provisions for medical benefits under the act. How health insurance provision for only part of the tuberculous wage-earning population may seriously impair a comprehensive national program for hospitalization and prevention of the disease is clearly set forth on page 223:

Soon after the passing of the National Insurance Act in 1911 representations were made that tuberculosis affected non-insured as well as insured; that treatment of insured could have only partial success so long as non-insured members of the same household were neglected; and that this was work for public-health authorities which they were partially undertaking. It was evident that the inextricably interlaced measures for the prevention and the treatment of tuberculosis must accrue to the whole population; and the mistake of the National Insurance Act was remedied to the extent that public-health authorities were informed that the National Treasury was prepared to pay one-half of the approved expenditure incurred by these authorities in establishing schemes for the treatment of tuberculosis available for the entire population. Such schemes were proceeded with . . . but influences other than medical led to the unsatisfactory use of institutional treatment. A large number of patients were sent to and retained in sanatoria for prolonged periods, who might have been adequately treated at home, or who should have been in hospitals . . . and there will probably be no material improvement until the Sanatorium Benefit is withdrawn under the National Insurance Act, and the treatment of tuberculosis becomes an obligatory duty of public-health authorities, with a minimum standard of provision to which all must attain.

Thus in this particular alone a health insurance program modeled on lines of the British National Insurance Act may impair the working of one important arm of modern public health work. There is no space in which to detail Dr. Newsholme's temperate judgments on the Maternity and Medical Benefit provisions of the act.

In closing this review it may be said that since the actuaries, statisticians and publicists in our Society may be called upon to participate in discussions of health insurance from time to time, they should make themselves acquainted with the general aims and purposes of public health work and of the practice of medicine, in order that they may advise only measures which will not impair

the effective existing and proposed social efforts for the advancement of human welfare. In Dr. Newsholme's words, we should advise against that "moral contagiousness under modern conditions of life, of a new course adopted in any country. Bismarck's attempt to counteract socialism by insurance has been responsible for state and official experimentation in insurance in many countries, which at least in England, was not actuarially, financially or medically sound, and which has involved expenditure in administration entirely incommensurate with the benefits received."

E. W. KOPF.

*The Law of Workmen's Compensation.* Samuel A. Harper. Callaghan & Company, Chicago, 1919. Pp. xx, 697.

Several textbooks have been published in this country concerning the law of workmen's compensation, each aiming to cover the subject generally. The author of this book has made an exhaustive study of decisions in every State, but it is a question whether his book can be regarded as one covering all the compensation laws in the United States. However, he has written a valuable textbook covering the compensation law of the State of Illinois, enriching his text by quoting decisions from other State tribunals. Throughout the book the various sections of the Illinois Compensation Law are quoted verbatim and in connection with each section decisions in the Illinois courts and other jurisdictions are quoted. If the book were a general text, there would have been no need to quote the Illinois law so frequently and at such length. On the contrary, it should have been avoided; but so many difficulties exist at the present time that the author, who is a member of the Chicago bar, probably was obliged to use this law as the basis for his text. An analysis of the various State compensation laws and decisions will demonstrate the fact that each State law involves a separate study. This branch of the law is so new in the United States that uniformity can not be expected. As time passes the good features in the different acts will be collected, which will make possible the passage of uniform legislation. When that time arrives the writing of a general text will not only be easier, but more helpful than at present.

A reading of Chapter III will demonstrate the impossibility of producing a general text covering the entire country. There is a

discussion in this chapter of hazardous industries that produce compensable accidents. The author ably analyzes various decisions indicating that the courts have been very strict in interpreting hazardous occupations as defined by the law. But this topic, like a number of others, is becoming a matter of historical rather than practical interest. The statutes in many States are growing more liberal, not only covering industries that are hazardous, but many which are usually considered non-hazardous.

The book contains an interesting discussion of the State and the municipality as an employer under workmen's compensation laws. Advocates of compensation laws in this country originally asserted that the laws were desired to protect employees in hazardous industries carried on for profit. As the State and its subdivisions are not supposed to make profits, their employees were usually not covered. Where they were covered, decisions in the courts were conflicting. Again we have a matter that is only of historical importance as the present tendency is for the legislature to grant the benefits of the compensation law to all State and municipal employees.

There are several portions of the book which are very helpful to a proper understanding of this branch of the law. The principles underlying the problems of constitutionality, maritime risks and interstate risks are illustrated by the latest decisions. The author's discussion of when an employee is injured in the "scope of employment" should enable a lawyer or claim agent to handle intelligently the compensability of doubtful cases falling within that category.

While two chapters are devoted to existing insurance systems and direct liability of insurance carriers, the author missed a good opportunity in failing to base these chapters on the Universal Standard Policy Form. This policy form has been in use in practically every State. If the decisions rendered in the various jurisdictions (in connection with that form) had been collected, without doubt any weakness would have been discovered and would have offered an excellent basis for improvements.

Attention must be called to page 477, where the statement is made that "in the absence of waiver or estoppel, the insurance company is not liable for an accident to a minor illegally employed if the policy covers only employees legally employed." It would be interesting to read an insurance policy specifically covering employees legally and illegally employed. Incidentally, in New York

State the court has held, in the case of an injured employee, a child of fourteen, illegally employed, that the insurance carrier was not exempted from liability.

In addition to analyzing various compensation decisions in the courts, forms used by the Illinois Industrial Commission and a number of present value tables are included at the end of the volume.

The author should be commended for his collection of leading cases that have been decided since the introduction of workmen's compensation in the United States. His work must not merely be regarded as a reference book, but should stimulate further investigations of the principles underlying this branch of the law.

S. B. ACKERMAN.

*Journal.* The Incorporated Australian Insurance Institute. Annual. Melbourne, Australia.

The Society has for review the first volume of the *Journal* published by the Incorporated Australian Insurance Institute, which was organized in August, 1919. The Institute, which seems to correspond rather closely to the Insurance Institute of America, at present represents a national federation of the Insurance Institutes of New South Wales, Victoria, South Australia and Western Australia. Provision is made, however, for new members, and there is reference in the address of one of the officials, which is reproduced in the *Journal*, to the possibility of the addition of the local Institutes of Queensland and New Zealand.

