PROCEEDINGS
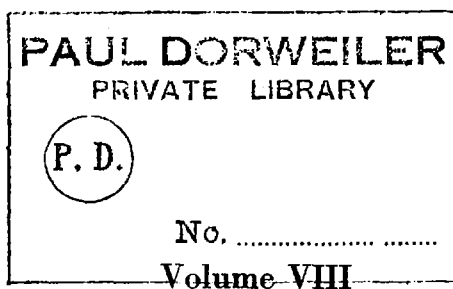
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NOTICE.

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PROCEEDINGS

November 18, 1921.

COMPETITION AND REGULATION OF RATES FOR CASUALTY INSURANCE

Address of the President—A. H. Mowbray

At a recent public hearing before a state board charged with supervision of workmen's compensation insurance rates, one of the speakers pointed out that there was a real danger, under the wide authority granted such officials by the various state laws, of there coming about a competition between states, each trying to exact from the companies the most favorable rates for its industries. Since the insurance business consists in assembling and redistributing the losses to which we are all subject, and the companies have no funds from which to pay losses other than their premium incomes and the interest earning on funds temporarily held awaiting disbursement, a too favorable rate for one coverage or locality can exist only at the expense of some other group of assurants. For example, too favorable rates for workmen's compensation insurance in one state must be offset by either

1. An overcharge for workmen's compensation insurance in one or more other states, or

2. An overcharge in the same state or other states for liability insurance or some other coverage written by the same companies.

Both these results are subversive of the true economic function of insurance and socially undesirable. It therefore behooves us to consider the origin and extent of the danger and the possibility of interposing safeguards to prevent this untoward result.

The danger arises from the requirement by law that rates be "fair, reasonable and adequate,"(1) and the vesting authority in

(1) See Va. Compensation Act Section 75 (a). So in substance, in many others

state officials to determine whether any given rate is "fair, reasonable and adequate;" and this without check upon their discretion and judgment save through appeal to the courts in particular instances.(2)   The extent of the danger depends on the one hand upon the militancy of local interests and their power to bring pressure to bear upon the state authorities to decide cases in their favor and, on the other, upon the capacity of those authorities to resist such pressure, to analyze correctly each rating problem presented and fairly to weigh all the evidences which may be available.   Before considering what safeguards might be imposed to prevent such competition between states, it will be well, I think, to review historically the conditions and circumstances which have brought about the provisions of law under consideration.

The practice of insurance in this country antedates the Declaration of Independence, but until the middle of the last century the business was not subject to special regulation.   The general attitude seems to have been that quoted at the 6th International Congress of Actuaries as representative of the attitude of Great Britain;

"As a general rule it may be said that restrictions on the freedom of contract or on the methods of carrying on a business, can only be justified by the existence of some form of incapacity in one or more of the parties to the contract; or by the plea that the business is of such a nature that if carried on without restraint it would be or might be a source of injury or danger to some members of the State and through them to the State itself."(3)

There had apparently been no public recognition of any such incapacity or danger.

About the middle of the last century there began in Massachusetts and New York that system of insurance supervision which has now extended to all the states, but for many years such supervision was confined to the matter of solvency and the ability of the companies to carry out their contracts.(4)   There

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(2) See, for example, Chap. 85 Minnesota Laws of 1921 establishing the Workmen's Compensation Insurance Board.   Similar powers are granted insurance boards or commissioners in many other states.

(3) A. R. Barrand F. I. A., *Proc.* 6th Int. Cong. Actuaries, Vol. 1, p. 71.

(4) Note should perhaps be made, by way of exception to this statement, of the passage of laws requiring the use of standard fire insurance policies.

was no supervision of rates save such indirect supervision of life insurance rates as came about through the adoption of certain standards of solvency. The regulation of rates was left to the forces of competition between companies and insurants, in accordance with our traditional policy of relying upon competition as the general economic regulative force. Indeed, toward the close of the last century much legislation was adopted whose purpose was to foster and force such competition.

This legislation took the form of anti-trust and anti-compact laws which were passed when it was found that the common law, though it fostered, did not enforce competition.

"Contracts that were in unreasonable restraint of trade at common law were not unlawful in the sense of being criminal, or giving rise to civil action for damages in favor of one prejudicially affected thereby, but were simply void and not enforceable."(5)

The anti-trust laws made such contracts unlawful. When it was found that the language of general anti-trust laws did not cover insurance, specific laws were enacted prohibiting compacts or agreements between companies for the purpose of fixing or regulating rates. In some states, for example, Mississippi, such laws are still in effect.

Since the greater part of such legislation preceded any of the laws vesting regulative powers in state authorities, the adoption of the latter represents a change of policy and may be presumed to be based on the conclusion that unrestricted competition does not bring about right rates. This, it can be readily shown, is due to a fundamental difference between the conduct of the insurance business and ordinary commercial operations where competition has been found an effective regulative.

Commodities generally are produced under such conditions that the supply at any given time can be increased only at greater cost. The pressure of competition between buyers therefore tends to increase the price, offsetting or tending to offset, the force of competition between sellers which tends to lower the price. But the seller, knowing his cost of production, will not sell at a loss except under very unusual circumstances. Hence the price, as we were taught in our economics courses, tends to be fixed near the cost of production of the marginal supply.

(5) U. S. v. Addystone Pipe and Steel Co. 85 Fed. 271.

But there is no natural limit to the supply of insurance.   The greater the volume of coverage, if not subject to a conflagration or similar hazard, the better the insurance.   And if risks are not acceptable to one group of underwriters or even all the existing companies, new stock, or mutual companies may readily be formed.   Since buying pressure cannot exhaust the market it does not tend to higher prices.   And the underwriter's cost of production is before and not behind him.   He can only estimate on the basis of past experience what his loss cost will be.   If he is over optimistic he may take unwise chances and endanger his company's future, not only with loss to his stockholders, but if the indemnities run over a term of years as is workmen's compensation insurance, with possible disaster to the beneficiaries.   Competition therefore cannot be relied upon to produce right rates.

But unrestricted competition not only fails to produce right rates—it also tends generally to produce wrong rates.   If the underwriters have difficulty in correctly appraising risks, how much more must the seeker for insurance coverage?   Under the circumstances he naturally turns to those in whom he has confidence to secure it for him at the best rates and under the best conditions they can.   And, contrary to the practice in the stock and commodity markets, it is the custom for the broker placing the insurance to be paid not by his client but by the company.   Hence competition between companies tends to be a competition for the patronage of such brokers or the service as agents of those able to control the placing of large volumes of business.   This competition tends to raise commissions to such brokers and agents and to the giving of bonuses and other rewards all tending to increased cost and rates.   The evils of this form of competition brought out by the Armstrong investigation of the life insurance business led to statutory limitation of commissions and acquisition expenses in that field. The state authorities have also found it necessary to intervene and impose similar restrictions on acquisition expenses in workmen's compensation insurance.

But unrestricted competition not only tends in this way to increase costs and rates, it tends also to unfair discrimination in rates.   Just as the large shipper used to obtain from the railroads concessions not granted those having less goods to ship,

so those having the placing of large lines in insurance which would measurably swell the volume of business of the company with which they are placed are in position to bargain for better terms than those whose risks are individually smaller though the aggregate of their business may be much larger. Any inadequacy in the total premium income from too great concessions in rates for large risks must be made up through excessive rates on those of less magnitude and hence the distribution of the loss burden is not made in an equitable manner.

The fire insurance companies were probably the first to realize these unsatisfactory results of competition and sought by compacts and agreements to regulate rates and commissions only to be met by the anti-compact laws I have already referred to. But as the evils the companies struggled against were real, the rightness of their position in this regard has since been recognized in many states. The state of Kansas, however, while recognizing the failure of competition, was yet unwilling to recognize anything in the nature of an uncontrolled private monopoly and in 1909 adopted a law requiring the filing of fire insurance rates with the Superintendent of Insurance and giving him the authority to order changed rates he found to be excessive, unreasonable or inadequate. Provision was made for appeal from his decision to the courts. The law was attacked as unconstitutional but was upheld by the U. S. Supreme Court. The majority opinion (the dissent, however, was vigorous) held that "a business, by circumstances and its nature, may rise "from private to be of public concern and be subject, in consequence, to governmental regulation."(6)   After discussing the nature and circumstances of the insurance business, the court held it came within this principle. This decision was rendered in 1914.

Notwithstanding this Kansas law was enacted before the passage of the first workmen's compensation law to actually come into effect in the United States, it does not seem to have been in any way responsible for the laws providing for regulation of workmen's compensation insurance rates, save insofar as the decision in the test case on that law showed that such regulation was not open to attack on constitutional grounds.

(6)German Alliance & Lewis 233 U. S. 389.

The first provision for regulation of rates for workmen's compensation insurance was in the compensation law of Massachusetts when it was proposed to give the Massachusetts Employes Insurance Association a monopoly of the new line of insurance created by the law. The authority of the Insurance Commissioner over the rates of that Association was to be absolute. The reasoning in this case seems clear. The state was creating a new subject for insurance and requiring all, under severe penalities, to secure it. It was likewise creating a monopoly to write such insurance and relieving the employer insured therein of further responsibility. Clearly it was the duty of the state to see that there was no abuse of power by its creature, and unless the State itself were to stand sponsor for the payment of compensation it must see that adequate rates were collected. But when the law was changed so as to permit competition for the insurance, the power of the insurance Commissioner over the rates of the carriers was limited to deal with the question of adequacy only, leaving it to competition to bring about reasonableness. The Massachusetts language has since been adopted in several states. The more recent laws, and especially those adopted by states in which compensation laws have been in effect without rate supervision, have gone further and given as broad powers as those granted the Kansas Superintendent with respect to fire insurance rates.

We may, I think, conclude after this review that the adoption of rate regulatory legislation was brought about by consideration of the public interest in the insurance and the failure of competition as suitable regulative. The public interest was undoubtedly emphasized by the legal requirement that the insurance be carried, for we find such regulation of rates for workmen's compensation insurance where there is no regulation of other insurance rates. In view of this development it would be futile, it seems to me, to try to lessen the regulatory power. Nor, on the whole, does it seem desirable to lessen it.

Is the danger real? Can we brush aside the warning of the tendency to the equally or more dangerous competition between states as in fact groundless? We have the example of the city of Austin, Texas, demanding of the Texas State Insurance Board a reduction of rates for fire insurance on the ground that its own local experience should be used as the basis of its rates

notwithstanding its limited volume, the conflagration hazard and other contingencies. While I do not feel free to go into details, I know of at least one instance where great pressure has been put by an association of local employers upon a state official having jurisdiction over workmen's compensation rates to fix what insurance experience appears to indicate is an adequate rate for their industry.

Should an Insurance Commissioner err in such a matter, there is little likelihood of relief through the courts unless gross misconduct can be shown. For when the legislature has granted discretionary powers to a state official the courts are not disposed to question the wisdom of his decisions unless wrongful intent or patent abuse of such power is shown. The establishment of either of these is, needless to say, attended with greatest difficulty.

Such being the case are we to take a pessimistic attitude and consider the situation incurable or shall we patiently study it, seeking out and endeavoring to apply appropriate safeguards before serious difficulties arise? Our duty seems to be clear. If safeguards can be found they must be. Nor is it a difficult task to find them in principle. They can be summed up, it seems to me, in the brief phrase, "standards of judgment." What more is meant by the expression "a government of laws rather than a government of men" than this: that for the uncontrolled discretion of the administrative official there is substituted a set of standards of judgment and of action by which the exercise of his office may be checked and controlled?

Although the principle is easy to find, its application is attended with the greatest difficulty, for standards can be used as the basis for controlling judgment and discretion of public officials only when they are generally accepted. And standards are not generally accepted unless they have grown up through established usage over a long period of time or have been carefully worked out on the basis of painstaking scientific research.

Here lies our task. It is for us to work out such standards and establish their soundness. And we must soon, I think, do this not alone for workmen's compensation insurance but for all casualty lines. For when we observe the efforts (attended with some success) to make the carrying of automobile liability insurance compulsory, we may, anticipate regulation of rates

in the not distant future for this line also. And is it not significant that a legislative committee like the Lockwood Committee undertakes an investigation of the rates for a line attracting as little publicity as plate glass insurance?

The work done by our members on accident and health insurance which was discussed at our last meeting, it has been intimated, is likely to become an accepted legal standard in many of the states. Is it too much to expect that in our meetings through our papers and discussions we may develop like standards for other casualty lines; standards which may come to be accepted as suitable guides by officials charged with the duty of rate regulation? Has not the public and the insurance business the right to expect this of us?

INDUSTRIAL RETIREMENT SYSTEMS BASED ON THE MONEY-PURCHASE PRINCIPLE

BY

J. H. WOODWARD

"The cardinal principal of social policy is to make youth adventurous and keep age secure." Beveridge—*Unemployment.*

PURPOSE OF THE PAPER

It is becoming increasingly frequent for actuaries to be asked for advice as to the best means of providing pensions for the employees of large industrial establishments. The matter of pensions for employees in the public service has been given much attention during recent years and the reports of commissions appointed to investigate that subject, as well as the more recent legislation in that field, contain evidence that the theory of pensions and pension schemes is coming to be better and more generally understood. In the field of private enterprise, however, little has been accomplished. Most existing pension plans in use by large employers of labor are unsatisfactory in that they furnish no effectual guarantee to the employee, and that their financial feasibility is dependent on a continued growth of industry at the rapid rate at which that growth has proceeded during the past few decades. Many employers are coming to realize that the problems involved are far from simple and that technical advice is indispensable.

In the past much of the labor of actuaries has been expended in devising means for correcting or ameliorating conditions which, if sound technical advice had prevailed at the starting of the plan, would not have arisen, and it is worthy of note that most of the papers in actuarial journals relating to pension funds have to do with the valuation of existing funds and with the determination of the rates of contribution required to pay benefits provided under an already existing plan rather than with the fundamental principles which should be followed in formulating the systems. The main purpose of this paper is to stimulate a discussion of what those principles should be, and, more especi-

ally, to emphasize the advantages of systems based on the so-called money-purchase principle.*

WHAT IS A PENSION?

A pension in the modern sense may be regarded as a form of deferred wages. It represents money payments for services rendered, the only difference between pensions and ordinary wages being the fact that the money, in the case of pensions, may be paid to the employee many years after the time at which the services in respect of which the pension is paid, were performed. The fact that, because of the long period of time involved, compound interest is an important factor, does not change the true nature of the transaction. In ancient times pensions were a form of patronage extended by a sovereign to his subjects, either as a reward for political services, as a subsidy for the encouragement of artistic, literary or scientific activity, or for other reasons. The old age pensions today provided by many European governments are in the nature of state gratuities and nothing more than a modified form of poor relief. The modern industrial pension, however, and the pension granted by governments to superannuated civil servants, is not, properly speaking, a gratuity or benevolence. It is, on the contrary, just as much a part of the employee's wages as though it had been included in his weekly pay envelope. It is, or should be, one of the inducements which influence him to enter or to remain in the employment. Any pension system, therefore, which leaves the way open for a default after many years of faithful service rendered, or which imposes conditions involving the forfeiture of the employee's accrued rights, either at the time of resignation, dismissal, or at his death, may be considered to be on the defensive so far as its social justice is concerned.