The objects of the Institute, as set forth in the Memorandum of Association, are as follows:

- “ A. To provide and maintain a central organization for the promotion of efficiency, progress, and general development among persons employed in Insurance business, whether Members of the Institute or not, with a view not only to their own advantage, but to rendering the conduct of such business more effective, safe and scientific, and securing and justifying the confidence of the public and employers by reliable tests and assurances of the confidence and trustworthiness of persons engaged in such business.
- “ B. To encourage and assist in the study of any subjects bearing on any branch of Insurance.
- “ C. To publish a *Journal* and any other matter deemed desirable by the Council of the Institute.
- “ D. To form a library or libraries for the use of the Members of the Institute.

- “ *E.* To offer money or other prizes for essays or research on any subject bearing on Insurance.
- “ *F.* To devise and impose means for testing the qualifications of candidates for the certificates of the Institute by examination in theory and practice, or by any other actual and practical tests and to grant certificates of qualification to the successful candidates.
- “ *G.* To promote personal and friendly intercourse between Members of the Institute, to hold conferences and meetings for the discussion of professional affairs, interests and duties, the reading of papers, and the delivery of lectures; to compile lists, registers, and records of events and proceedings of interest to the Members; to issue copies of such lists, registers and records from time to time to Members of the Institute, and generally to collect, collate, and publish statistical or other information of service or interest to members of the profession.
- “ *H.* To ascertain the law and practice relating to all things connected with Insurance, to collect and form a strong body of executive opinion, with the view of obtaining the codification and amendment of the Acts relating to Insurance Companies and to watch any legislation affecting the same.
- “ *I.* To exercise professional supervision and control over the Members of the Institute, to safeguard their interests and welfare, to further their advancement, and to promote whatever may lead to the improvement of the status of Insurance officials in general and the Members of the Institute in particular.
- “ *J.* To act as a means of communication between Members and others seeking engagements in Insurance Offices, and employers desirous of employing them.
- “ *K.* To assist necessitous Members and the widows and children and relatives of deceased members, and to act as treasurer and distributor of any benevolent fund or funds which may be contributed by Members or others, and to make any contribution to any such fund or funds out of the income or assets of the Institute.
- “ *L.* To purchase, rent, lease, hold and dispose of any building or buildings to be used as a place of meeting for the Members of the Institute, or as a college, lecture or reading rooms for library, or for social purposes, or any other property, real or personal, for the advancement of the above objects or any of them.
- “ *M.* To promote and encourage provision by the Members against the contingencies of age, sickness, misfortune and death, and to assist financially or otherwise, toward such provision.
- “ *N.* To do all such other lawful things as are incidental to or conducive to the attainment of the above objects or any of them.”

It will be noted that this list of objects embraces considerably more functions than are assumed by any of the insurance organizations of this country. It is quite obvious that this extensive pro-



gram could not be put into practice at the outset. In fact, it is stated in the *Journal* that the first work attempted was limited entirely to the holding of examinations, although reference is made to two items on the agenda of the first annual conference held at Melbourne on March 24, 1920, which have to do with the establishment of an orphanage or benevolent fund and a scheme of prizes for persons passing examinations with high honor.

The membership of the Institute consists of several classes of members: Members, Honorary Members and Corresponding Members. Members are all persons who belong to the local insurance Institutes approved by the Council. At the start certain individuals were elected as Foundation Fellows and Associates, thus creating a nucleus for the organization. At the present time it is provided, however, that, subject to a few exceptions, election to Fellowship or Associateship can take place only as a result of examination. Honorary Members (Fellows and Associates) are nominated by the member Institutes and are subject to election by the annual conference on recommendation of the Council. Corresponding Members are persons who are temporarily non-resident, but who because of their interest in insurance and in the work of the Institute wish to retain their affiliation.

A large part of the *Journal* is devoted to a description of the examination system, which is worthy of comment. Examinations are offered in four branches as follows: Fire, Life, Accident, Marine. Every candidate, unless he can present a proper certificate indicating that he has received a substantial education in another manner, must take Part I, which is the same for all branches and which embraces the following subjects:

- a. French
- b. History
- c. English
- d. Mathematics
- e. Geography

The candidate who passes this part of the examinations, or is permitted to waive it, is next admitted to examination in any one of the branches which he may select. Examinations in each branch are in two parts. Associateship is the reward of candidates who are successful in the examinations in the elected branch. Fellowship may then be obtained upon writing a thesis.

The examinations which correspond most closely to those of our Society are given in the accident branch. It is quite apparent that specialization in casualty insurance technique is not nearly so highly developed in Australia as in this country. The following list of subjects is reproduced for those who will be interested to compare the scope of our examinations with those of the Institute:

*Part II:*

- a. Elementary human physiology—the general structure of the Body; the form and relative position of the parts of the Skeleton, and Organs; the Nervous and Muscular Systems.
- b. Workmen's compensation insurance, including law (elementary); Workmen's Compensation Practice, including Policy Forms, Conditions, and Endorsements; General Principles of the Workmen's Compensation Acts.
- c. 1. Personal Accident, Disease and Sickness Insurance.  
2. Livestock Insurance.  
Both including policy forms, conditions and endorsements.
- d. Public liability and motor insurance—practice, including law (elementary) in regard thereto; Policy Forms, Conditions and Endorsements.
- e. Fidelity guaranty (including bonds), burglary, glass and boiler insurance, including Policy Forms, Conditions and Endorsements.

*Part III:*

- a. Correspondence—good composition and tactful phraseology, and a general knowledge regarding the practice of accident insurance in all its branches.
- b. Claims in all sections of accident business (and their settlement).
- c. Physiology, anatomy—fractures, strains and diseases, and the probable period of disability consequent thereof; medical terms and their meanings; industrial diseases.
- d. Law—the relationship between employer and employee under the following Acts:  
Fatal Accidents Act,  
Employers' Liability Act,  
Workmen's Compensation Act, and  
Common Law.
- e. Law—the liability imposed by the Common Law upon persons to pay damages to others who are injured or whose property is damaged by the acts or omission of the former or their servants or agents.
- f. Accounts and investments.

A thorough examination is given in each of these subjects, papers being required to be written on each. In the examinations which are reproduced in the *Journal* the student is allowed 2½ hours for each paper of ten questions.

Technical papers, a number of which are reproduced in the

*Journal*, are first read before the local Institutes and are selected for publication by a central committee. In the present volume the following papers are presented:

“Paper Manufacturing”—An analysis of the paper manufacturing industry, particularly with reference to fire insurance.

“Boot Factories and Their Hazards”—A similar analysis of the boot and shoe manufacturing industry, also from the standpoint of fire hazards.