PAST AND FUTURE SERVICE

It is proposed to accept the deferred wage principle and to examine into some of the inevitable consequences of that accept-

*For the most complete exposition of the meaning and theory of the money-purchase plan, reference should be made to *Pensions for Hospital Officers and Staffs. Report of a Sub-Committee of the Executive Committee of King Edward's Hospital Fund for London*, London, C. & E. Layton, 1919   The chairman of the committee was Mr. W J. H. Whittall, F. I. A.

ance. We may first note that the service in respect of which a pension is paid falls into two classes, (1) past service, and (2) future service. Past service may be either (a) already provided for, or (b) unprovided for (as when a new scheme is introduced or an old scheme is insolvent). Existing employees have past service to their credit, whereas new entrants into employment have only future service. It is advisable first to seek a correct solution for new entrants. The question of what to do about unprovided for past service of existing members should invariably be given separate consideration.

WHAT DETERMINES THE SCALE OF BENEFITS?

Consider a group of employees whose industrial career is just commencing. Assume that these employees are young, and that they have been in the employ of the employer for a period of two or three years so that they represent not casual employees but employees whose likelihood of remaining with the establishment is fairly high and who constitute a class from which the key men of the organization will later be drawn. What are the considerations which determine the form and amount of the pension benefit to be granted or provided for, and of the incidental insurance benefits which may appropriately form a part of the general scheme? The answer to this question is fundamental. It depends to some extent upon the ability of the average human being to understand insurance principles. It depends mainly on the proportion of the wages which it is feasible and practicable to defer. Measures which tend to limit the current consumption of income as it is earned must be sufficiently moderate to insure that the psychological resistance to the plan will not be so great as to defeat it.

CHIEF PURPOSE OF A PENSION PLAN

The chief purpose of a pension plan is to provide an income for the employee for the remainder of his life after he reaches an age at which he may be presumed to be incapacitated from satisfactorily and efficiently performing the duties of his occupation. The view which has been sometimes expressed by civil servants that a pension plan should enable an employee after a certain number of years of service, regardless of age or disability, to retire on pension, seems unworthy of serious considera-

tion: the doubtful blessing of retirement while still active may well be left to be attained wholly through individual initiative.

Since the accumulation of a sufficient fund to purchase an old age annuity involves the building up of considerable sums of money which—if the annuity benefit were the only benefit provided—would in many cases be sacrificed or forfeited in the event of death before reaching the pension age, it follows that this accumulating fund may conveniently be made the basis of a death benefit which will be one of the subordinate benefits of the general system.   Furthermore, the permanent incapacity to labor is by no means wholly dependent on age and may be brought about at a relatively early period in the employee's career through accident or sickness.   In such cases it is highly desirable that a retirement allowance should commence at once and a benefit for permanent and total disability is therefore one which conveniently fits into and should form a part of every comprehensive pension scheme.   Temporary sickness, on the other hand, is a misfortune which can not be so conveniently insured against under pension plans and which it is better to provide for under a separate system.   The remaining classes of economic catastrophe to which the wage earner is liable, the principal of which are unemployment and sickness in his family are also better left to be provided against by separate measures.

Four Kinds of Benefit

In a logically constructed retirement system we have four forms of benefit whose basis is to be determined: (1) an old age annuity; (2) a death benefit; (3) a disability annuity; (4) a withdrawal benefit.

The Old Age Benefit

There are two theories as to what should be the measure of the old age benefit—one that it should provide an amount which may be considered to be the minimum of subsistence; the other, that it should enable the employee to continue to live at the same standard of living to which he has been accustomed, or, what is practically the same thing, that his wages or salary should be continued without diminution in amount.   Obviously, the second theory produces the most desirable condition of affairs on the assumption that it is possible and expedient for industry to assume so heavy a burden.   In practice, however,

the actual scale of benefit will be a compromise between these two extremes, depending upon what proportion of the wages it is practicable to defer.

Under modern conditions of industry, it seems too much to expect that the average wage earner with a family can be persuaded or compelled to defer or forego for future consumption more than about 10 per cent of his earnings. In many individual instances, of course, the amounts saved from present consumption consist of very much more than 10 per cent, but the constant pressure for an improved standard of living—or, more accurately, a standard involving a more liberal expenditure of money—is so great as to impose a powerful, if indefinite, psychological limit on the possibility of deferring wages for pension or insurance purposes. The inability or unwillingness to save is not so much due to lack of foresight and intelligence as it is to habit, environment and the personality of the individual. It is a matter of common observation that it is not so much the low paid man who is unable to save as it is the man whose pay is relatively low as measured by the demands which a complex civilization has thrust upon him.

The Cost of the Superannuation Benefit

In order to give the employer who is commencing a study of this question some conception of the heavy cost of providing an old age benefit on the money-purchase principle—the only principle which in the long run completely meets the several tests of a sound and equitable pension system—it will be well to submit to him the short and simple tables which follow:

TABLE A.

AMOUNT TO WHICH $100 PER ANNUM, PAID AT THE BEGINNING OF EACH YEAR, WILL ACCUMULATE IN THE SPECIFIED NUMBER OF YEARS AT 4% COMPOUND INTEREST.

Years	Amount
5	$563.30
10	1,233.60
15	2,032.50
20	3,096.90
25	4,331.20
30	5,832.80
35	7,659.80
40	9,882.70
45	12,587.10
50	15,877.40

TABLE B.*

ANNUITY (FIRST PAYMENT IMMEDIATE) PURCHASED BY $1,000 AT
VARIOUS AGES ON THE BASIS OF McCLINTOCK'S ANNUITANTS
TABLE OF MORTALITY (MALE LIVES) WITH INTEREST AT 3½%.

Age	Annuity
55	$77.18
60	88.55
65	104.18
70	125.95

TABLE C.

ANNUAL PENSION PURCHASED BY A CONTRIBUTION OF $100 PER
ANNUM FOR VARIOUS ENTRY AND RETIREMENT AGES.

Entry Age	Pension			
	Retirement Age			
	55	60	65	70
20	591.18	875.11	1311.32	1999.76
30	334.28	516.49	798.00	1244.73
40	160.73	274.23	451.22	734.64
50	43.48	110.33	216.95	390.05

As a simple example of the use of the tables, take the case of an employee entering the system at age 30 and who desires to retire at age 65. Assume that he contributes—or that there is contributed in his behalf—amounts equal to approximately 10% of his salary as follows: up to age 40, $100 per annum; ages 40 to 50, $150 per annum; ages 50 to 65, $200 per annum. Then, from Table C, his pension will amount to $798.00 + ½ ($451.22) + ½ ($216.95) which equals $1132.09. That is to say, at age 65 he can retire on a pension equal to about 57% of his then salary of $2,000. The cash accumulations in his account are found from Table A to be $7,659.80 + ½ ($4,331.20) + ½ ($2,082.50) = $10,866.65. Referring to Table B, $10,866.65 × $104.18 = $1,132.09, which checks with the result found directly from Table C. These accumulations would, as will be

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*No special significance is to be attached to the particular tables of mortality and rates of interest used in this discussion. In actual practice these should be chosen to fit the circumstances. Provision must also be made in practice for meeting the administrative expenses of the scheme. If the scheme is insured under a participating arrangement, any savings from mortality or loading together with interest earned in excess of the assumed rate, may be used to increase the benefits.

later explained, be payable as a death benefit if death occurred just prior to the due date of the first pension payment, and they need not be forfeited in event of resignation or dismissal.

Table D shows the percentage of contribution necessary to provide a pension of 50% of the salary for various retirement ages and terms of service assuming that the salary remains constant throughout the term.

TABLE D.*

PERCENTAGE OF SALARY REQUIRED TO PROVIDE A
PENSION OF 50%.

Retirement Age	Term of Service			
	40 years	30 years	20 years	10 years
55	6. 6	11. 1	20. 9	50. 4
60	5. 7	9. 7	18. 2	45. 3
65	4. 9	8. 2	15. 2	38. 4
70	4. 0	6. 8	9. 9	31. 8

AGE AT RETIREMENT

As to the age at which pension payments should commence, it is clear that any plan which is to avoid waste of human effort must in this regard be flexible. In some cases there will be greater reasons for retirement at age 60 than in others at age 70. The general principle would seem to be, however, that the age at which retirement is to be absolutely compulsory should be high—say age 70. At the earlier ages retirement should be had either at the option of the employee or the employer, the pension benefit, however, being reduced as the age decreases, both by reason of the shortening of the term of service and of the increasing value of the annuity to be granted. Under a system founded on a proper principle, it should not be necessary to impose arbitrary limits, but the age of retirement and the amount of

*It should be carefully noted that the percentages of salary given in the table apply to the salaries of *only those who are members of the scheme*, not to the entire pay-roll of the establishment. Thus, if there is a probationary period of three years before an employee enters the scheme, and if one-half the payroll of the establishment is disbursed to employees who have been less than three years in service, then the cost of the plan measured as a percentage of the entire pay-roll is one-half the percentages shown in the table. The "term of service" should be taken as commencing at the end of the probationary period.

the pension should be so coordinated as to bring about equitable results under any conditions.

OPTIONS AT RETIREMENT

It will be further necessary to protect the scheme against the injustice which might arise in the event of death soon after the age of retirement. The practical necessity of introducing an option for this purpose is easily seen. An employee is getting along in years and is known by the employer to be in ill health. The employee is retired and, after receiving pension payments for a few months, dies. The entire reward, therefore, for having foregone a percentage of his salary over many years may consist in a few months' pension payments. While, presuming absolute good faith on the part of the employer, such a result might be defensible on purely actuarial grounds, it would never be accepted by the friends or relatives of the employee without creating an antagonism and, furthermore, it might easily lead to charges that the employee had been retired for the specific purpose of avoiding the payment of the death benefit which would have accrued if his death had occurred while in the service. Again, the employee's wife may still be living and it may be highly desirable to make specific provision for her. At least three alternative options should, therefore, be provided at the retirement age: (1) a life annuity with no return at death; (2) a life annuity with the return at death of the excess, if any, of the withdrawal benefit at date of retirement over the sum of the actual pension payments received; (3) an annuity for a reduced amount to continue during the life of the employee and during the subsequent lifetime of his widow should she survive him. The provision of these three options would permit such a choice to be made by the employee at the time of retirement as might be indicated by his condition of health and his conjugal status and would prevent any serious misunderstanding or charges of injustice against the scheme.

THE DEATH BENEFIT

We may next direct attention to the benefit which would be received in the event of the death of the employee before attaining the pension age. In the case of establishment funds paid for wholly by the employer, such death benefit as may be pro-

vided is generally independent of the pension accumulations, whereas under a money-purchase system such as has been described, there is an increasing death benefit which varies from a few hundred dollars in the early years up to a relatively large sum as the retirement age approaches. (See Table A.) The forfeiture of this benefit in the event of death in the service would of course result in a material cheapening in the cost of the plan. While the principle involved in benefits of the pure endowment or deferred annuity type is entirely sound from an actuarial standpoint, it is nevertheless one which appears difficult of popular apprehension and any pension plan which involves the principle of forfeiture on premature death is likely to produce dissatisfaction among its beneficiaries. In the case of establishment funds on a contributory basis, where the employee's contributions are returned with interest in the event of premature death, then, of course, the reduction in cost produced by forfeiture would be proportionate to the employer's contribution only.

The economic function of the death benefit which forms a natural part of any pension scheme is to provide for the support of the dependents of the employee in the event of his death before reaching the retirement age. There are, however, a number of other important considerations arising from the necessity of providing a plan which will as far as possible minimize misunderstandings on the part of those not familiar with the principles of insurance. Suppose, for example, that a withdrawal benefit was granted but that no death benefit was granted. Obviously, in such cases it would be undesirable for the employee to die in the service, and any employee on his sick bed would undoubtedly, if he understood his rights, resign in order to preserve his equity in the pension scheme. If, through neglect or ignorance, he failed to resign, there would be the embarrassing question of the extent to which it would be fair and proper to take advantage of such neglect or ignorance. If the withdrawal benefit were greater than the death benefit, the same condition would hold to a lesser degree. It follows, therefore, that the death benefit must at least be equal to the withdrawal benefit which, as we have seen, should, if the principles of the money-purchase plan are followed, be equivalent to the accumulated contributions set aside to provide the pension. The basic portion of the death benefit should therefore consist of the accumulated contributions. Such

accumulations, however, while entirely adequate during the later years of employment, are relatively small during the early years, while the actual necessities of the family may be greater at the younger ages. It will be found advisable, therefore, to construct the death benefit by taking the withdrawal benefit as the base and supplementing this benefit by additional amounts of life insurance at the younger ages. This can be conveniently accomplished by setting aside a small constant percentage of the wages—say one per cent—and using this to purchase additional one-year term insurance, the amount of the insurance to be added to the benefit decreasing each year per dollar of premium as the age increases. In this way the total death benefit, while it will still increase from year to year, will commence at the younger ages, when the need of life insurance is greatest, at a relatively high amount

As an illustration of the amount of additional insurance which might thus be provided, the following table shows, on the basis of the American Experience Table of Mortality with 3½% interest the amount of insurance purchasable at several ages for an annual premium of $10.

TABLE E.

AMOUNT OF ONE-YEAR TERM INSURANCE PURCHASABLE AT THE SPECIFIED AGE FOR AN ANNUAL PREMIUM OF $10
AMERICAN 3½% (NET.)

Age	Amount of Insurance
20	$1326
30	1228
40	1057
50	751

A consideration of the figures in this table in connection with those shown in Table A will serve to give a rough idea of the total death benefit thus provided.

THE WITHDRAWAL BENEFIT

At first sight, most employers regard it as desirable that a pension plan should involve a forfeiture of benefits in the event of resignation or dismissal, as they hope in this way to promote a greater persistency of employment and because they quite naturally feel that any employee leaving their employment has forfeited his interest in the pension fund except in so far as the

employee may himself have contributed. To the extent, however, that we adhere to the deferred-wage theory, it is obvious that any forfeiture on leaving the employment is objectionable. Furthermore, the idea of forfeiture as a penalty in cases of dismissal for cause is untenable for the reason that it would only be by the merest chance that the benefit forfeited would fairly represent a measure of damages.

Under an ideal pension plan, it should, on the contrary, be feasible for an employee to go from one employer to another without the sacrifice of any of his accrued rights, each employer contributing or requiring a contribution from the employee to make provision for such portion of the pension payments as might be earned during the period of service with the employer in question. Thus a reasonable mobility of labor would be preserved, a healthy migration of workers from one industry to another, as economic requirements might demand, facilitated, and the system would be free from attack on the ground that it might be used by employers for unreasonably depressing wages, preventing strikes or for the arbitrary coercion of the wage earner.

It does not follow, however, that the withdrawal benefit need necessarily be payable in cash, especially in a lump sum payment. It should preferably take the form of a properly computed paid-up benefit or the right to continue the contract to maturity at the employee's own expense.

THE DISABILITY BENEFIT

The disability benefit differs from the superannuation benefit in that the number of cases of disability to be dealt with will be relatively small and that the problem is primarily one for insurance rather than for accumulation. A serious defect of most industrial pension plans is that the employee becomes eligible for a disability benefit only after a long period of service—often as long as twenty years. It is entirely practicable, however, to supply this very necessary protection at a moderate cost—even at the earliest ages, although it is advisable for various reasons to scale the benefit down somewhat at the younger ages. In fixing the scale of benefit we have as a point of departure the obvious consideration that, as the higher ages are approached, disability becomes gradually indistinguishable from incapacity

arising from old age and that, therefore, at the higher ages there should be relatively little difference between the disability benefit and the old age benefit. The disability benefit should consist of two parts (1) a waiver of subsequent contributions, and (2) a disability annuity payable up to a definite age, say 65. When that age is reached, the disability annuity ceases and the superannuation benefit becomes available. A small constant percentage of the salary—about one-half of one per cent—will be sufficient to permit a satisfactory scale of disability benefit to be arranged. For the purposes of the plan, total permanent disabilities might be defined as total disabilities which had had a continuous duration of more than thirteen weeks. Disabilities under thirteen weeks duration would then be left to be provided for under whatever scheme were adopted to care for temporary sickness. In the event of recovery from "permanent" disability the employee would be restored to the active pay-roll and treated in all respects as though he had not been disabled.

Existing Employees

The question of what should be done about employees who are already approaching the pension age—in fact, all who have a number of completed years of service behind them at the time the scheme is adopted—is one which requires careful consideration. The standing of these employees as respects their past service is entirely different from the standing of employees who have been included in the scheme from the commencement of their employment. The holding out of a pension benefit was not an inducement for these men to enter the employment or to remain in it. Hence, so far as past service is concerned, they may be considered to have received full remuneration for services rendered and any pension benefit which may be granted must be in the nature of a gratuity or special reward rather than of a deferred wage. But, in spite of the fact that no provision has been made for these men in the past, it will be generally desired by the employer to make supplementary grants. These may take the form of conditional credits for the number of years of past service corresponding to the scale of superannuation benefit adopted for new employees. A special fund should be set aside to provide for the liability thus created. No special care need be taken to provide a corresponding death benefit and it is clear

that no withdrawal benefit will be in order. A vitally important point in developing a logical and consistent pension plan is to make a sharp differentiation between these supplementary benefits based on a term of service in respect of which nothing has been contributed or set aside, and the regular benefits under the plan which are provided for by contributions currently set aside at the time the service is performed. Similar considerations apply to former employees now actually carried on the pension roll, although when a pension has once been granted it should be definitely guaranteed for life.

LABOR TURNOVER

Most pension plans in actual practice rely upon the effect of the labor turnover to keep the cost of the scheme within what appears to be a reasonable percentage of the pay-roll of the establishment. In the ordinary pension fund this is done by means of the introduction into the service table of rates of discontinuance for each age. We have seen, however, that if we adopt the deferred wage hypothesis we are barred from counting on the gain from forfeitures on withdrawal as a legitimate means of reducing the cost. This does not mean, however, that the question of labor turnover is not one of the highest importance and one which must be carefully considered. Casual employees, seasonal workers, and common laborers who drift from one industry to another and rarely remain with one employer for more than a limited time, constitute a class whom it is generally desired not to include and who, in any event, are necessarily excluded from practical considerations. The rate of resignation or dismissal, although it is frequently assumed to be a function of the age, varies chiefly according to the length of service. In some establishments, especially where there are a large number of female employees, it will be found that as much as fifty per cent of the entire pay-roll is disbursed to persons who have been less than two years in service. In any event it will be found that the withdrawal rate is very heavy during the first year or two and gradually declines until, after a period of between five and ten years, it remains approximately constant at a small percentage. A serious objection to the direct use of the rate of labor turnover in actuarial calculations is the fact that it fluctuates widely according to industrial conditions, that in the same establish-

ment it may be very high during a period of great industrial activity and correspondingly low during a period of industrial depression.

Turnover statistics are thus too mercurial in their nature to admit of legitimate use in actuarial computations and a scheme which relies for its financial soundness upon an attempt accurately to forecast the labor turnover to be experienced in the future may well be regarded with distrust. The fact, however, that the rate of labor turnover is very high during the first year or two and then decreases rapidly, suggests the desirability of excluding entirely from the operation of the pension scheme all employees who have been in the service for less than a specified period. Such a period, which may be termed a probationary period, also serves to make it unnecessary to take into account the great number of casual and migratory employees who are not likely to become members of the permanent staff. The determination of the probationary period is, therefore, an important factor in estimating the cost of the scheme when that cost is to be expressed as a percentage of the entire pay-roll. The length of the probationary period to be recommended will depend mainly upon an analysis of the labor turnover for the particular establishment. It may differ for the death benefit as distinguished from the superannuation benefit. Thus, the death benefit might carry a probationary period of one year while a period of five years might be required before starting the accumulation for the old age benefit. A plan which appears at first to be very expensive may seem much more reasonable when its cost is expressed as a percentage of the total pay-roll rather than of the pay-roll of the employees comprised within the scheme.

SALARY SCALE

Another subject to which we find that considerable attention is unavoidably devoted in actuarial investigations is the question of salary scale. The ordinary pension plan where the pension benefit is determined by multiplying the final salary—or the average salary for the five or ten years previous to retirement—by a certain percentage, generally one and one-half or two per cent for each year of service, depends for its mathematical accuracy upon the ability to forecast correctly a scale of average salaries which will prevail in the business for many years to come. We

have only to consider the spectacular fluctuations in rates of wages which took place during the war and which are now taking place during the period of post-war readjustment to perceive the high degree of conjecture which must enter into such computations. Wages are dependent not merely upon the conditions in a single industry but upon the influence of fundamental economic forces which move in cycles over long periods and which are further influenced by minor fluctuations within those cycles. Where the contributions are levied upon wages which have been paid in a period of deflation and low wages and the pension is determined as a percentage of salaries paid during a period of inflation and high wages, the difficulty of maintaining the proper equivalence between the contributions and the benefits and of knowing whether or not the fund is solvent will be readily appreciated. Where the pension consists of the benefit actually purchasable by sums set aside out of past wages and accumulated at interest, it is clear that the financial working out of the scheme can be more readily controlled and that the equivalence between contributions and benefits is automatically maintained.

CONTRIBUTORY VS. NON-CONTRIBUTORY

The question of whether the plan should be paid for wholly by the employer or whether the employee should be called upon to contribute to the cost is one which, under the deferred wage theory, can hardly be regarded as fundamental. In the long run the cost is paid out of the aggregate wage fund and may be said to be borne wholly by the employer or wholly by the employee according to the point of view. In practice, however, this point is warmly debated and it is undoubtedly true, that, especially at the inception of a new plan, it does actually make a considerable difference which plan is adopted. Suppose, for example, that a new scheme is to be placed in operation in an existing group of employees. If the plan is paid for wholly by the employer, this is equivalent to suddenly increasing the wages of the entire staff by the percentage of contribution which is necessary under the plan. We are dealing, therefore, with a thinly disguised wage increase. Ultimately, of course, this might prevent the necessity for a direct increase in wages at a later date, or, on the other hand, during a period of depression it might pave the way for a more severe cut in direct wages than would

otherwise be considered necessary.   But in many salaried staffs there are persons who have reached the maximum of their efficiency and who would not in the nature of things receive further increases of salary during their term of service.   Such persons would, then, receive an increase in their real remuneration were the pension to be paid for wholly or partly by the employer, which would represent in many cases a permanent gain to them.

Again, pension plans in order to be put into effect must generally first receive the approval of committees of executives or boards of directors who have little time to spare for studying the economic niceties of the question.   It is much easier to secure their approval of a plan under which it is stated that a substantial part of the cost is to be borne by the employee.

The only really serious objection to a contributory plan is the difficulty of making it compulsory for existing employees.   One of the requisites of a successful pension scheme is that its application shall be universal: if individuals are to be left to choose whether or not they will enter, those who will later stand in greatest need of the benefits will be apt to be the precise ones who have elected to stay out.   The fact that the employer's contribution may be made contingent on an allotment to be made by the employee of a proportionate percentage of his salary, forms of course a strong incentive for the more intelligent employees to join the scheme and is the main measure to be relied on to overcome the difficulty mentioned.

A further argument frequently advanced for contributory plans is that where a part of the cost is paid by the employee himself he is more keenly appreciative of the advantages which accrue to him.   It is difficult to assess correctly the merits of contentions of this type.   Few subjects require so nice a balance of so large a variety of considerations and interests as does a well constructed pension scheme.   Since many of the values involved are psychic rather than economic, they are liable to change as the mental attitude adopted toward the system by those affected by it develops.   Of only one thing may we be certain: whatever plan be adopted, it may be predicted with confidence that it will not be wanting in adverse critics.

Our general conclusion as to the desirability of a contributory feature is that while in the long run the point may be immaterial,

it may nevertheless prove a determining factor in securing the initial adoption of the plan. Where a contributory feature is unnecessary for securing the support of those on whom responsibility for the adoption of the plan rests, then it seems better to avoid the difficult question of compulsory membership and reduce administrative detail as far as possible by making the plan noncontributory. It should be noted that if the plan is to be contributory it should be made compulsory for new employees and a part of their contract of employment.

Self Insurance vs. Company Insurance

Industrial pension plans are usually administered by the employer himself. In the case of government pensions, the administration is usually vested in a special commission or pension board charged with the care of the fund and the conduct of the pension activities. The services of insurance companies in this field have been invoked but little. The typical employer's pension fund is inevitably self-insured because its actuarial structure is so defective as to make it uninsurable through any outside means.

Nearly all existing industrial pension plans are financially unsound. No insurance company could be found which would be willing to assume the liabilities promised in consideration of the funds in hand and the contributions provided. Such funds are legally solvent perhaps, but only because they reserve the right to repudiate. Furthermore, under the common form of pension plan which involves an assumption of scales of salary and where the rate of dismissal or resignation to be experienced in the future has an important effect upon the solvency of the plan, it is hardly to be expected that insurance companies could be of any assistance. Assuming, however, a properly constructed scheme in which the benefits are based upon what the contributions will purchase rather than upon the future salary to be paid and in which the accrued rights of the employee are not sacrificed on withdrawal, there would seem to be no reason why insurance companies might not be advantageously employed to undertake the service and carry the risk. Under such conditions the only elements involved in calculating the premium necessary to provide the benefits are calculations involving the rates of mortality, of disability and of interest. As soon as we exclude

the necessity of taking into account hypothetical salary scales and problematical rates of labor turnover, the possibilities of putting the whole scheme on a scientific basis are greatly increased.

One of the objections likely to be raised by an employer to pensions secured through outside insurance is the fact that the rate of interest employed in computing the premium seems to him low as compared with the rate at which he is able to employ capital in his own business. It may well be asked, however, whether, when the hope of receiving a pension has been held out to the employees, it is proper that their interests should be exposed to the hazards of an industrial enterprise. The situation is analagous to that of an insurance company which might have all of its assets invested in the securities of one industrial corporation. Safety, and the certainty that pension payments due many years hence will be paid when the proper time arrives, are of far greater importance than is the ability to pay a larger benefit predicated on the success of a business speculation. The safeguards to be thrown around the financial interests of participants in a pension scheme should be no less than those which guard the beneficiaries of trusts, the policyholders in a life insurance company, or the depositors in a savings bank. It may be many years before we have a conspicuous or sensational example of a large industrial pension plan which has brought disappointment to its beneficiaries, and until that time arrives the safeguards provided by law for the protection of pensioners will presumably be lax. There would seem to be no sound reason, however, why the pension funds of industrial or commercial institutions should not be subjected to the supervision of the state authorities in the same manner as are the affairs of banks and insurance companies. Indeed, it may be noted that the recent report of the Illinois Commission on Pensions recommends that this be done.*

PENSION RIGHTS SHOULD BE CONTRACTUAL

In order that the criteria which we have outlined for a satisfactory scheme may be put into practice, the first essential is that the rights of the employee should be made contractual.

*Report of Illinois Pension Laws Commission 1918-1919, page 249.

An examination of the rules governing the pension plans of most large corporations show that such rules are so formulated as to make it very clear that the obligation is not contractual. It is usual to provide that, while the right to a pension will not be defeated or denied after a pension has once been entered upon, yet with regard to all of the active employees the right is expressly reserved to amend or, if necessary, wholly to abrogate the plan at any time at the option of the employer. Where there is a contributory feature, it is of course provided that the contributions with interest will be returned in the event of the discontinuance of the plan. Reverting to our fundamental concept of a pension as a form of deferred wages, it is at once apparent how serious is the objection to such a scheme. We can hardly expect the plan to bring about the results expected of it when it may be arbitrarily discontinued at the convenience of the employer. The ability of the employee to face the future without worry over pecuniary matters is the principal reason given for the betterment of morale which is expected to be brought about, and yet, under a scheme of this kind, while the employee's uncertainty as to the future may be lessened, it is far from being effectively removed.

There seems no escape from the conclusion that someone should be legally bound to pay the pension in order to secure which the employee has foregone a part of his remuneration. The contract may be either with the employer direct or it may be with an insurance company which has undertaken to guarantee the plan. In either event the first desideratum is safety.

Safeguarding the Employee's Interest

Where the plan is contractual and the right to pension benefits is evidenced to the employee by an individual contract, of which he is the sole owner and over which he exerts a large measure of control, it is important, if the whole purpose of the plan is not in some instances to be defeated, to safeguard the interest of the employee by making it difficult or impossible for him to deal with the contract in a spendthrift manner. It is true that measures to protect persons against the results of their own improvidence or bad judgment have never been popular because they appear to contravene the natural right of an individual to do what he pleases with that which belongs to him. Other persons than the

employee, however, are interested in the pension contract. The employer is entitled to an arrangement under which he need have no fear that his carefully devised plan will come to naught because of the spendthrift action of its chief beneficiary. Society in general is interested in making certain that the benefits of the contract shall not be prematurely diverted. The family of the employee has a right to feel that its pecuniary responsibility for his old age has been definitely lessened.

This safeguarding of the contract against improvident action should not, of course, be confused with the forfeiture of any accrued rights thereunder. It means simply that in the event of discontinuance the surrender value should take the form of a paid-up annuity, and that in the event of death between the date of lapse and the date of commencement of the pension, the full reserve value should be paid as a death benefit. During the first few years of the contract, however, these paid-up options will amount to relatively little so that it would perhaps be better to provide that up to about the fifth year the surrender value will be paid in cash, such payments, however, to be made in twelve equal monthly instalments and to be unassignable and non-commutable. There should also be a provision enabling the employee to continue the contract to maturity on his own initiative. It will be understood, of course, that the insurance company, if the plan is insured in a company, gains nothing by such an arrangement since the cost may be presumed to be the same whether the contract is continued as a paid-up contract or whether it is surrendered for its cash value.

Advantages of a Retirement System

The advantages of such a retirement system as has been described are three-fold. It benefits the employee, the employer and the community.

To the employee its value is immeasurable. It frees him from fear of a penniless old age, of premature death, and of permanently disabling sickness. It makes thrift easy because it makes it compulsory.