“Insurance of Workers Against Sickness, Unemployment, Old Age and Death”—An analysis of social insurance schemes in other countries, with deductions drawn therefrom as applicable to the Australian situation.

“The Goods Policy”—An historical analysis of this marine insurance policy form, particularly with reference to Australian practice.

Taken by and large, the *Journal* is an attractive publication, containing much of interest and value to persons engaged in the insurance business. Improvements will be made, no doubt, as time passes and the Institute extends its activities to the several fields covered by its statement of objects. The present volume, however, is a step in the right direction and as such it sets a high standard for future accomplishment.

G. F. MICHELbacher.

*Readings and Problems in Statistical Methods.* Horace Secrist. Macmillan Company, New York, 1920. Pp. xxi, 482.

The motives which prompted the publication of this book were apparently two: to supplement the discussion of principles in available texts and to offer suggestions for the development of laboratory exercises. The first motive is predominant in the author's mind and is reflected in his treatment. The book is intended as a companion volume to his “Introduction to Statistical Methods” and the selections of readings are grouped under topical headings to correspond to chapters in his text.

A companion volume of readings of this sort might include only examples or applications of the principles discussed in the text, or it might be a restatement or further discussion of principles. The former would be the preferable procedure if the texts available for elementary teaching were satisfactory for the purpose. But statis-

tics has been for too short a time an important field of study in university curricula in the United States for the *final* text to have been written. Such statement in no way detracts from the efforts of Secrist or of others to supply this need. The English texts by Bowley and Yule are too difficult for our elementary classes and are not altogether suited to American conditions. The result has been, at least in the reviewer's experience, that the discussion of principles in the texts must be supplemented by articles from various statistical or other periodicals. A case in point is tabulation. Neither Secrist's text nor Bowley's "Elements" nor Bowley's "Manual" cover in as satisfactory way the construction of statistical tables as the article by Day in the March, 1920, *Statistical Quarterly*. Watkins' articles on "The Theory of Statistical Tabulation" in the *Statistical Quarterly* and on "Statistical Units" in the *Quarterly Journal of Economics* both contain discussions of principles which will greatly assist the beginner. The inclusion, therefore, of well-selected discussions of principles, as well as illustrative examples and applications of principles, has added considerably to the value of the "Readings" for at least one of its users.

The title of the book, "Readings and Problems," indicates, as stated above, the twofold motive for its publication. The introduction states that the review problems have been included because of the demand from instructors in statistics for laboratory problems; but the author protests vigorously against "make-work" problems and insists that problems should be chosen by each instructor from his own experience and with a view to arousing the intellectual interests of the students. With the need of the latter there can be no disagreement, but the extent to which the author has subordinated this phase of his book is disappointing. The teaching of statistics has in recent years tended more and more to follow the method common to physical and biological sciences—a combination of classroom discussion of principles with laboratory demonstrations and analyses. The substantial body of principles and fairly standardized methods of procedure now comprehended within the subject *statistics* has made this a possible, even a necessary, development. It is probably a safe prediction that another generation will see the regular use of laboratory manuals in statistics as in chemistry or physics. This does not mean that the teachers of statistics, or the specialists in the field, will become slaves to a manual; but a well-

prepared laboratory manual will be a great aid to the better quality of teaching and a great assistance to students. The subject is being taught in many colleges and universities by men who are not specialists in statistics, who devote a major part of their time to other fields. It is for these in particular that a manual has its chief use. The quality of the instruction which they give will depend in large part upon the character of the texts available, and a good laboratory manual will be an important factor in their success. This is not so much a protest against "Readings and Problems" as an expressed hope that some one will write the necessary manual.

An indication of the scant consideration which the author avowedly gives to laboratory problems is the fact that they occupy exactly 24 out of 420 pages in the book. Twelve of the twenty-four are devoted to graphic method and afford a good illustration of the way in which problems may be used to develop the technique and the critical faculty so necessary in statistical work.

BRUCE D. MUDGETT.

## CURRENT NOTES.

C. G. SMITH, CURRENT NOTES EDITOR.

Editor's Note: Because of the considerable delay in issuing this number of the *Proceedings* (attributable to the national printers' strike which temporarily handicapped our printer) it has been found advisable to omit this department as the material which it would have contained is no longer of "current" interest. The complete department will be resumed in the next number, which we hope will be issued in accordance with our usual schedule.

In this issue we present only a few personal items in order that the members may keep in touch with the changes in our membership list. This is desirable because the Council has decided in the future to print the membership list only once a year and this department will therefore be the only medium through which the list can be corrected for changes which occur during the year.

The following changes should be noted in the membership list as of November 17, 1920, which appeared in *Proceedings* No. 15.

## FELLOWS.

E. J. Bond, Jr., First Vice President, Maryland Casualty Company, Baltimore, Maryland, was elected a Fellow at the May, 1921, meeting.

The new address of George B. Buck, Consulting Actuary for Pension Funds, is 75 Fulton St., New York.

Charles S. Forbes is now Actuary of the Service Mutual Insurance Company, Boston, Mass.

Charles E. Heath is now Chief Examiner of Casualty Companies of the New York Insurance Department, 165 Broadway, New York.

Herbert Hess is connected with Herbert Hess & Co., Public Insurance Accountants, 120 Broadway, New York.

T. P. Kearny, Manager, Compensation Insurance Fund, Denver, Colo., has become a Fellow by examination.

G. F. Michelbacher is Secretary-Treasurer of the National Bureau of Casualty & Surety Underwriters, 15 Park Row, New York.

Victor Montgomery, Actuary, California Insurance Department, San Francisco, Cal., has become a Fellow by examination.

James Morrison is now the Secretary of the Royal Indemnity Company.

Stanley L. Otis is the Director, Bureau of Workmen's Compensation, New York Labor Department, 124 East 28th St., New York.

S. B. Perkins, Actuary, Compensation and Liability Department, Travelers Insurance Company, Hartford, Conn., has become a Fellow by examination.

Charles H. Remington is Vice President of the Aetna Life Insurance Company.

Robert Riegel, Professor of Insurance, University of Pennsylvania, Philadelphia, Pa., was elected a Fellow at the May, 1921, meeting.

A. W. Whitney is the Associate General Manager, National Bureau of Casualty & Surety Underwriters, 15 Park Row, New York.

W. N. Wilson, Travelers Insurance Company, Hartford, has become a Fellow by examination.

Arthur B. Wood, Actuary, Sun Life Assurance Company, Montreal, Canada, was elected a Fellow at the May, 1921, meeting.