The employer, however, necessarily looks upon a pension scheme as a business proposition. It is not his affair to correct the defects of human nature or remedy social shortcomings except

in so far as his efforts are warranted by the increased efficiency of his staff. For him the retirement system accomplishes the following:

(a) It eliminates the cost of continuing on the pay-roll employees who are no longer active and who are therefore receiving, in the absence of any systematic plan, what in effect constitute disguised pensions.

(b) It enables him to get rid of inefficient employees whom he might otherwise hesitate to discharge.

(c) It decreases his rate of labor turnover.

(d) It serves to attract to his employ thrifty and far-sighted men and to repel the more improvident who wish to be able to consume their entire income as it is earned.

(e) It lessens unrest.

(f) It makes certain, if soundly constructed, that the cost of superannuation is assessed against the product at the time when it is incurred.

The community as a whole is an obvious gainer from such an arrangement. For any extensive adoption of pension plans by large employers must serve to lessen materially the necessary amount of poor relief to be provided. The feeling of individual and family security which tended to exist when men lived in small communities, when the employer had a personal interest in each employee, when families grew up without being split into widely dispersed individuals, will under such a plan be in some measure restored.

It is not to be expected, however, that the full measure of these advantages will accrue from the adoption of a half-hearted and insecure plan. It will therefore be well to recapitulate very briefly the essentials of a system which is to be sound from the social, the economic and the actuarial points of view.

Those essentials are:

(1) It must be financially secure. It should not be dependent on the continued solvency and good intentions of the employer.

(2) It must be equitable. A definite known amount should be set aside from the wages of each employee and the benefits which he receives should be for each individual—not merely for the plan as a whole—the actuarial equivalent of the contributions.

(3)   It must be contractual.   Every employee should have a definite written contract showing what benefits he will receive if he dies, becomes disabled or leaves the employment, as well as what benefits are guaranteed to him on reaching the age for retirement.   By watching the value of his contract grow from year to year he comes to regard it as part of his wages.

THE   DEVELOPMENT   OF   PUBLIC   LIABILITY INSURANCE RATES FOR AUTOMOBILES

BY

A. L. KIRKPATRICK

The scope of this paper is limited to automobile public liability insurance. It may be said however, that fundamentally the process of making rates for property damage and collision insurance does not differ greatly from that of public liability rates. There is a wealth of literature available dealing with the hazards insured against, the various forms of coverage, underwriting methods and methods of adjusting claims, but in none of the material is there a comprehensive description of rate making.

Perhaps this is because, until recently, rate making was more or less a matter of taking whatever experience was available and of using this as a rough guide to the judgment of the underwriters. It has been rather a simple matter to get the experience of the companies on any line of business, on any classification, or in any territory. But up to the present, the volume of experience obtained in this manner was not sufficient to produce an indication of true cost in more than a few of the larger territorial and underwriting classifications. This prevented the development of analytical methods in rate making and it being rather difficult to describe the processes by which judgment rates are established little or no literature has been written on the subject.

More recently the need for rates which more closely follow the statistical experience of the business has become apparent, first because the underwriters have come to realize that rule of thumb methods have not produced satisfactory results and second because of the development of a lively interest on the part of the general public.

The number of automobiles in use has increased enormously during the last decade and because of this, the traffic congestion in cities and even on the country highways has made the hazards of automobile operation a matter of public concern. Premiums for automobile insurance have increased by leaps and bounds until at the present time they amount to many millions of

dollars annually. It is not at all surprising therefore, that the public is taking a real interest in the rates for automobile insurance. When a man has to pay from one hundred to three or four hundred dollars a year to insure his car, it is certain that he is going to interest himself in seeing that the rates are reasonable and in keeping with the loss and expense requirements of the business. This interest is manifested through the state legislatures and insurance departments. At the present time there are ten states which require that the rates shall be filed with insurance departments, before they can be put into effect within the state. This is indicative of the movement toward state regulation of rates within the last four or five years.

When it becomes necessary to prevail upon an insurance department to approve a complete set of rates, it is obvious that it is desirable to have a sound statistical basis underlying the rates. Insurance departments have a habit of taking nothing for granted. The burden of proof is always on the insurance carriers and there must be some means whereby they can show that their rates are reasonable and adequate. Facts are required rather than a mere statement that the rates are based on a limited amount of experience developed on business written several years past, supplemented by a generous supply of personal judgment.

The coverage for which these rates are designed may best be described by quoting from the Automobile Casualty Manual:

"Automobile Public Liability Coverage shall provide 'indemnity' for the assured against loss by reason of his legal liability to others for bodily injuries, accidentally sustained, including death at any time resulting therefrom, on account of any accident due to the ownership, maintenance, or use of any automobile described in the policy. . . . ."

The standard limits of liability assumed by a company are $5,000 for injury or death to one person and $10,000 for injuries or death to all persons involved in a single accident. There is no limit placed on the number of accidents covered during the policy period. Higher limits may be obtained by paying a comparatively small additional premium.

Automobiles are assigned to four broad divisions for the purpose of rating; (1) Private Passenger Cars, (2) Commercial Cars, (3) Public Automobiles and (4) Garages', Automobile Dealers' and Manufacturers' Cars.

Private Passenger Cars include electric as well as gasoline and steam propelled cars of the pleasure type. The basic coverage permits the car to be driven by anyone, over the legal age, with the consent of the owner for either pleasure or business purposes. But the car may not be used for carrying passengers for a consideration. At the present time a reduced rate is granted if business use is excluded from the policy. A further reduction is allowed if the car is driven only by the owner. The basis of the premium charged is for one car insured for one year.

In the group of Commercial Cars are included trucks and delivery cars used for the ordinary transportation or delivery of goods or merchandise. There are four rate classifications to which cars are assigned according to the use to which they are put. For example, Police Patrols are assigned to the first and highest rated classification. Moving Vans are put in the third classification while ordinary wholesale and retail delivery cars are assigned to class four which is the lowest rated. Within each classification cars are further classified according to the load capacity of the car as Heavy, Medium or Light.

Public Automobiles include livery cars, taxicabs, omnibuses and jitneys. They are classified according to the use to which the car is put. That is taxicabs are treated as a class and no distinction is made between them. Livery cars are treated as another classification without subdivision. Busses are further classified according to the number of passengers they seat.

The garage group includes "cars operated by public garages, automobile sales agencies and service stations, automobile manufacturers and automobile schools." Risks falling in this group require coverage not only for all the cars which they own but also for the operations of all employees, regardless of what car is being driven. For example, the repair man must be covered while he is bringing in or returning a customer's car for overhauling and the demonstrator must be covered no matter which one of the demonstrating cars he may be driving. In order to insure risks of this type, there are two alternative ways of granting coverage and computing the premium in addition to the method of describing and charging for a specific car. The first is the Pay-roll Basis. Under this form of coverage the premium is based on the entire pay-roll of the assured including all employees. The rate in this case is quoted per hundred

dollars of pay-roll. The policy may cover all the operations of the assured or may be limited to operations on the premises, and the rate charged varies accordingly. The second method is known as the Named Driver Basis. Each driver is named in the policy and coverage is given to all accidents occurring while any automobile is being operated by one of the named drivers. The premium charged is per driver insured for a year. This basis is intended only for risks having a small number of drivers. On large risks, the pay-roll basis is ordinarily used.

The manual also provides methods of completely covering fleets of five or more private passenger, commercial or public automobiles. The Daily Use Basis provides that the assured must keep an accurate record of new cars put in service and of cars suspended from service, or reinstated. At the end of the policy period the premium is computed on the actual number of days which each car was in use. This method provides automatic coverage for new cars without the necessity of notifying the company every time an addition to the fleet is made. At the same time it does not require payment of a premium for the time when a car may be out of service.

Fleets which have more cars than drivers may be insured on the Named Driver Basis. Under this form each driver is named in the policy and a premium charged on an equal number of the highest rated cars at full rates. The remaining cars are covered at 25 per cent. of their full manual rates. The Pay-roll Basis may be used in the case of commercial cars to determine the number of drivers. The total pay-roll of all chauffeurs is divided by the average salary to determine the average number of drivers employed during the year. The premium is then based on the number so obtained. It is to be noted that the pay-roll basis applied to commercial cars differs from that used in the case of Garages.

The Private Passenger car division has developed far more experience than the other three and it is principally this type of car which is treated in this paper. The methods of compiling and using the experience do not differ fundamentally for the other groups and it is hardly possible to treat, in detail, in a paper of this kind, all of the various problems arising in connection with all divisions.

Practically every casualty company with any volume of busi-

ness has always kept experience on its automobile business for each city of importance and for each state. It has also kept its experience for each of a large number of underwriting classifications. But without a uniform set of rules for classifying premiums and losses and in the absence of a uniform division of territories, it is obvious that the early experience of the various companies was not comparable except in the aggregate. This was realized early in the history of automobile insurance and led to the adoption by the National Workmen's Compensation Service Bureau of a uniform automobile statistical plan for the use of member companies.

A description of the details of this plan and of the methods of tabulating statistics compiled in accordance with its provisions would be of little interest. It is sufficient to say, that the majority of the member companies have adhered to the plan for a number of years and that as a result they have accumulated a mass of experience which is uniform in every respect.

It has been necessary to make numerous amendments to the plant to keep it in line with changes in underwriting practice. Every time a change in an existing classification has been made, a classification erected or several old classifications combined, the statistical plan has been amended accordingly. When it was necessary to call for experience from the companies for the purpose of revising rates, a statistical committee met with a committee of underwriters to determine first what experience was necessary and second whether the data was available in the form desired. This has been no small task, for with the changes in underwriting and statistical procedure which have taken place within the last three years the preparation of a call now involves the examination of a veritable labyrinth of codes.

For years private passenger cars were classified and experience kept for public liability and property damage insurance according to horse-power rating. In 1919, it was found that horse-power was no longer an adequate measure of the accident producing qualities of a car. The ratable horse-power was originally computed according to the formula of the Society of Automobile Engineers and the results were quite satisfactory. Then came a new departure in engine building, which involved the use of a smaller cylinder bore combined with a longer stroke. As the formula was based upon certain assumptions with ref-

erence to the relationship of bore and stroke it immediately produced inequitable results. A common instance cited is that of the Ford and Mercer cars, which were assigned to the same horse-power group under the formula, but which actually developed totally different horse-powers. Under these circumstances it became necessary to abandon this basis and to adopt a new method of classifying cars for rating.

It was during 1919 that the list price basis was adopted with a further qualification depending upon the use of the car and the extent to which different drivers of the car were covered. This method had not been in force long when another difficulty was encountered. With the rapidly increasing price of cars, it frequently happened that a new model of a certain make of car fell into a higher list price group and therefore took a considerably higher rate than the earlier model. In construction the two cars were probably similar and thus equally hazardous and this difficulty was overcome by substituting for list price groups, a set of so-called symbol groups, designating them by letters, W., X., Y. and Z. A separate statistical group was erected for Fords although at the present time they are rated the same as Group "W" cars.

With the change of basis of manual classification from "horse-power" to "list price" and later to "symbol group" the statistical classifications were also changed. It is needless to say that all the classification experience which the companies had been keeping for years was somewhat reduced in value when it came to making rates on the symbol group basis. At first thought it appeared that all past experience might have to be thrown into the discard, but further study showed that the classification experience could be converted to the symbol basis.

There is a certain relationship between the horse-power and list price of cars, the two tending to increase together. In order to avoid scrapping the available experience the rating committee took advantage of this relationship. A large number of applications were drawn at random to obtain a fair sample of the business as a whole. These were tabulated by horse-power and by rate symbol group and the distribution of cars within a horse-power group was obtained by rate symbol groups. The resulting percentages were then applied to the distribution by horse-power groups in the general experience. For the sake

of illustration, let us assume that the following tables show the actual results of the investigation. Table I shows the calculation of the percentages as the result of a review of 17,434 sample applications. In Table II is shown the distribution of experience by horse-power groups in the general experience. Table III is the result of the redistribution by rate symbol groups of the experience contained in Table II. For example, the 90,659 cars in symbol group W, Table III, 1917 policy year is obtained by adding together 67.7% of the 18,874.4* cars in horse-power group 11-20, 55% of the 141,016.0 cars in group 21-30, and .8% of the 40,281.4 cars in group 31-40. The use of Table III will be taken up in a later paragraph.

What the next change in basis will be, if a further change is made, is difficult to foresee but it is certain that until there is some stability in the underwriting practice, no company can furnish statistical data of great value for rate making purposes. It is hoped, that the time will soon come when a satisfactory method of underwriting may be permanently maintained, without radical modifications. When that point is reached it will be possible to conduct extensive statistical studies and to make use of methods which will solve many of the present day difficulties in automobile rate making.

Up to the present time it has not been possible to base rates upon the experience of more than two policy years or at most three years. There are two reasons for this. In the first place, as has been stated, changes in bases of rating have made early experience obsolete or nearly so. What old experience was used had to be modified as best it could to reflect the new basis. Secondly, cost conditions have changed so rapidly that even experience a year old has had but little value for rate making, while experience three and four years old has been ancient history and therefore valueless. These changes have been brought about by the rapid development of the automobile business with changing construction and design and more particularly by the increased hazard of operating automobiles on public thoroughfares.

In the past, the experience used by the National Workmen's Compensation Service Bureau in its rate revisions covered the

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*One car insured for a fraction of a year is treated statistically as a fraction of a car.

TABLE I.
Distribution of Private Passenger Cars in Each Horse-Power Group by Rate Symbols

H. P. Group	Total	Number					Total	Per cent			
		Fords	W	X	Y	Z		W*	X	Y	Z
1-20	1,983	0	1,343	627	13	0	100.0	67.7	31.6	.7	0
21-30	12,685	3,361	3,616	4,024	1,634	50	100.0	55.0	31.7	12.9	.4
31-40	2,167	0	18	513	1,278	358	100.0	.8	23.7	59.0	16.5
Over 40	599	0	0	6	33	560	100.0	.0	1.0	5.5	93.5
Total	17,434	3,361	4,114	5,816	3,175	968	..	..	..	..	..

*Includes Fords.

TABLE II
Countrywide Experience by Horse-Power Groups

H. P. Group	1917		1918		Total 1917 & 1918		Pure Premiums				Apparent Diff.
	No. Cars	Total Losses	No. Cars	Total Losses	No. Cars	Total Losses	1916	1917	1918	1917 1918	
0-20	18,874.4	285,140	22,424.7	358,093	41,299.1	643,233	15.85	15.11	15.97	15.56	.82
21-30	141,016.0	2,353,375	168,606.9	3,047,649	309,622.9	5,401,024	16.89	16.69	18.08	17.44	.92
31-40	40,281.4	912,890	44,535.1	1,100,816	84,816.5	2,013,706	19.58	22.66	24.72	23.74	1.25
Over 40	15,059.5	388,055	16,069.2	454,122	31,128.7	842,177	22.84	25.77	28.26	27.05	1.42
Total	215,231.3	3,939,460	251,635.9	4,960,680	466,867.2	8,900,140	17.93	18.30	19.71	19.06	Base

TABLE III.
Countrywide Experience Converted from Horse-Power to Rate Symbol Groups.