#### ASSOCIATES.

R. E. Ankers is now Actuary of the Continental Life Insurance Co., District National Bank Building, Washington, D. C.

Clarence S. Coates, University of California, Berkeley, Cal., passed the 1921 examinations and has been enrolled as an Associate.

W. J. Constable, National Council of Workmen's Compensation Insurance, 16 East 40th St., New York, passed the 1921 examinations and has been enrolled as an Associate.

Robert E. Haggard, Superintendent, Permanent Disability Rating Department, Industrial Accident Commission, 525 Market St., San Francisco, Cal., passed the 1921 examinations and has been enrolled as an Associate.

E. J. Jensen, Travelers Insurance Company, Hartford, Conn., passed the 1921 examinations and has been enrolled as an Associate.

Vincent C. McGuire is with the Comptroller's Department, City of New York, Municipal Building, New York.

R. V. Mothersill is the Secretary, Minnesota Compensation Insurance Board, St. Paul, Minn.

Fritz Müller is with the Friederich Wilhelm Life Insurance Company, Behren St., Berlin, Germany.

Sidney D. Pinney, Travelers Insurance Company, Hartford, Conn., passed the 1921 examinations and has been enrolled as an Associate.

Joseph Raywid is Vice President, Underwriters Statistical Bureau, Inc., 153 Fifth Ave., New York.

William F. Roeber, University of California, Berkeley, Cal., passed the 1921 examinations and has been enrolled as an Associate.

Elmer I. Shephard, Assistant Professor of Mathematics, Williams College, Williamstown, Mass., passed the 1921 examinations and has been enrolled as an Associate.

Arther G. Smith, New Jersey Compensation Rating & Inspection Bureau, Newark, N. J., passed the 1921 examinations and has been enrolled as an Associate.

A. E. Thompson, Statistician, Royal Indemnity Company, 84 William St., New York, was enrolled as an Associate by the Council.

Leland L. Waters, Actuary, National Accident Insurance Company, Lincoln, Neb., passed the 1921 examinations and has been enrolled as an Associate.

Eugene R. Welch, Secretary, State Compensation Insurance Fund, 525 Market St., San Francisco, Cal., passed the 1921 examinations and has been enrolled as an Associate.

R. A. Wheeler, Associate Actuary, Liberty Mutual Insurance Company, 210 Lincoln St., Boston, Mass., has been enrolled as an Associate by the Council.

John F. Williams is Actuary, Division of Insurance, State Department of Trade, Springfield, Ill.



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**OBITUARY.****ARTHUR F. SAXTON.**

Born, July 23, 1869.

Died, February 26, 1921.

**ARTHUR F. SAXTON.**

In the death from pernicious anemia on February 26, 1921, of Arthur F. Saxton, the Casualty Actuarial Society suffered the loss of one of its charter members, and the casualty insurance business one of the keenest students of its affairs. Mr. Saxton was born in Grand Rapids, Michigan, on July 23, 1869, but was brought to New York State in early childhood and spent most of his business life in the service of the State, in that respect following out what appears to be a family tradition, his father having been, after previous service in the senate of the State, Lieutenant Governor, and on his retirement from this office Judge of the Court of Claims up to the time of his death.

Mr. Saxton entered the State Insurance Department at Albany in April, 1898, as confidential examiner, but was appointed assistant actuary in December, 1898. In October, 1906, Mr. Saxton, after passing the required promotion examination, was made an examiner and was transferred to the New York Office. The importance of the promotion was the greater because of the publicity thrown on the Department, and especially its examination staff, by the Armstrong Investigation, necessitating especial care in building up that staff. In July, 1910, he was made chief examiner of Fraternal and Assessment Companies, and in 1912 chief examiner of Casualty Companies, which position he held up to the time of his death, although for exactly one year before his death he was incapacitated from actual work.

Mr. Saxton was an indefatigable student of casualty insurance, with a deep understanding of human nature that enabled him to

penetrate beyond the surface indications with respect to the conditions of the companies over which he had supervision and keep in touch with their real condition. Of highest integrity and fearlessness, he won the admiration of all of his associates and those with whom he worked, and with it, because of his kindly personality, loyal friendship and frankness of manner, their friendship as well.

Mr. Saxton was essentially a home man and had few interests outside his professional work and his family life. He had, however, the actuary's fondness for the good Scotch game and many of his friends will prefer to remember him as the genial companion of the links.



# CASUALTY ACTUARIAL SOCIETY

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## THE COUNCIL.

*Officers:* ALBERT H. MOWBRAY.....*President*  
 WILLIAM LESLIE.....*Vice-President*  
 LEON S. SENIOR.....*Vice-President*  
 RICHARD FONDILLER.....*Secretary-Treasurer*  
 G. F. MICHELbacher.....*Editor*  
 LOUIS I. DUBLIN.....*Librarian*

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 JAMES D. CRAIG (1916-1918)  
 JOSEPH H. WOODWARD (1918-1919)  
 BENEDICT D. FLYNN (1919-1920)

*Ex-Vice-Presidents:* HARWOOD E. RYAN (1916-1918)  
 GEORGE D. MOORE (1918-1920)

	<b>Term Expires</b>
<i>Elected:</i> RALPH H. BLANCHARD.....	November, 1921
W. W. GREENE.....	November, 1921
EDMUND E. CAMMACK.....	November, 1922
EDMUND S. COGSWELL.....	November, 1922

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## COMMITTEE ON ADMISSIONS.

JAMES D. CRAIG (*Chairman*)  
 B. D. FLYNN  
 J. H. WOODWARD

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W. H. GOULD (*Chairman*)  
 JAMES MORRISON  
 E. S. COGSWELL

## EDITORIAL COMMITTEE.

G. F. MICHELbacher, *Editor*. (*Chairman, ex-officio.*)*Associate Editors.*

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FREDERICK RICHARDSON,

A. W. WHITNEY,

J. H. WOODWARD,

WILLIAM LESLIE.

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OLIVE E. OUTWATER,

H. O. VAN TUYL.

## COMMITTEE ON PAPERS.

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H. E. RYAN,

G. F. MICHELbacher, *Editor (ex-officio)*.

## COMMITTEE ON PROGRAM.

GEORGE D. MOORE (*Chairman*).

E. W. KOPF,

A. W. WAITE.

ABSTRACT FROM THE MINUTES OF THE MEETING,  
MAY 24 AND 25, 1921.

The semi-annual and sixteenth regular meeting of the Casualty Actuarial and Statistical Society of America was held at the Hotel Pennsylvania, New York, on Tuesday and Wednesday, May 24 and 25, 1921.

President Mowbray called the meeting to order on the first day at 10:30 A.M. The roll was called, showing the following forty-eight Fellows and seventeen Associates present:

*FELLOWS.*

BLANCHARD	HEATH	MURPHY
BRODIN	HENDERSON	OUTWATER
BUDLONG	HOOKSTADT	PARKER
CAMMACK	JACKSON, C. W.	RYAN
CARPENTER	JOHNSON	SCHUITLIN
CRAIG, J. D.	KING	SENIOR
DAVIS	KIRKPATRICK	SMITH
DEARTH	LAIRD	STRONG, W. M.
DEKAY	MCMANUS	THOMPSON, J. S.
DUNLAP	MADRILL	VAN TUYL
FALLOW	MAYCRINCK	WAITE, A. W.
FLYNN	MICHELbacher	WHITNEY
FONDILLER	MILLIGAN	WOLFE, L. J.
GOULD	MOORE	WOLFE, S. H.
GRAHAM, W. J.	MORRIS	WOODWARD
HAMMOND	MOWBRAY	YOUNG, C. N.

*ASSOCIATES.*

BARBER	NEWELL	WEBBER
BLACK, N. C.	PERKINS	WHEELER
BROOKS	SPENCER	WILLBACH
COMSTOCK	THOMPSON, A. E.	WILLIAMSON
ELSTON	WAITE, H. V.	WILSON
MOTHERSILL	WARREN	

The President's address was presented.

The minutes of the meeting held November 17, 1920, were approved as printed in the *Proceedings*.

The Secretary read the report of the Council and, upon motion, it was adopted by the Society. Diplomas will be granted without

charge to those who become Fellows by examination. A. E. Thompson and R. A. Wheeler had been enrolled as Associates without examination. The prices of the *Proceedings* had been advanced to meet greatly increased printing costs. A substantial appropriation had been authorized to purchase textbooks, which will be loaned to students preparing to take the examinations of the Society. It is the sense of the Council that papers should be discussed at the same meeting when presented, where they come in at an early date; otherwise, discussion will be deferred until the next meeting of the Society. The memorial notice of Arthur F. Saxton, appearing in this number, was read.

The Council recommended the following for election to Fellowship in the Society, without examination, under the terms of Article III of the Constitution:

E. J. Bond, Jr., Vice-President, Maryland Casualty Company, Baltimore, Md.

Robert Riegel, Professor of Insurance and Statistics, University of Pennsylvania, Philadelphia, Pa.

Arthur B. Wood, Actuary, Sun Life Assurance Company, Montreal, Canada.

After ballot, these nominees were declared to be duly elected Fellows.

The following amendment to the Constitution, proposed and approved by the Council and brought before the Society in due and regular form, was, on motion, adopted:

Article I of the Constitution was amended to read as follows:

Article I. NAME—This organization shall be called the CASUALTY ACTUARIAL SOCIETY.

The papers printed in this number were read or presented.

Recess was taken until 2:15 P.M.

Mr. A. R. Marsh, Editor of the *Economic World*, addressed the Society, by invitation of the President, upon "The Economic Outlook, with particular reference to Insurance."

The papers read at the last meeting were discussed.

A motion was carried that the Council consider the desirability of reestablishing the Committee on Notation.

Upon motion, the meeting adjourned at 4:40 P.M.

President Mowbray called the meeting to order on the second day at 10:15 A.M. He stated that this session would be devoted to a discussion of non-cancellable accident and health insurance, and that he had invited the members of the Bureau of Personal Accident and Health Underwriters to be present and to participate in the discussion. The following registered:

John W. Abbott, M.D., Medical Director, Maryland Assurance Corporation, Baltimore.

Edwin C. Bowen, Asst. Secy., Aetna Life Insurance Co., Hartford.

- L. D. Cavanaugh, Actuary & Asst. Secy., Federal Life Insurance Co., Chicago.
- W. E. Clark, Norwich Union Indemnity Co., New York.
- Robert O. Davidson, Chief Underwriter, Accident & Health Dept., Equitable Life Assurance Society, New York.
- Ralph A. Ferson, Supt., Personal Accident Dept., Hartford Accident and Indemnity Co., Hartford.
- Edmund W. Frain, Supt., Commercial Accident & Health Dept., General Accident Fire & Life Assurance Corp., Philadelphia.
- J. B. Galloway, M.D., Supt., Personal Accident Dept., Globe Indemnity Company, Newark.
- Stewart M. LaMont, Asst. Secy., Indemnity Insurance Company of North America, Philadelphia.
- James F. Little, Asst. Actuary, Prudential Insurance Company, Newark.
- J. W. McGovern, Chief Underwriter, Accident & Health Dept., Maryland Casualty Company, Baltimore.
- Manton Maverick, Vice-President, Continental Casualty Co., Chicago.
- Fred S. Moore, Mgr., Commercial Dept., Massachusetts Accident Co., Boston.
- Joseph Nadel, Statistician, Norwich Union Indemnity Co., New York.
- John M. Powell, Actuary, Columbian National Life Insurance Co., Boston.
- Arthur G. Powers, Underwriter, Aetna Life Insurance Co., Hartford.
- W. B. Snowden, Asst. Mgr., Accident Dept., Pacific Mutual Life Insurance Co., New York.
- Calvert F. Stein, Actuary, Maryland Assurance Corporation, Baltimore.
- F. L. Templeman, Mgr., Accident & Health Claims, Maryland Casualty Co., Baltimore.
- Richard H. Thompson, Fourth Vice-President, Maryland Casualty Co., Baltimore.
- Arthur Watt, Secretary, Southern Life & Trust Co., Greensboro, N. C.
- Frank R. Woodbury, Mgr., Accident Dept., Pacific Mutual Life Insurance Co., New York.
- Arthur P. Woodward, Secretary, Accident Dept., Connecticut General Life Insurance Co., Hartford.
- Mr. Cammack and Mr. Laird read their papers and the discussions are given in this number of the *Proceedings*.
- Upon motion, the meeting adjourned at 1:30 P.M.