Rate Symbols	1917		1918		1917 & 1918 Comb.		Pure Premiums				Differ-ential
	No. of Cars	Losses	No. of Cars	Losses	No. of Cars	Losses	1917	1918	1917 1918		
W	90,659	1,215,525	108,272	1,543,752	198,930	2,759,277	13.41	14.26	13.87		.73
X	60,362	1,095,553	71,251	1,419,039	131,613	2,514,592	16.15	19.92	19.11		1.00
Y	42,017	1,072,774	49,066	1,339,065	91,983	2,411,839	25.00	27.29	26.22		1.38
Z	21,292	555,182	23,047	659,250	44,339	1,214,432	26.07	28.60	27.39		1.44
Total	215,229	3,939,034	251,636	4,961,106	466,865	8,900,140	18.30	19.72	19.06		Base

two latest available policy years. For example, the revision of
1920 was based on the experience of policy years 1917 and 1918
reported as of December 31, 1919, and the rates were put into
effect in the spring of 1921. In the main, there are two divisions
of the experience. The first is reported by underwriting classi-
fications without subdivision into territorial groups. The second
division is a report by cities and rural territories without sub-
division by underwriting classifications.

The first experience shows the loss cost per car separately
for each classification and for each policy year. The second
division shows the relative cost of losses on all the insured cars
in the important cities and in each state. Having once determ-
ined the pure premium necessary to give an adequate rate for a
given city or territory, the proper classification differential is
applied to obtain the rate for a given make of car.

Take as an example, the City of Chicago, and suppose that
the liability experience for all kinds of private passenger cars
was as follows:

1918		Pure Premiums Per Car		
Number of cars	Total losses	1916	1917	1918
1551.1	52,789	19.91	32.93	34.00

It appears that a pure premium of $34.00 reflects the cost per
car during the latest period covered by the experience, namely,
policy year 1918. Table III shows us differentials to be applied
to obtain a classification pure premium in Chicago. Cars in
Group W will take 73% of $34.00 or $24.80. Group X cars will
get a pure premium of 100% of $34.00. Similarly cars in Groups
Y and Z will be rated at $47.00 and $49.00 respectively.

This procedure is necessarily predicated on the hypothesis
that the distribution of cars by classifications is the same in all
cities and the same in the city as in the country. The assump-
tion was open to serious criticism until put to a test a year or
so ago.

For the purpose of the test, a special report of experience was
called for. In this report, the country was divided into three
territorial groups. The first group contained New York City
and surrounding suburban territory, Jersey City, Hoboken,
Providence, Philadelphia, Buffalo, Cleveland and Boston.

The second was made up of the remaining cities having a population of 200,000 or over; and the third consisted of the remainder of the United States.   Each territory was divided into four horse-power groups.   Some idea of the results of this test are given in Table IV.

TABLE IV

AUTOMOBILE LIABILITY EXPERIENCE

PRIVATE PASSENGER GASOLINE CARS BY HORSE-POWER GROUPS

Territorial Divisions	Horse-Power Groups	Pure Premiums			Apparent Differ-ential	Aver. H. P.
		1917	1918	1917 1918		
N. Y. City, N. Y. Suburban...............	0-20	22.35	33.79	29.63	.81	18.5
Jersey City, Hoboken..	21-30	34.13	32.22	32.87	.90	25.1
Providence, Philadelphia	31-40	44.45	48.41	46.95	1.28	34.2
Buffalo, Cleveland.....	Over 40	39.00	56.35	49.81	1.36	43.0
Boston...............	Average	35.67	37.13	36.62	Base	27.64
	0-20	11.06	16.89	15.14	.93	
Remaining	21-30	15.19	14.96	15.02	.93	
"200,000" Cities	31-40	20.03	20.99	20.69	1.28	
Combined	Over 40	12.53	19.76	17.54	1.08	
	Average	15.55	16.48	16.21	Base	27.32
	0-20	12.93	11.06	11.73	.78	
Remainder	21-30	12.94	14.67	14.04	.93	
of the	31-40	18.99	17.99	18.36	1.22	
United States	Over 40	23.24	20.20	21.38	1.42	
	Average	14.70	15.23	15.03	Base	27.12
	0-20	15.11	15.97	15.58	.82	
	21-30	16.29	18.08	17.44	.92	
Whole Country	31-40	22.66	24.72	23.74	1.25	
	Over 40	25.77	28.26	27.05	1.42	
	Average	18.30	19.71	19.06	Base	27.27

Two things are at once apparent from this exhibit.   First, the average horse-power in each of the three territories is almost exactly the same, which is a good indication that the distribution of cars by horse-power is practically consistent in all sections of the country.   Second, the differentials for the horse-power groups are similar for each of the three territorial divisions. These results indicate that the method of using the national ex-

perience for the development of differential is reasonably accurate.

Now that rates are based on list price, the question of distribution within the various territories is raised again. It is possible that there are more closed cars in the cities than the rural districts since the automobiles can easily be operated all winter in the city whereas the country roads are likely to be impassable during a good part of the winter. It is further possible that there are enough high priced cars in the city to produce an average list price higher than in the country. This point has not yet been put to a test, but in view of the close relationship between the horse-power groups in the three territorial divisions, it is doubtful if any great difference would be found in the distribution by list price.

Having obtained an average pure premium for a territory and having subdivided it into classification pure premiums by the application of the proper differentials, an important problem arises because the results, being based upon past experience, are still several years behind the present time. All of the data which has been used so far is from two to four years old. It is necessary to exercise judgment here and there in adopting pure premiums to allow for certain discrepancies due to inadequacy of the exposure but in general the adopted pure premiums reflect cost conditions of a past period and considering recent trend these results are inadequate as a measure of the present cost of doing business.

The next step therefore, is to determine the proper modification to apply to the selected pure premiums to allow for the increase in cost between the time which the experience represents and the present day.

At the present time the experience of policy year 1921 has not developed far enough to give much of an indication of the ultimate loss ratio for this period. The experience of policy year 1920 is the closest to the present of any available data. At December 31, 1920, all of the premiums of policy year 1920 had been written and probably most of them had been recorded and half of the period for the occurrence of losses had elapsed. It has been found that there is a rather close relationship between the losses actually paid at that date and the ultimate payments which will be made to liquidate all claims of that policy year. It is

likewise true that the premiums written to the end of December bear a close relationship to the final earned premiums for the policy year.* Tables V and VI will serve to illustrate this point.

In Table V, the first column of premiums presents the premiums written on policies issued during 1916 as reported at December 31, 1916; premiums written on policies issued during 1917 as reported at December 31, 1917, and so on for years of issue 1918 and 1919. The second column shows the same figures a year later, *i. e.* at December 31, 1917 for policy year 1916, December 31, 1918 for policy year 1917, etc. The column headed "Ratio" shows the ratio of the second column to the first. Table VI shows the development of incurred losses reported at the same dates as the premiums in Table V and their relation to the paid losses at the end of the first twelve months of the policy year. The first column of losses shows the losses on policies issued in 1916, which have been actually paid during 1916; the losses on policies issued during 1917 paid during 1917, etc. These figures take no account of the outstanding estimates on claims which have occurred but have not been settled. The next column shows the incurred losses by policy years, twelve months later. These figures include both paid and outstanding amounts. The column headed "Ratio" is the ratio of these incurred losses to the paid losses of the first column.

It is quite evident from Table V that if the premiums on

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*If we could calculate the loss development factors on the total incurred losses, (*i. e.*, both paid and outstanding amounts) rather than on the paid losses above, the relationship from year to year might be found more uniform than they are in this exhibit. In such cases the development factor would take account only of the new claims which will be reported during the last half of the policy year. This method, however, is open to the objection, that the claims which have been reported have had very little time for development and investigation at the date of reporting. For this reason, the estimate of cost set up by a claim department is likely to be wide of the mark and lead to a serious error. This is particularly true in the case of liability claims. Over a sufficiently large number of claims this error is minimized and in the practice of an individual company, it tends to vary always in the same direction, to either over or underestimation. If this tendency can be accurately determined for the general experience of all companies this method of projection might prove more valuable than the one in use at present. It is only fair to say, however, that this is a recent development and has not yet been put to sufficient test to finally determine its worth.

TABLE V

DEVELOPMENT OF PREMIUMS OF A GIVEN POLICY YEAR

Policy Year	At 12 Months	At 24 Months		At 36 Months		At 48 Months	
	Premiums Written	Premiums	Ratio	Premiums	Ratio	Premiums	Ratio
1916	1,811,569	1,707,119	.942	1,706,242	.942	1,704,789	.941
1917	2,361,118	2,269,139	.961	2,263,746	.959	2,258,998	.957
1918	2,901,007	2,775,613	.957	2,770,713	.955	..	..
1919	4,745,680	4,647,886	.979	..	..	..	..
Total	11,819,374	11,399,757	.964	6,740,701	.933	3,963,787	.950

TABLE VI

DEVELOPMENT OF RATIO OF INCURRED TO PAID LOSSES

Policy Year	Losses Paid to Dec. 31st of Issue Year	Total Losses Incurred					
		At 12 Mos.	Ratio	At 36 Mos.	Ratio	At 48 Mos.	Ratio
1916	296,294	717,415	2.421	714,175	2.410	712,192	2.404
1917	450,708	1,006,242	2.233	1,012,891	2.247	1,004,982	2.230
1918	492,817	1,252,607	2.542	1,234,020	2.504	..	..
1919	950,336	2,468,106	2.597	..	..	..	..
Total	2,190,155	5,444,370	2.486	2,961,086	2.388	1,717,174	2.299

1920 policy year as reported at December 31, 1921, are discounted by 4%, the result will give a remarkably good approximation of the ultimate premiums for that period. Since a decrease in the volume of premiums must go hand in hand with a corresponding decrease in the number of cars exposed, it is correct to discount the number of cars as of December 31st by 4% to get the number of cars exposed for a year in policy year 1920 as they will appear when the experience is complete.

The development of the losses is not as uniform from year to year as is that of the premiums. It is quite apparent from an inspection of Table VI that if a ratio of about 2.50 were chosen as representing the probable development of policy year 1920 losses that the maximum probable margin of error would not exceed 5%. By multiplying the reported paid losses by 2.50 the total ultimate 1920 losses are obtained. Dividing the losses by the number of cars gives the pure premium cost per car for policy year 1920.

Costs for 1920 year of issue are the latest which are available and represent the closest approximation to present day costs. A comparison of the pure premium cost for 1920 with the corresponding cost for any earlier year will give the percentage of increase in cost over the country as a whole.

It might appear to be a fair assumption that if the pure premium cost per car has increased, say 25% over the whole country from one year to the next, the same percentage of increase has taken place in all territories. As a matter of fact, however, there are found to be very great differences in some lines. This fact makes it necessary to use a different factor of increased cost in different territories. There might be a different factor for each city on which separate experience has been kept but only a few cities have enough exposure to adequately determine the cost for a given year and it becomes necessary therefore to group the cities where conditions are nearly alike and to apply the same factor to all cities in each group. The first step is to determine the pure premium cost for all cars in the group of cities during 1920 and also during the period covered by the experience used in adopting territorial pure premiums, i. e. 1918 and 1919 policy years. The ratio of these two pure premiums gives the increased cost factor. When the adopted pure premium for any territory is increased by this factor the result,

of course, will be the pure premium necessary to meet costs under 1920 cond tions.

The practice of using an estimated loss ratio for 1920 as a prediction of the experience results of 1921 is a distinct step in advance of old methods where the latest experience to be used would have been that of policy year 1919, part of which was in force during 1919 and part during 1920. But even the present practice does not go far enough. By the time the new rates actually go into effect it will be 1922. Notwithstanding this, the rates will be based on conditions which were in force more than a year prior. So far this obstacle has not been overcome in any line although more attention has been given to it in the Workmen's Compensation field than in any other. The need is for some index which will show the current trend of costs. This will be treated in a later paragraph as one of the possibilities for future development.

So far we have been dealing only with the pure premium or pure loss cost. In order to get a final manual rate it is, of course, necessary to add a loading for expenses. The loading for public liability insurance is made up of the following items and the percentages of premium given will serve as an illustration:

Acquisition Cost	25.0%
Claim Adjustment	7.0%
Taxes	3.5%
Administration Cost	9.5%
Total	45.0%

The above percentages are of the gross rates so that in order to properly load the pure premium, the following formula is used:

$$\text{Gross Rate} = \frac{\text{Pure Premium}}{1 - .45}$$

The cost of conducting the business is obtained from an analysis of the figures of a number of companies just as the pure premiums are obtained from actual experience. But there is often a considerable difference in the results shown by different companies when there is only one of the many lines of business under consideration. This is due, of course, largely to the difference in treatment of the various items of expense in allocating them to the various lines of business. Commissions and taxes produce little or no difficulty. They can easily be correctly charged

against the proper line of business. But when we come to claim expense and administration expense where there is a considerable item of cost which applies to all lines of business written by the company, there arises considerable difficulty. There are a good many ways by which the allocation may be made, but the simplest and most generally used is the distribution of the expense in proportion to the premium volume of each line of business. This means that if the total administration cost of a company during the year amounted to 9.5% of its premium volume for the year that each line of business would be considered as having cost 9.5% of its premiums for administration cost. When this procedure is carried to the point of allocating the expense to each policy as is actually done in making a rate, we naturally charge 9.5% of the policy premium as being the cost of handling that business. A more complete treatment is given the subject in a later paragraph.

So far this paper has dealt with present methods of making rates. The balance will be devoted to the possible future development of rate making methods. In this connection there are three main problems: (1) Keeping rates in line with current experience indications, (2) The zone problem and (3) The expense loading problem. Their solution has not yet been completed and just what that solution may be cannot, of course, be foretold at this time. This presentation of the subject is intended to show the points involved and to indicate where possible, the principals which must govern the solutions, rather than attempt to lay down a completed program.

It was previously pointed out that by the time a complete set of rates has been developed, the experience on which they are based may no longer, be representative of present day conditions and it may be necessary to modify the adopted rates to allow for that condition. The development of the latest policy years experience was designed to take care of this lag in the experience at the time of the revision, but the same lag in the experience must be dealt with between rate revisions. The loss ratio experience for the latest calendar year or any part of a calendar year is very easily furnished by all companies and gives an approximation to the trend of loss costs as compared with premium income. It has a very serious weakness, however, in that it is affected heavily by the over or underestimation in the claim

reserves both at the beginning and end of the experience period· This so weakens the experience that it can hardly serve as more than a rough guide in determining the final level of rates.

There are however two factors which enter into the loss cost by means of which its trend may be measured from month to month. They are claim frequency and average cost of claims. The chief difficulty encountered with these factors is to get the figures from the companies in the form required. Take first, claim frequency. It is easy of course, to determine the number of claims incurred during any period but this must be related to some unit of exposure. The measure of exposure most easily obtained is the earned premium for the period and this may be found of some use. But a change in rate level changes the earned premium without a change in the exposure. It is evident therefore that the indicated accident frequency might be changed by a change in rates and would not represent the true trend of affairs. To get a true exposure it would be necessary to tabulate the number of "cars in force" in the same manner as "premiums in force" are tabulated. This would put a considerable additional burden upon the statistical departments of the companies. It is only fair to point out here that even a frequency per car exposed obtained in this manner could not be taken as an absolute indication for the reason that weather conditions cause the number of cars in actual use to vary greatly from the number of insured cars "in force" and the indicated frequencies would have to be studied in the light of seasonal changes and the trend watched over both short and long periods of time.