## EXAMINATIONS OF THE SOCIETY.

*Examination Committee.*MERVYN DAVIS, *Chairman.**In Charge of Associateship  
Examinations.*A. L. KIRKPATRICK, *Chairman,*  
OLIVE E. OUTWATER,  
H. O. VAN TUYL.*In Charge of Fellowship  
Examinations.*E. S. FALLOW, *Chairman,*  
W. W. GREENE,  
F. R. MULLANEY.

## EXAMINATIONS FOR ADMISSION AS ASSOCIATE.

*Part I. First Paper.*

May 4, 1921.

*Time: 9.30 to 12.30 o'clock.*

1. A train 60 yards long passes another 72 yards long traveling in the same direction on a parallel line in 12 seconds. Had the slower train been traveling half as fast again, it would have been passed in 21 seconds. Find the speeds at which the trains were traveling.

2. Given  $x = .002$  — Find to 6 places of decimals the value of—

$$\frac{\left(1 + \frac{4}{3}x\right)^{\frac{1}{2}} + (1+x)^{-4}}{\left(1 + \frac{2}{5}x\right)^{-2}}$$

3. Solve the equations—

$$(a) \quad xy + ab = 2ax \\ x^2y^2 + a^2b^2 = 2b^2y^2$$

$$(b) \quad \sqrt{5x^2 + 3x + 16} - \sqrt{5x^2 + 3x - 6} = 11$$

4. Prepare a profit and loss statement and balance sheet from the following trial balance as of December 31, 1920.



Capital .....		\$ 5,000
Cash .....	\$ 1,477	
Sales .....		10,257
Purchases .....	8,702	
Inventory as of Jan. 1, 1920.....	2,542	
Discount on Sales.....	75	
Expenses .....	872	
Accounts Receivable.....	1,589	
	\$15,257	\$15,257

Merchandise inventory as of December 31, 1920—\$2,250.

5. What are the advantages of double entry bookkeeping? What are its limitations?

6. Jones draws a 60-day draft on Brown in favor of Smith, Brown accepts. What journal entry should Smith make? What entry should Brown make?

7. From the following table find the average cost per pound of copper produced. What is the average production per company? What is the approximate median cost and approximate model cost?

*Copper Costs, 1918.*

Cost per pound.	No. Cos.	Pounds Produced. 000,000 omitted.
12c .....	2	122
13c .....	4	208
14c .....	3	314
15c .....	4	359
16c .....	6	421
17c .....	8	460
18c .....	9	497
19c .....	7	324
20c .....	5	186
21c .....	6	95
22c .....	8	42
23c .....	3	87
24c .....	5	135
25c .....	1	9
26c .....	3	17
<b>Total .....</b>	<b>74</b>	<b>3,276</b>

8. Discuss the value and limitations of the following methods of gathering statistical data:

1. Personal investigation.
2. Estimates from correspondents.
3. Schedules to be filled by the informants.
4. Schedules in charge of enumerators.

*Part I. Second Paper.**May 4, 1921.**Time: 1.30 until 4.30 o'clock.*

9. What is the present value (compound interest) of a deferred annuity of \$1,000 per year, payments to begin 20 years from date and to continue for 5 years, interest 5 percent? Carry solution as far as possible without the use of a logarithmic table and indicate balance of solution.

10. Find the coefficients of  $x^{32}$  and  $x^{-17}$  in the expansion of

$$\left(x^4 - \frac{1}{x^3}\right)^{15}$$

11. What will \$500 deposited semi-annually in a savings bank, with interest at 4 percent, compounded semi-annually, amount to at the end of four years?

12. Suppose you are secretary of a labor union and desire to gather information with regard to unemployment in your union. Outline a questionnaire showing the information you would ask for.

13. How would you tabulate for publication the data collected in the preceding question?

14. In the following distribution of weights find the mean, the median, the mode and the standard deviation.

Weight.	No. of Men.
100 to 110 lbs.....	12
110 to 120 lbs.....	52
120 to 130 lbs.....	81
130 to 140 lbs.....	142
140 to 150 lbs.....	113
150 to 160 lbs.....	65
160 to 170 lbs.....	17
170 to 180 lbs.....	15
180 to 190 lbs.....	1
190 to 200 lbs.....	2

15. Define: Authorized Capital.

Treasury Stock.

Amortization.

Obsolescence.

Trading Account.

Mixed Account.

Good Will.

16. You are called upon to devise and install a complete book-keeping system for a corporation just being organized to conduct a retail shoe business. Give a complete list of books that will be required and state briefly the use of each.

*Part II. First Paper.**May 5, 1921.**Time: 9.30 to 12.30 o'clock.*

1. In how many ways can  $n$  things be given to  $p$  persons when there is no restriction as to number of things each may receive?
2. From a bag containing 5 twenty-dollar bills and 15 ten-dollar bills, a person is entitled to draw 2 bills. Find the value of his expectation.
3. On what unit is the premium computed in the following forms of casualty insurance:
  - Automobile Collision?
  - Workmen's Compensation?
  - Bank Burglary?
  - Manufacturers' and Contractors' Public Liability?
  - Owners', Landlords' and Tenants' Public Liability?
4. What is meant by the terms "Principal Sum" and "Double Indemnity" in accident and health insurance?
5. Describe briefly the schedules known as Schedule "Z" and Schedule "W." What is the purpose of each? Have they any direct relation to each other? If so, what?
6. Draw up a simple statement of income and disbursements and assets and liabilities in accordance with the convention blank for a company transacting Accident and Health Insurance.
7. Define the term "subrogation" and name three lines of casualty insurance in which a company exercises this right.
8. In applying for an accident and health policy a man stated that he never had had any serious sickness. Later he made claim under the policy and upon investigation the company found that he had once been very ill with pneumonia. Would this misstatement have a material bearing on the company's liability? Discuss fully.

*Part II. Second Paper.**May 5, 1921.**Time: 1.30 until 4.30 o'clock.*

9. How many signals can be made with 5 lights of different colors which may be displayed singly or any number at a time, side by side or one above another?
10. Out of  $2n$  tickets numbered consecutively three are drawn at random. Find the probability that the numbers on them are in arithmetical progression.
11. State briefly all the purposes of an inspection of a risk for Workmen's Compensation and for Steam Boiler coverage.
12. Explain briefly the basis of classification, in use at the present time, of private passenger automobiles under all forms of casualty coverage.

13. Distinguish between "policy year" and "calendar year" and give the advantages and disadvantages of each as a method of compiling experience.

14. Outline the statutory requirements for liability and workmen's compensation loss reserves as embodied in Schedule "P" in the annual statement.

15. On what grounds were some of the early workmen's compensation laws declared unconstitutional? How has this obstacle been avoided in later laws?

16. What is the purpose of State supervision of insurance and what are the main provisions of the law of your own State in this regard?

#### EXAMINATIONS FOR ADMISSION AS FELLOW.

##### *Part I. First Paper.*

May 4, 1921.

Time: 9.30 until 12.30 o'clock.

1. (a) Solve:

$$\frac{x^2}{y} + \frac{y^2}{x} = 4$$

$$\frac{1}{x} + \frac{1}{y} = 1.$$

(b) Find the value of:

$$\frac{a - \sqrt{a^2 - x^2}}{x} \text{ when } x = 0.$$

2. (a) If the arithmetic mean between  $a$  and  $b$  is twice as great as the geometric mean, show that

$$a : b = 2 + \sqrt{3} : 2 - \sqrt{3}.$$

(b) Find the sum of  $n$  terms of the series whose  $n$ th term is  $3^n - 2^n$ .

3. State, and prove the truth of, the Exponential Theorem.

4. The population of a town is ten thousand. It loses annually two percent by deaths and gains three percent by births. Every year two hundred people move into the town and one hundred move away. Find an expression for the population at the end of  $32\frac{1}{2}$  years.

5. Given net premium rates for each quinquennial age for Non-cancellable Accident and Health Insurance, and desiring to quote rates for each age, how would you proceed to obtain them?

6. Having given  $\log 280 = 2.4472$

“ 281 = 2.4487

“ 283 = 2.4518

“ 286 = 2.4564

deduce  $\log 282$ .

7. (a) Differentiate  $\log (\log x)$ .

(b) Evaluate  $\int x^3 e^{-x} dx$ .

8. (a) Find the value of  $\frac{d^5}{dx^5} (x^4 \log_e x)$ .

(b) Find the limit of  $\frac{a^n - 1}{n}$  as  $n$  approaches zero.

*Part I. Second Paper.*

May 4, 1921.

Time: 1.30 until 4.30 o'clock.

1. An investigation was made concerning 1,500 men as to their weight and the following data obtained:

Weight	Number of Men
100 .....	4
110 .....	20
120 .....	22
130 .....	76
140 .....	114
150 .....	186
160 .....	212
170 .....	252
180 .....	218
190 .....	174
200 .....	150
210 .....	46
220 .....	18
230 .....	8

What was the mean deviation from the arithmetic mean of the group?

2. (a) Define mean, median and mode and give the approximate relationship existing between them.

(b) What is meant by skewness and how is it measured?

3. Explain three practical methods of smoothing distribution curves. Within what practical limits must the smoothing of distribution curves be confined?

4. (a) What is meant by correlation?

(b) Calculate the coefficient of correlation from the following data:

		Temperature in Degrees.												
		15	20	25	30	35	40	45	50	55	60	65	70	75
Precipitation in Inches.	0.5	0	3	0	2	2	1	1	4	1	1	1	3	1
	1.0	0	2	4	5	2	2	0	3	3	3	4	4	3
	1.5	1	2	4	7	8	5	4	6	6	4	5	10	4
	2.0	2	4	5	5	6	6	6	5	3	3	6	7	7
	2.5	0	1	3	5	5	3	3	7	6	5	5	16	2
	3.0	0	1	5	7	2	4	0	5	3	1	5	5	5
	3.5	0	1	5	2	2	6	2	2	1	4	3	4	6
	4.0	0	1	2	2	5	0	2	4	2	4	2	5	1
	4.5	0	1	0	6	3	3	1	2	1	2	0	3	2
	5.0	0	0	2	0	4	4	1	2	1	1	5	6	1
	5.5	0	0	0	0	3	1	0	1	0	2	1	3	0
	6.0	0	0	0	1	0	2	0	0	1	1	0	3	1
	6.5	0	0	0	0	2	0	0	0	0	0	0	1	0
	7.0	0	0	0	0	0	0	1	1	0	1	1	1	2
	7.5	0	0	0	1	0	1	0	0	0	1	0	0	0
	8.0	0	0	0	0	0	1	0	0	0	0	0	0	0
8.5	0	0	0	0	0	0	0	0	0	1	1	0	0	
9.0	0	0	0	0	0	0	0	0	0	0	0	0	0	
9.5	0	0	0	0	0	0	0	0	0	0	0	1	0	

5. Given a table showing the values of temporary life annuities on single lives, joint two lives, and joint three lives, show how you would find the value of an annuity to be payable until the survivor of three children, aged 4, 9 and 14, respectively, attains majority.

6. Derive the ordinary approximation for the value of a life annuity, payable  $m$  times a year, in terms of the life annuity payable annually.

7. Express in formulas the following probabilities:

(a) That a person aged ( $x$ ) will die before he attains the age ( $x+n$ ).

(b) That he will die before his son, whose present age is ( $y$ ).

(c) That father and son will both be living at the end of  $m$  years.

8. Death benefits of a certain compensation law provide the following proportions of the deceased's wages:

Widow, 30 percent till death.

Each child, mother living, 10 percent till age 18.

Each child, mother deceased, 15 percent till age 18.

Write a formula for the present value of the benefit where the wage was \$1,200 per annum, and dependents were Widow, 44, and Children, 9 and 11, respectively.

*Part II. First Paper.**May 5, 1921.**Time: 9.30 until 12.30 o'clock.*

*Note:* In accordance with Rule 8 of the rules regarding examinations for admission to the Society, candidates who are to be examined in Part II of the Fellowship examinations are required to write on only three of the four prescribed topics in order to obtain full credit. For this reason the examination questions are so arranged that it will be possible for the candidate to choose three of the four topics for his examination. A choice of topics is binding for both morning and afternoon papers; that is to say, if you choose as the subjects for your examination topics 1, 2 and 3, you must be careful to limit yourself to the questions on these topics both in the morning and afternoon examinations.

*Topic I.*

*Advanced Practical Problems in the Compilation and Use of Statistics Relating to Casualty (Including Social) Insurance.*

1. Outline the statistical investigations which should be made in connection with Personal Accident Insurance.
2. (a) What statistics are required in order to determine the expense loading for Workmen's Compensation Insurance Rates?  
(b) What is Schedule W, and wherein does it fail of its purpose?