The average cost per claim is not hard to obtain. Most companies now have these figures available and watch their trend rather closely. Use has been made of average costs in past revisions by comparing latest indications with those of former periods. But up to the present, the companies have not been induced to file the data at regular intervals for the purpose of studying the current trend. Having these figures available it would not be difficult to watch the trend of costs per claim. When it is apparent that either claim frequency or cost has changed materially from that which existed at the time the rates were made, then the rates can be increased or decreased as the need is indicated.

Experience has shown that pure premium costs vary widely from city to city. There are a good many reasons for these differences but probably the principal ones are the layout of the city streets, traffic conditions and the attitude of the general public and the courts toward automobile accidents and the settlement of claims arising out of them. If the insurance companies were able to establish safety standards for a city which if complied would obtain for that city an immediate reduction in the rates for its automobiles after the manner of the compensation rating schedule, there would be an added incentive to the automobile owners to see that such standards are followed out. There would be a definite monetary reward offered for efforts toward accident prevention. The difficulty with such a plan is to determine after the schedule has been put into effect, what results it is producing. In the first place, some of the cars insured in a given city, Newark for example, may meet with accidents in other cities. These accidents must be charged against Newark statistically but they do not reflect the conditions of Newark. On the other hand cars from other cities may meet with accidents in Newark and these accidents will be charged against the home city of the car. In many cities these two facts might offset each other but it would not be safe to make that assumption for all cities without a severe test, of its accuracy. The use of such a schedule might be made a powerful factor in the prevention of accidents.

The expense loading in a rate is at present determined as a percentage of that rate. This is the simplest way of handling the matter but leads to some rather peculiar results. For example it might appear inconsistent to continue to charge the same percentage regardless of changes in rate level. If a loading of 45% is adequate for a $30.00 rate it is not necessary to continue to charge 45% when that rate is raised to $35.00 since the actual cost of handling the business is not increased in proportion to the rate. The same argument holds true in the case of differentials between territorial and underwriting classifications. For instance, if the loading for home office administration is 10% of the rate then a 1921 Special Six Studebaker touring car in New York City pays $11.90 for that expense while the same car in Arizona pays $1.40. The apparent answer is that the expense loading should consist of a constant amount

for those items of fixed expense and a percentage for the variable items. Such a loading was tried in workmen's compensation rates not long ago and was subsequently abandoned as being impractical. The fact of the matter is, that if one variation is corrected all others must be taken into account also and to do that produces only an involved formula for the loading. The results are slightly different but not sufficiently so to warrant the difficulty and expense of such a procedure. Under those circumstances it appears that the present method is the most practical one to use.

In conclusion it should be said that a description of methods of making automobile rates at this time must be read with a realization of the fact that they are changing rapidly to meet the changing conditions and increasing importance of the business. Present methods may be greatly improved upon in the course of the next few years. This paper has attempted to indicate in general the nature of the problems to be faced. But it is impossible to predict how new developments in underwriting and statistical methods will affect the problems of rate making in the future.

DISTRIBUTION OF SURPLUS BY CASUALTY COMPANIES WRITING PARTICIPATING INSURANCE

BY

WILLIAM LESLIE

There are two principal things, in the opinion of the writer, that make the distribution of surplus by casualty companies a matter well worth discussing. In the first place, participating insurance in the casualty field has had a steady growth since the inception of workmen's compensation laws. At the present time it is written by some of the stock corporations, and by all mutual corporations, interinsurance or reciprocal exchanges and state funds. The absence of any literature bearing upon the methods employed, or which should be employed in the distribution of surplus among policyholders, is a commentary upon the importance thus far attached to this phase of casualty insurance. It is true that some states have, by law, imposed certain requirements, and that in others supervising officials have set up more or less arbitrary rules relative to dividends to policyholders. But on the whole, the subject has been pretty thoroughly neglected; the individual carriers have acted independently and mainly with an eye to competitive possibilities; the enactment of regulatory legislation, where such exists, has been without thorough investigation of the fundamentals involved and in some instances has been influenced mainly by considerations of expediency. The existing situation warrants a thorough examination of the principles which should underlie the distribution of surplus, the ultimate goal being the development of a sound philosophy and correct actuarial technique. Whether any or all of the methods developed by independent companies or imposed by law or regulation are sound is a question worth trying to answer.

The second reason relates to the possibility of alleviating through participating insurance many of the present vexatious rating problems. It harks back to the old discussion of retrospective vs. prospective experience rating and invites considera-

tion of some system of dividend distribution which will aid in the adjustment of rates for individual risks in a retrospective manner. There is also the interesting possibility of making effective a graduated expense loading, based upon the expense requirements of individual carriers and the incidence of those expenses upon their individual risks, by giving proper weight to this item in the dividend system.

The scope of the subject is so broad and the ramifications so many that the writer has been forced to limit the paper to a particular phase of the subject. There are three interesting angles or points of view from which one might logically proceed:

1.   A review might be made of existing laws relating to surplus distribution, and the subject discussed primarily from the regulatory point of view.

2.   Existing systems might be carefully analyzed and discussed primarily from the carrier's point of view.

3.   An examination might be made into the underlying principles of dividend distribution and a general philosophy developed primarily from the policyholder's point of view.

Of course these would not be mutually exclusive, but each would stress a different phase of the subject.

It cannot be said that this paper follows any one of these logical divisions.   It contains a very general and casual review of existing dividend systems, it touches very slightly upon the regulatory phase and discusses some of the principles which should underlie a sound philosophy of dividends.   It is primarily an explanation of the dividend system used by the State Compensation Insurance Fund of California, with such reference to the above divisions of the subject as it was felt would bring out through contrast the special features of the Fund's system.

PART I

As a first step, therefore, it may be well to mention briefly the methods of distributing surplus which are now employed. Because of their large number, it is not possible within the limits of this paper to do more than describe them in terms of their general and more important features.   The prevailing systems of

distributing surplus may be classified under three heads, as follows:

(1)   The flat percentage of premium method.

(2)   The industry group method.

(3)   The individual risk experience method.

The first method is the most universal and has an advantage over other methods because it is the simplest to apply. The only problem presented is that of determining the amount of divisible surplus to be apportioned and that of course is a problem found in any system. But, because this determination may be made according to different principles, we find in practice, distinction between the systems of individual companies using the flat percentage of premium method. There are in general use three different bases upon which the percentage of premium to be returned may be determined.

(a)   Policies are grouped by year of issue and the actual profits ascertained for the group. The total amount to be distributed may be the total of such profits, or it may be a modification thereof, made in the light of the carrier's general surplus at the time of distribution, or because of a predetermined plan of withholding certain amounts for specific purposes or for future contingencies. The date of distribution may have an important bearing, particularly if the carrier is subject to the general reserve laws and is obliged to put up its reserves on the percentage basis. It is obviously impossible to get any line on the profits by year of issue until the close of the policy year. Three month's additional time is highly desirable to permit developments of losses and the auditing of pay-rolls. But by then many policyholders have waited over a year for their share of the surplus, and the delay may seem to them unwarranted. Also, if the carrier has to maintain reserves upon the percentage basis, it may be unable to distribute the entire indicated profit without borrowing from policyholders of later years of issue or using temporarily surplus withheld in past years for just such a purpose. In some instances, two distributions are made, the second taking place at the end of the period for which the percentage reserve is maintained.

(b)   Policies are grouped by date of expiration, the groups consisting of the expirations either for a full year or for some

period less than a year, say six months or even three months. At the end of the period, the amount of surplus to be distributed is determined and may or may not have a relation to the profits earned on the expired policies. The amount, in whatever way determined, is distributed pro rata among the policies which expired during the period. This method permits the payment of returns with reasonable promptness but it offers no assurance to a policyholder that the distribution in which he participates will bear a definite relation to the surplus earned while his policy was in force. As a basis of grouping, it is not usually used for the purpose of accounting for surplus earned, but is rather confined to the sole purpose of describing the policies which are to participate in a particular distribution. The amount of the distribution is dependent in most cases upon the total divisible surplus, which in turn is affected to some extent by the surplus earned on the group of expired policies, and to that same extent there is, therefore, a relation between the surplus earned and the surplus returned on a given group of expired policies. Many carriers that use this method of apportioning surplus have recognized the practical advantage of what might be termed a "fixed dividend policy." They attempt to pay the same rate of dividend year in and year out, in order that their policyholders may have a reasonable assurance of what to expect in the way of returns. Such a practice clearly illustrates the great difference between grouping by year of issue for the purpose of accounting for surplus earned and grouping by period of expiration for the purpose of declaring dividends.

(c) Policies are grouped by month of expiration and the return allowed bears the same ratio to the premiums on expired policies that the total surplus earned while the policies were in force bears to the total premiums earned during the same period. This basis is not very satisfactory in workmen's compensation insurance, because of the large outstanding losses and the estimated pay-rolls, both of which make it an extremely uncertain measure of the correct extent to which such policies should participate.

The first basis is used extensively by state funds. In some funds all policies are written to expire on the same date, in which event the three bases are one and the same. When this is the case the delay in apportioning surplus is minimized, although

even then some of the funds have found it desirable to withhold part of the surplus for later distribution, usually at the end of two or three years, in order to mature their losses.

The second basis is employed largely by mutual corporations. Its use is required by law in many cases, although there is usually a good deal of latitude in the actual determination of the amount of surplus to be distributed.   It carries with it the implication that the surplus on any date belongs to the existing policyholders and may be distributed by them, through their board of directors, as they see fit, provided of course, that requirements of law are fulfilled.   Presumptively the directors will act in the best interests of the policyholders as a whole and their judgment as to the amount to be distributed can be relied upon with safety.

The third basis is found mainly among reciprocal or inter-insurance exchanges writing automobile insurance, although the language of the power of attorney, required by some compensation insurance exchanges, seems to involve substantially the same basis.   The exchanges do not usually speak in terms of earned premiums and generally describe their systems as involving the prorating of losses and expenses among their members, the balance of the original deposit being returned as unused. The exact basis of prorating differs with different exchanges but in general it provides as follows:

Losses and expenses incurred in each month are divided by the deposits (premiums) in force at the end of the month, the result being the fraction of the deposit put up by each policyholder that has been used during the month.   Members are charged for a full month's expenses in their month of entry but are not charged any expenses in their month of exit.   The sum of the charges for the twelve months commencing with the month of entry gives the total proportion of the deposit that has been used and the remainder is the amount to return.   Exactly the same result is obtained by dealing in terms of earned premiums provided it is assumed that all policies become effective on the first of the month, to comply with the requirement that a full month's expenses be charged in the month of entry and none in the month of exit.   The ratio of losses and expenses incurred to premiums earned being determined for each month, they are averaged for the twelve months that the policy was in force and the result is identical with that of the prorating system.   The variations in

this system among different exchanges are mainly in the way of greater refinements respecting the charging of losses and expenses for the months of entry and exit.   The basis seems to be quite suitable for exchanges writing lines other than compensation.

The second method, which has been called the industry group method, is one in which policies are grouped by industries for the purpose of determining the amount of surplus to be distributed. Each industry group is a unit in itself and receives its allotment of divisible surplus upon some basis that reflects the extent to which it created that surplus.   Except for this feature, the individual risk participation may be in all respects the same as under the flat percentage of premium method.   The plan offers some practical difficulties in the creation of proper industry groups and the assignment of individual risks involving over-lapping classifications.   It has some competitive advantages when dealing with that type of employer who does not want to carry the burden of other industries, which he believes are extra-hazardous or underrated, or both.   On the other hand, it is probably just as often a disadvantage when dealing with that other equally common type of employer who believes all the other risks in his own industry are worse than his own.   It represents an attempt, however, to correct through the distribution of surplus the inequalities in the rates between industry groups and to that extent has a scientific justification.   It is found in both mutual companies and state funds.

The third method involves the distribution of surplus in accordance with the individual risk experience.   It differs from the first method primarily in the fact that policyholders do not receive a uniform percentage of premium as a dividend but rather a varying rate, which is dependent upon the surplus earned by the individual risk.   The three bases of determining the amount of surplus to be distributed enumerated under the first method can equally well be present under this system, producing again distinctions between the practices of different carriers.   It is also possible to combine this method with the industry group method, first apportioning the surplus among industry groups and then distributing the group surplus among the various risks upon the basis of the individual risk experience.   The variations in the methods that can be employed in determining the individual risk participation are innumerable, there being an even

wider latitude than in the development of a plan of experience rating.

The individual risk experience method is the least used of any of the three general methods described. This may be accounted for in several ways:

First, the laws of the states in which most of the mutuals are incorporated do not permit the use of any but the flat percentage of premium method.

Second, there are certain practical difficulties, such as the determination of the true risk experience, which incline many carriers to take the easier course of paying a flat percentage, with or without the grouping by industries.

Third, there is a belief upon the part of many that a variation in the rate of dividend for individual risks is unfairly discriminatory.

Fourth, it is not in consonance with the idea of a "fixed dividend policy," which has the effect of enabling an employer to forecast with considerable certainty his final insurance cost.

Finally, it is held by some to be a violation of a fundamental principle of insurance, in that the purpose and justification of insurance is the distribution of losses and that those who suffer heavy losses should not receive less on that account than their more fortunate associates.

In any discussion of methods of surplus distribution, that is based upon practices now existing, it is essential that all the facts of each case be known, otherwise one is very apt to reach the wrong conclusion. It may be very much worth while to generalize but before assuming that a general conclusion is applicable to a specific case, it is necessary to find out whether that case presents peculiarities not hitherto considered. For example, one could not offhand state that a particular system of dividend distribution, which as a general proposition seemed most desirable, would in fact be the best system for any given state fund, mutual, stock company or reciprocal exchange to follow. Requirements of law, rulings of supervising officials, the form of carrier, and its relation to policyholders, have all played their part in the development of the existing systems. At the same time, it is not possible in this paper to attempt a presentation of the various laws, rulings, etc., which have led to the adoption of specific dividend plans. It is the primary purpose of this paper

to present, through a specific illustration, the main features of the third method of surplus distribution, viz., the individual risk experience method, and to hope that through discussion or future papers, other phases of the subject will be covered.

Before proceeding to this end, it is desirable to say just a word or two in a general way about some of the questions which may arise in connection with the distribution of surplus, if a company is engaged in more than one line of insurance or in more than one state.

Should the surplus be ascertained independently for each line and then be distributed according to one of the three previously described general methods, or should the total surplus be distributed without regard to the relative profits or losses from the several lines? This is not an easy question to answer. In mutual companies, where the liability to assessment runs concurrently with the right to receive dividends, it is not difficult to follow the argument that the total surplus should be distributed pro rata without regard to lines, because that is the way assessments would be levied. But, on the other hand, the grouping by lines seems logical when viewed in relation to the circumstances under which the business is written. Rates for compensation insurance are in most cases supervised as to adequacy and, compared to other lines, the underwriting results are much more definite. Competitive situations met by rate reductions may make other lines less profitable, thus forcing a burden on the compensation policyholders, or on the other hand, larger profits in other lines may result in furnishing compensation insurance below its net cost. In either event, the distribution of surplus without regard to the surplus earned by lines is hard to justify. Of course, when considering a mutual company, it is possible to look upon it as "one big union," in which each member has, theoretically at least, acquired an interest measured by the size of his premium, irrespective of the kind of risk he has transferred to the group. Presumptively the relative risk hazard has been correctly measured in advance and if not, the remedy lies in changing the measure for the future and not through accommodation in the plan of distributing surplus. The only objection to this is that the underlying presumption is a practical impossibility, because relative risk hazards are seldom correctly measured and cannot in the nature of things be arbitrarily

changed without regard to rates charged by other carriers. It would seem, from a purely practical point of view, that much might be gained by apportioning the surplus earned on the company's business as a whole among the several lines of insurance in relation to the surplus earned by each, and then proceeding to distribute the surplus of each line among the individual policyholders according to one of the three general methods.

A couple of actual cases may throw light upon the situation. A certain company writes compensation and automobile liability insurance. During a recent year it had a very excellent compensation experience, due in large measure to the fact that its writings were confined mostly to one industry, the compensation rates for which were apparently too high. At the same time it had a very bad automobile experience showing very little profit when its reserves were put up on the legal reserve basis, and a loss when its reserves were put up on the company's own estimates. This condition was due to the fact that competition had forced the automobile liability rates to a very low point for the class of cars insured. The company wished to pay no dividends upon its liability business on the ground that they had not been earned. Technically, under the law this was impossible. The by-laws of the company did not separate the business by lines of insurance but gave each member an interest in surplus earned from any source, just as each one was liable for a pro rata assessment in case of a net loss, irrespective of the source of the loss. The affairs of the company had to be viewed as a whole and the liability policyholders were entitled to a pro rata share of the surplus earned by the compensation policyholders. In this particular case it happened that the two classes of policyholders were pretty generally one and the same so the legal requirement was not as unjust as it might have appeared if they were different sets of persons.

In another mutual company, a peculiar arrangement had been made with a stock company, the practical effect of which was to reinsure all automobile liability risks with the latter upon a basis where 10% of the original premium was retained and the rest paid for reinsurance. The company wished to pay this 10% as a dividend on its liability business and to allow such dividend to its compensation policyholders as had actually been earned on their risks, which, in this case, was greater than 10%.

Again, the company was not legally entitled to make this distinction by lines of insurance, even though it worked an apparent hardship on the compensation policyholders.

But, assuming that we are dealing with a carrier that is not prevented by law from separating its business by lines for purposes of surplus distribution and, further, that the carrier has decided upon such a course, is it possible to properly allocate expenses to each line? In any ordinary case it would seem that this could be done with sufficient accuracy in substantially the same way it is done for Schedule "W". Of necessity, a strict accounting of expenses according to all lines of insurance could not be kept and many items would have to be distributed upon some such basis as premiums. No one would contend that this sort of an allocation of expenses was rigidly accurate but the slight inaccuracy, taken by itself, could not possibly be the justification for combining all lines and disregarding their indicated individual contributions to surplus.

If a carrier is operating in several states, should the business of each state stand on its own feet in the matter of distributing surplus or should the business of the company be treated as a whole? The question is somewhat analogous to the one preceding but has some distinguishing features, particularly so far as compensation insurance is concerned. In other lines, there being no regulation of rates, it may or may not be just to policyholders to treat the business of the company as a whole in the distribution of surplus, depending upon how nearly rates are kept to their proper level in different states or sections of the country. If a competitive situation forces rates in a particular section below their level in other parts of the country (such is the situation in certain lines of automobile insurance in California at the present time), then it would seem that recognition of that fact should be taken in the distribution of surplus. In compensation insurance we have almost universal rate regulation, but the regulation is in many instances by state authority and in every case the rates are promulgated to fit the compensation acts of the individual states. Carriers doing a countrywide business and distributing their surplus without regard to their experience by individual states may create havoc among the domestic carriers confined within the borders of a single state, not to mention an equal opportunity for injustices to policyholders in different states.

For compensation rate making has not yet reached a point where the same relative rate levels actually exist in all states, and if a low rate level required in one state precludes the earning of a dividend in excess of a certain amount on the business written in that state, the payment of a larger dividend by a carrier operating on a countrywide basis would result in driving the local participating carriers out of business. There are three ways in which different states attempt to prohibit this sort of unfair competition with local carriers:

(1)   Where a foreign company has established a "fixed dividend policy" and where the rate of dividend paid in the past exceeds the rate which is presumably earnable under the level of rates that has been approved for the state, such company is required to charge higher rates, the increase being such as would make the net cost of the insurance after payment of the dividend substantially what the probable net cost would be for an equally well conducted local carrier.

(2)   If a foreign company charges the approved rates without any increase, then the rate of dividend it may pay is limited to what a properly conducted local carrier could probably earn and pay.

(3)   Surplus distributed to policyholders within the state must have been earned on policies covering risks in the state, irrespective of the surplus the carrier may have earned on its countrywide business or the dividends it may be allowing in other states.

While the discussion would be interesting, there is no intention of digressing so far from the main purpose of the paper as to get into the mazes of the advantages and disadvantages of such "protective tariff" measures. Suffice it to say that decidedly contrary views exist, particularly with regard to the last mentioned method of controlling surplus distribution.

Part II

The State Compensation Insurance Fund of California distributes its surplus among policyholders upon the individual risk experience method. Its present dividend system is the result of seven years' experience with this general method of apportioning surplus. It is needless to point out that so far as the Fund is

concerned, the process by which the present system in all its details has been reached is one of evolution. The theory which underlies the system is built upon the following premises:

(1) The surplus to be returned to a group of policyholders should be that contributed by their policies.

(2) The grouping of policyholders should be upon broad lines to bring fully into play the principles of insurance.

(3) The net cost of insurance (premiums less dividends) should so far as possible represent the true relative measure of the risk which has been assumed.

(4) Overhead expenses included in the net cost should be assessed so far as possible in relation to their incidence.

Starting with these as fundamentals, it is easy to see that one might come out with a great variety of formulae for surplus distribution, and it would seem that each would be a proper formula if it would stand two tests; one, is it equitable and, two, is it practicable.

The primary consideration in the apportionment of dividends under any form of insurance should be the equitable treatment of all policyholders. Equity does not prohibit discrimination between risks but it requires the basis of such discrimination to be fair. Fair discrimination in workmen's compensation insurance is a particularly difficult thing to attain because of the complicated nature of the benefits, the insufficiency of the statistics upon which rates are based, the impropriety of the average rate for a class as the measure of the hazard of individual risks within the class, the variability in the hazard of individual risks from year to year resulting from a multiplicity of interrelated causes and, finally, the limitations of human ingenuity in the practical solution of theoretical problems.

In determining what is equitable, our treatment of the subject must conform to practical requirements of the business, for we are not dealing with an abstract proposition in philosophy or mathematics, but with a concrete phase of a large and important business. A business, which, in its contact with the public and particularly the insuring public, must be able to explain its workings in homely terms and to carry conviction to the minds of all that those workings are entirely fair and proper. But, in deciding the practical limitations, we must not fall into the habit

of thinking of the insurance carrier in terms of its corporate manifestations only. We must remember that the carrier, whether it be a stock or mutual company, a state fund or an interinsurer, is really a group of policyholders, whose interests are paramount in the determination of ways and means of conducting the business. In developing its dividend formula, the Fund has attempted to keep this viewpoint ever present and to weld theory and practice into an equitable and workable dividend scheme.

The basis of grouping employed by the Fund is the policy year. The surplus earned on policies of a given year of issue is distributed among the holders of those policies. Because of the desirability, from a practical point of view, of allowing dividends at the time of final adjustment on pay-roll audit, it is necessary to determine before all policies have expired the rate at which surplus is being earned on the business of a given year of issue. This is quite readily done by determining the projected loss ratio on December 31 of each year for policies of the current year of issue. Such determination, when made upon the past experience of the individual carrier and based upon a separation of the benefits into "medical" and "all other losses," is quite accurate and serves the purpose very nicely. It enables the Fund to decide in advance its dividend schedule for expirations of the ensuing year, very much as life insurance companies do. There must, of course, be a free surplus on December 31 of sufficient size to cover the prospective dividends, even though the amount of the dividends to be allowed is based upon prospective earnings.

The projected loss ratio and the actual expense ratio give the starting points of the distribution. They, together with investment profits, determine the amount available for distribution, expressed as a percentage of premiums. But the principal problem yet remains, viz., that of distributing this amount among individual policyholders. This brings us to a consideration of the third and fourth premises previously mentioned. The Fund has approached the solution of the problem from its analogy to that of experience rating and of a graduated expense loading. Experience rating utilizes individual risk experience to adjust the measure of the risk and a graduated expense loading formula attempts to assess expenses in relation to their incidence. The

problems differ mainly in the fact that dividend distribution is of necessity retrospective in its application.

If we grant that the rates charged a particular risk are based upon the best possible advance measure of the risk hazard, it still follows that they may not be correct.   If in the distribution of surplus it is possible to effect a further refinement of risk measurements, more complete justice will be done policyholders and the fundamental principles of insurance will be better carried out.   To the extent, therefore, that individual risk experience is significant in the modification of rates through experience rating, it is utilized in determining the participation of an individual risk in the surplus available for distribution.   The fact that prospective experience rating may have been employed in determining the advance rates, is only a further argument for a similar procedure applied retrospectively through the agency of the dividend.   For the experience used in determining the rate of dividend is new experience, not hitherto used in the rating of the risk, and when given its proper credibility produces a further refinement of the rate for the individual risk.   It checks up on prospective experience rating and reflects, with more expedition, changes in individual risk hazard produced by safety work, new processes, etc.

The loading in compensation rates at the present time is a flat percentage addition.   In the case of a carrier operating as does the Fund, this method of loading is far from representing the facts concerning the incidence of expenses.   The Fund from its own experience has determined a graduated expense formula, which when applied to the business of the Fund reproduces the actual total expenses.   It was evolved by a two factor process, *viz.*, that of dividing expenses according to whether they varied by size of premium or were constant for each policy.   Such a process does not introduce all the refinements, which in theory ought to be taken into account, but it does practically accomplish the thing.   When it is considered that the average total expense ratio of the Fund is in the neighborhood of 12% and that this includes at the present time taxes of 2.6% and claim expenses of about 4.5%, it will be seen that substantially no change would be made in the results through the use of additional factors.

The actual distribution of expenses for policy year 1917 is shown in the following table:

CALIFORNIA STATE COMPENSATION INSURANCE FUND.   EXPERIENCE OF POLICY YEAR 1917 BY SIZE OF RISK.

TABLE I.

Item	SIZE OF RISK MEASURED BY PREMIUM GROUPS.									
	Minimum Premium Policies	$0 to $200	$201 to $500	$501 to $1000	$1001 to $2000	$2001 to $4000	$4001 to $6000	$6001 to $10,000	$10,000 & over	Total
Number of Policies..............	3020	5026	657	268	139	86	33	20	18	9267
Premiums.....................	$56241	$272128	$205889	$183935	$190236	$232944	$160502	$152388	$362407	$1816670
Losses.......................	$52239	$180534	$143055	$79673	$97584	$132819	$73783	$59839	$200335	$1020131
Unallocated Claim Expenses	$2434	$11366	$8606	$7688	$7946	$9736	$6708	$6367	$15132	75888
Taxes..........................	1123	5429	4120	3681	3804	4662	3212	3047	7245	36333
General Expenses (Flat charge per policy).........	25236	52625	8970	5020	2510	1425	863	194	184	97054
General Expenses (% of premium)................	809	3921	2970	2653	2742	3360	2315	2197	5222	26189
Total Expenses..................	$29513	$73372	$24666	$19042	$17002	$19183	$13098	$11805	$27783	$235464
Ratio of Total Expenses to Premiums..........	52.4%	26.9%	12.3%	10.3%	9.2%	8.2%	8.1%	7.7%	7.5%	12.9%
Average Charge per Policy for General Expenses..............	$8.60	$11.20	$18.10	$28.60	$37.70	$55.60	$96.30	$119.00	$300.30	$13.30

The items listed show the number of policies, the premiums and the losses, and in addition the expenses divided into four groups, as follows:

1. Unallocated Claim Expenses.

2. Taxes.

3. General Expenses Chargeable According to the Number of Policies.

4. General Expenses Chargeable on the Basis of Premiums. From these actual figures for the premium groups shown, the following table was made up. It shows the graduated expense ratios applied to various premium groups as well as the average loss ratio and the ratio of profit.

TABLE II.

CALIFORNIA STATE COMPENSATION INSURANCE FUND.

Showing graduated charges for expenses, average loss ratio and indicated average dividends by size of risk. (Policy year 1917).

Premium Groups	(1) Graduated Expense Ratio	(2) Average Loss Ratio	(3) Average Dividend
$201– $300	17.5	53	29.5
301– 400	17.0	53	30.0
401– 500	16.5	53	30.5
501– 600	16.0	53	31.0
601– 700	15.5	53	31.5
701– 900	15.0	53	32.0
901– 1100	14.5	53	32.5
1101– 1300	14.0	53	33.0
1301– 2100	13.5	53	33.5
2101– 2500	13.0	53	34.0
2501– 3000	12.5	53	34.5
3001– 4000	12.0	53	35.0
4001– 5000	11.5	53	35.5
5001– 7000	11.0	53	36.0
7001– 9000	10.5	53	36.5
9001–14000	10.0	53	37.0
14001–20000	9.5	53	37.5
20001–30000	9.0	53	38.0
30001-40000	8.5	53	38.5

In apportioning surplus on current years of issue as policies expire, investment profit is withheld for the upbuilding of a surplus to be available for contingencies. Consequently no account of investment profit will be found in the preceding or following tables.

Table II shows the average ratio of profit in various premium groups. The Fund plan contemplates that a risk with the average loss ratio will receive the average dividend, but a variation from the average loss ratio will cause a variation in the rate

of dividend, the extent being dependent upon the size of the risk. Because of the slight value of individual risk experience in risks with $500 or less premium, the average dividend for the premium group is paid, irrespective of individual loss ratio, to all risks with premiums under $500. Above that the following formula is employed:

$$\text{Percentage of Dividend} = \frac{P - (e + l)\left[P + z\left(\frac{L}{l} - P\right)\right]}{P}$$

where

P = Individual risk premium.

e = Expense ratio for the premium group in which the risk falls.

l = Loss ratio for all policies participating in the distribution.

$z = \dfrac{P}{P + K}$ where K has any assigned value.

L = Actual losses of the individual risk.