*Topic II.*

*Calculation of Premiums and Reserves for Accident, Sickness, Workmen's Compensation and Other Branches of Casualty Insurance, Including Consideration of Basis of Reserve.*

3. (a) Explain the "Schedule P" method of determining loss reserves.  
(b) State the authorized method of computing reserves for Schedule "Z" for one of the States which require this schedule to be filed.
4. State upon what basic principles steam-boiler rates are based and give a definition of each principle.
5. Discuss the theory of computing reserves for non-cancellable accident and health insurance.

*Topic III.**Advanced Practical Problems in Insurance Accounting and Statistics, Including the Preparation of Annual Statements and Schedules.*

6. (a) Explain the following terms: Trial balance; assets; profit and loss; surplus; liquid assets; suspense account; non-admitted assets; market value; liabilities; true book value.

(b) In the casualty statement which are the legal reserves?

7. The condensed trial balance of a casualty insurance company December 31, 1920, was as follows:

	Dr.	Cr.
Losses .....	\$ 925,000	
Investigation and adjustment.....	200,000	
Commissions and brokerage.....	?	
Other expenses.....	350,000	
Taxes .....	40,000	
Dividends .....	100,000	
Investment profit and loss.....	15,000	5,000
Premiums written.....		?
Interest .....		105,000
Mortgage loans.....	525,000	
Bonds and stocks.....	?	
Cash .....	350,000	
Premiums outstanding.....	650,000	
Consolidated balance account.....		2,870,000
	\$5,780,000	\$5,780,000

Accrued interest was \$30,000; the market value of bonds and stocks was \$1,900,000, being \$100,000 less than the book value; premiums over 90 days due, \$40,000; premium reserve, \$1,200,000; loss reserve, \$675,000; outstanding bills and accounts, \$7,500; accrued taxes, \$45,000; capital stock, \$1,000,000. Supply the missing items in the trial balance and construct from the above data a statement of income and disbursements for the year 1920 and a balance sheet as of December 31, 1920.

*Topic IV.**Underwriting Problems in Casualty Insurance, Including Inspection of Risks, Adjustment and Settlement of Claims, Etc.*

8. Discuss the following points in connection with the underwriting of Group Health Insurance:

Employees of one employer.  
Usual coverage.



Individual selection.  
 Waiting period for new employees.  
 Female risks.  
 Other insurance.  
 Sanitary conditions of plant.  
 Type of employees.

9. (a) Discuss the following points in connection with the adjustment of a loss under a residence burglary policy:

True value.  
 Moral hazard.  
 Misrepresentation in regard to prior losses.  
 Other insurance.

(b) What is the so-called 80 percent average clause under a burglary open-stock policy?

10. *A* and *B*, related manufacturing concerns, occupy separate floors of the same building, which is owned by *A*. Both use the elevators. What public liability coverage is required for the full protection of the two concerns and how would the premium therefor be determined? Are the methods of premium determination cited by you equitable? Give reasons for your opinion.

*Part II. Second Paper.*

*May 5, 1921.*

*Time: 1.30 until 4.30 o'clock.*

*Note:* In accordance with Rule 8 of the rules regarding examinations for admission to the Society, candidates who are to be examined in Part II of the Fellowship examinations are required to write on only three of the four prescribed topics in order to obtain full credit. For this reason the examination questions are so arranged that it will be possible for the candidate to choose three of the four topics for his examination. A choice of topics is binding for both morning and afternoon papers; that is to say, if you choose as the subjects for your examination topics 1, 2 and 3, you must be careful to limit yourself to the questions on these topics both in the morning and afternoon examinations.

Candidate must write on same three topics selected in Morning Paper.

*Topic I.*

*Advanced Practical Problems in the Compilation and Use of Statistics Relating to Casualty (Including Social) Insurance.*

1. Draw up a punch card or cards for the purpose of keeping experience under automobile liability policies.

2. Outline concisely a statistical plan to be used by a workmen's compensation insurance company as the basis for an accident prevention campaign.

3. Explain in detail some of the principal difficulties encountered in attempting to compile experience on plate-glass insurance.

*Topic II.*

*Calculations of Premiums and Reserves for Accident, Sickness, Workmen's Compensation and Other Branches of Casualty Insurance, Including Consideration of Basis of Reserve.*

4. What reserves are required of a company transacting automobile liability, automobile property damage and automobile collision insurance, and how should they be computed?

5. Outline briefly the present method of computing workmen's compensation insurance rates (manual or basic).

*Topic III.*

*Advanced Practical Problems in Insurance Accounting and Statistics, Including the Preparation of Annual Statements and Schedules.*

6. (a) Explain the "cash basis" and the "revenue basis" in connection with the making up of a financial statement. Also explain the advantages and disadvantages of each method.

(b) On what basis is the casualty statement made up at present?

7. What special information is required in the schedules of the annual statement in connection with fidelity and surety insurance? Why is this information necessary?

8. A direct writings company has a catastrophe reinsurance contract with the Bureau to cover accidents costing more than \$25,000, for which it is assessed a certain percentage of its premium writings. At such times as the funds in the Reinsurance Bureau reach a certain amount a refund is made to the ceding carriers. The interest on investments in the Reinsurance Bureau, as well as the cost of conducting the Bureau, is credited or charged against each ceding carrier. At the end of a given year a certain number of claims have arisen for which a reserve is carried by the Reinsurance Bureau, which reserve is apportioned among all companies ceding reinsurance to the Bureau.

It has been ruled that the payments to the Reinsurance Bureau shall be deducted from the cash account and treated as an asset, and that the companies' proportion of the reserve in the Bureau shall be carried as a non-admitted asset in the annual statement, and the companies' proportion of the expenses shall be charged to the interest received account.

One of the losses for which a reserve has been formally set up is paid by the Reinsurance Bureau. What entries should be made on the books of a company reinsured in the Bureau to cover its proportion of the loss paid?

*Topic IV.*

*Underwriting Problems in Casualty Insurance, Including Inspection of Risks, Adjustment and Settlement of Claims, Etc.*

9. Discuss the principal points to be considered in the inspection of a steam-boiler risk.

10. A contractor, engaged principally in structural steel erection, is electing to "self-insure." He has an experience charge of 55 percent. His premium has lately averaged \$50,000 per annum.

This contractor wants quotations for following forms of insurance:

(a) Excess of total annual losses over \$45,000.

(b) Excess over \$5,000 for any one accident.

Would you consider this risk insurable under either or both of these forms of cover? State in a general way how you would determine rates for these forms. Give reasons throughout.

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