This formula is developed upon the following basis: Since l is the average loss ratio, then the average loading, viewed retrospectively, may be considered as $1 - l$. To convert the actual losses into premiums for comparison with the actual premium, it is necessary to divide the losses by l. The difference so indicated cannot be taken at its face value but must be modified in accordance with its credibility, which is measured by the factor z. The result is the addition to or deduction from the actual premium, to give the premium which the risk should have paid to obtain the average dividend. But the amount which the risk would have then been charged for losses and expenses would be the average loss ratio and the expense ratio for that premium group, multiplied into the adjusted premium. The remainder of the adjusted premium would have been the dividend. Having actually paid some other premium, P, the insured must first be charged or credited with the adjustment in his premium and after crediting the dividend which he would have received had he paid upon the adjusted basis, the net balance, if any, is allowed the insured as his share of the divisible surplus.

Obviously, this formula will produce situations where the insured not only has no dividend coming to him, but where he actually owes his insurance carrier money. It is necessary in

practice, therefore, to introduce arbitrary stop limits because, however logical it might be to call upon him for the payment of negative dividends, it would be impossible to collect them and suicidal from a competitive point of view to make the attempt. In fixing these limits, the Fund also recognized the vital weakness of ignoring the causes and severity of injuries, when modifying the measure of risk hazard upon the basis of individual risk experience.   In its desire to place the importance of individual risk experience at its lowest defensible measure and to minimize the effect of including in the actual losses, the costs of accidents which are not indicative of risk hazard it decided that every policyholder, irrespective of loss ratio, should get some dividend and that the cost of allowing minimum dividends, where they were in excess of those indicated by the formula, would be met by fixing a maximum dividend as well.   Thus in practice the formula is applicable only to those risks whose loss ratios lie within the minimum and maximum values corresponding respectively to the maximum and minimum rates of dividends.   Because the credibility of the risk experience, as an indicator of risk hazard, increases with the size of the risk, it was decided that the minimum dividend should decrease with an increase in the size of risk, thus bringing the individual risk experience more and more into play as the risk increases in size.   Finally it was decided that even for the largest risks a dividend of no less than ten per cent should be allowed, which, therefore, became the terminal value for these decreasing minimum dividends.

In order to fix proper maximum and minimum values for the dividends, according to size of risk, it was necessary to make actual tests.   Obviously, the values should be so placed that they would compensate for each other and at the same time there should be a consistent relation between the values assigned to different sized premium groups.   To make the test a tabulation of the year of issue premiums was made by size of risk and by loss ratio.   Tables V and VI at the end of this paper show such tabulations for policy years 1917 and 1918.   A study of them shows that for the smaller risks the loss ratios are either very small or very large and that this tendency diminishes as the risks increase in size.   This is a further justification for the imposition of arbitrary limits, as otherwise it would have been necessary to split the premium into its several component ele-

ments (Death, Permanent Total, Major Permanent, etc.) and adopt different values of K for each in order not to give improper weight to the serious cases.   Under the circumstances the same result is attained by the limits in a very simple and thoroughly satisfactory way.

As a result of the tests, the maximum for all groups was placed at the point of a 20% loss ratio.   The value of the dividend indicated by the formula for a 20% loss ratio became the value for any loss ratio less than that.   The minimum dividends which were adopted were, therefore, placed at the points where they would just take up the excess obtained by placing the maximum as above and where there would be a consistent downward trend to the terminal value of 10%.   This may be illustrated best by showing the 1917 year of issue values:

TABLE III.

CALIFORNIA STATE COMPENSATION INSURANCE FUND

Showing average, maximum and minimum dividends for various sized risks (Policy Year 1917).

Size of Risk	Expense Ratio	Average dividend (Allowed for loss ratio of 53%)	Maximum Dividend Allowed for loss ratios of 0 to 20%	Minimum Dividend	
				Loss ratio for which allowed	Amount in %
$201– $300	17.5	29.5	30.0	149% & over	27.5
301– 400	17.0	30.0	30.5	148% " "	27.5
401– 500	16.5	30.5	31.0	136% " "	27.5
501– 600	16.0	31.0	32.0	128% " "	27.5
601– 700	15.5	31.5	32.5	128% " "	27.5
701– 900	15.0	32.0	33.5	128% " "	27.5
901– 1100	14.5	32.5	34.5	127% " "	27.0
1101– 1300	14.0	33.0	35.5	123% " "	27.0
1301– 1700	13.5	33.5	36.5	122% " "	26.5
1701– 2100	13.5	33.5	37.0	120% " "	26.5
2101– 2500	13.0	34.0	38.0	114% " "	26.0
2501– 3000	12.5	34.5	39.0	113% " "	26.0
3001– 3500	12.0	35.0	40.5	109% " "	25.5
3501– 4000	12.0	35.0	41.5	107% " "	25.0
4001– 4500	11.5	35.5	42.5	106% " "	24.5
4501– 5000	11.5	35.5	43.0	106% " "	24.0
5001– 6000	11.0	36.0	44.5	105% " "	23.0
6001– 7000	11.0	36.0	45.5	100% " "	21.5
7001– 8000	10.5	36.5	47.0	99% " "	21.0
8001– 9000	10.5	36.5	48.0	98% " "	20.5
9001–10000	10.0	37.0	49.5	98% " "	19.0
10001–12000	10.0	37.0	50.5	97% " "	18.0
12001–14000	10.0	37.0	52.0	96% " "	17.0
14001–16000	9.5	37.5	53.5	95% " "	16.0
16001–18000	9.5	37.5	55.0	93% " "	15.0
18001–20000	9.5	37.5	56.5	93% " "	14.0

Upon the basis of a projected loss ratio of 63% for policy year 1920 and an average expense ratio of 12%, the following table of values was developed for application to policies of that year upon their expiration:

TABLE IV.

CALIFORNIA STATE COMPENSATION INSURANCE FUND

Showing average, maximum and minimum dividend for various sized risks.   (Applicable to policy year 1920.)

Size of Risk	Expense Ratio	Average dividend (Allowed for loss ratio of 63%)	Maximum Dividend Allowed for loss ratios of 0 to 20%	Minimum Dividend	
				Loss ratio for which allowed	Amount in %
0– 100	27.0	10.0	10.0		10.0
101– 150	23.0	14.0	14.0	Loss Ratios	14.0
151– 200	21.0	16.0	16.0	not con-	16.0
201– 250	19.0	18.0	18.0	sidered for	18.0
251– 300	17.5	19.5	19.5	risks of	19.5
301– 400	16.5	20.5	20.5	$500.00 or	20.5
401– 500	16.0	21.0	21.0	less.	21.0
501– 600	15.5	21.5	23.0	138% & over	18.5
601– 700	15.0	22.0	24.0	131% " "	18.5
701– 900	14.5	22.5	25.0	128% " "	18.5
901– 1100	14.0	23.0	25.5	125% " "	18.5
1101– 1300	13.5	23.5	26.5	123% " "	18.5
1301– 1700	13.0	24.0	28.0	119% " "	18.5
1701– 2100	12.5	24.5	29.0	116% " "	18.0
2101– 2500	12.0	25.0	31.5	112% " "	17.5
2501– 3000	11.5	25.5	33.0	110% " "	17.0
3001– 4000	11.0	26.0	34.5	108% " "	16.5
4001– 5000	10.0	26.5	36.5	107% " "	16.0
5001– 6000	10.0	27.0	38.0	104% " "	16.0
6001– 7000	10.0	27.0	39.5	101% " "	15.5
7001– 8000	9.5	27.5	41.0	100% " "	14.5
8001– 9000	9.5	27.5	42.5	98% " "	14.5
9001– 10000	9.0	28.0	44.0	97% " "	14.0
10000–12000	9.0	28.0	45.5	96% " "	13.5
12000–14000	9.0	28.0	47.5	94% " "	13.0
14000–16000	8.5	28.5	49.5	93% " "	13.0
16000–18000	8.5	28.5	50.5	92% " "	12.0
18000–20000	8.5	28.5	51.5	91% " "	11.5
25000	8.5	28.5	53.5	90% " "	11.0
30000	8.5	28.5	55.5	89% " "	10.0
35000	8.5	28.5	57.5	88% " "	10.0
40000	8.5	28.5	59.5	87% " "	10.0
45000	8.5	28.5	61.5	86% " "	10.0
50000	8.5	28.5	63.5	85% " "	10.0
60000	8.5	28.5	64.5	84.5% "	10.0
70000	8.5	28.5	65.5	84% " "	10.0
80000	8.5	28.5	67.0	83.5% "	10.0
90000	8.5	28.5	68.0	83% " "	10.0
100000	8.5	28.5	69.0	83% " "	10.0
200000	8.5	28.5	73.0	82% " "	10.0

In connection with this table it is of interest to point out that, under the method used to apportion dividends, an average loss ratio of 63% and an expense ratio of 12% would mean an average dividend of 25%, and the actual dividends allowed during the first nine months of 1921 on expirations of policy year 1920 averaged 25.5%. These dividends were distributed by the formula previously given, substituting therein the graduated expense ratios and the average loss ratio shown in the table for policy year 1920.

If an average loss ratio higher than the projected loss ratio were actually experienced, the dividends distributed would likewise be less because the risks participate upon the basis of their loss ratios.   Likewise, if the projected loss ratio is found to be too high, the actual amount of dividends distributed will be found to be greater than the estimated amount.   In short, there is a tendency within the formula itself to adjust the amount of surplus distributed to the actual amount available irrespective of the validity of the first assumption respecting such amount. The closer the first approximation, the more equitably will the formula operate, but unless there is a material change in the distribution of loss ratios from that upon which the limits are based, there is no chance of missing the mark to any appreciable extent.   It is quite easy to watch the progress of the plan during the year it is being applied to expiring risks, and it could be subject to monthly, quarterly or semi-annual modification if such were found desirable.

In allowing the dividend upon an expired risk, it is not only necessary to have the pay-roll audit completed and the final adjustment of premium made, but also the losses must be sufficiently matured to determine true loss ratios.   While this is a real problem in many risks where there are indeterminate cases, it is not a bit different from the problem as it exists in experience rating procedure.   If it can be solved satisfactorily in the latter case, it can equally well be solved for purposes of dividend distribution.

The Fund has not only had no trouble in applying the plan in the determination of dividends on expiring business, but it has found that it appeals very strongly to the insuring public.   It would seem that the best proof possible of its practicability would be the fact that it has stood up perfectly under the test

of actual use.   Further, it seems to comply with the criterion that the formula of distribution be equitable, for only such weight is given to individual loss experience as the credibility of that experience warrants.   It does not discriminate unfairly between risks, but carries the principles of fair discrimination to their logical conclusion in that unintentional errors in advance risk measurement are modified and their disturbing effect upon policyholders minimized.

TABLE V.

DISTRIBUTION OF PREMIUMS BY LOSS RATIO AND SIZE OF RISK.

CALIFORNIA STATE COMPENSATION INSURANCE FUND.

(1917 Year of Issue)

Loss ratios (in %)	$501 to $1000	$1001 to $2000	$2001 to $4000	$4001 to $6000	$6001 to $10,000	Over $10,000
0 to 4	$54239	$38663	$39492	$18266	$14389	..
5 to 9	23288	27642	25133	14235	14865	..
10–14	18986	24991	34018	15352	7160	$29249
15–19	17648	11038	9139	25017	33600	25071
20–24	7459	13921	6284	..	7722	22688
25- 29	8805	10495	13522	9844	8037	34767
30–34	5401	9234	13816	..	6930	..
35–39	3486	6792	7864	15625	..	..
40–44	1730	2871	6184	4570	7571	10196
45–49	2708	2209	5525	..	..	28917
50–54	5007	2726	3504	..	8514	19067
55–59	2697	4306	2447	..	17388	54760
60–64	3183	..	18267	5169	..	47497
65–69	2417	2429	2169	8846	..	..
70–74	953	7095	..	..	..	..
75–79	1459	1233	2411	..	..	17080
80–84	1916	..	5280	..	..	..
85–89	1243	..	..	5007	..	42114
90–98	643	..	2861	4291	..	..
99 over	20659	24584	35020	34274	23475	30724

TABLE VI.
CALIFORNIA STATE COMPENSATION INSURANCE FUND. DISTRIBUTION OF PREMIUMS BY LOSS RATIO AND SIZE OF RISK.
(1918 Year of Issue)

Loss ratios (in %)	Size of Risk								
	$0 to $200	$201 to $500	$501 to $1000	$1001 to $2000	$2001 to $3000	$3001 to $5000	$5001 to $9000	$9001 to $10,000	Over $10,000
0 to 10	$312962	$184609	$160542	$116555	$42028	$76625	$47788	$7228	$10166
11 " 20	20307	30594	37353	54926	33485	58245	48756	40524	62569
21 " 24	5337	6091	13196	15373	4863	7599	..	..	11604
25 " 28	2655	8069	11361	15136	9241	11892	6225	9928	..
29 " 32	3417	4366	10792	15142	7319	9530	5169	..	46189
33 " 36	2241	4668	6836	9608	4713	9401	6162	24277	65297
37 " 40	1845	4167	8641	5780	2452	..	..	18962	41003
41 " 43	2196	3428	1472	2914	4643	..	..	..	15145
44 " 47	2072	3206	5271	5619	..	7320	..	9907	36643
48 " 51	2923	3186	4982	8040	2120	22073	5891	..	178824
52 "	857	476	..	1845	2651	..	5496	..	..
53 " 56	1638	1722	1717	1102	..	12544	6361	..	37393
57 " 60	1561	1905	3347	1627	5059	9133	..	16702	22912
61 " 64	1297	1457	4892	3925	..	3191	..	..	194694
65 " 68	1157	1634	636	2708	..	3088	6821	..	..
69 " 72	1762	1292	2229	1632	4962	3437	6947	..	10164
73 " 76	1430	1444	2416	..	2648	..	5570	7779	20788
77 " 80	645	1304	667	..	..	3351	..	..	10973
81 " 84	545	1589	1377	..	2304	8205	..	..	..
85 " 88	1534	442	..	..	..	6556	..	..	12103
89 " 92	581	1415	616	..	2334	..	..	..	13919
93 " 96	1018	1536	1612	1314	2727	11750	..	..	..
97 " 100	866	969	1801	..	2625	..	..	..	..
101 " 104	273	1765	..	4564	2028	..	11537	..	17870
105 " 108	663	1327	947	..	5139	4369	..	9724	..
109 " 112	586	671	733	1154	2536	..	..	..	..
113 " 116	1183	355	1460	..	2327	4228	..	9219	..
117 " 119	282	337	..	..	..	..	..	..	..
120 " 123	440	..	575	..	..	..	..	..	21826
124 " 126	148	276	511	..	..	..	..	..	..
127 " 130	273	..	..	1662	2384	..	..	..	..
131 " 134	281	732	..	2848	..	..	..	..	..
135 " 138	715	243	547	2870	2946	3052	..	..	..
over " 138	24220	19991	29287	45267	12718	17647	18234	7383	830080

CLASSIFICATION OF RISKS AS THE BASIS OF INSURANCE RATE MAKING WITH SPECIAL REFERENCE TO WORKMEN'S COMPENSATION INSURANCE

BY

A. H. MOWBRAY

Classification of risks in some manner forms the basis of rate making in practically all branches of insurance. It would appear therefore that there should be some fundamental principle to which a correct system of classification in any branch of insurance should conform, even though in its application to each particular line the general principle may take what seem to be discordant forms. It is the purpose of this study to seek out this principle and if found, attempt to apply it with special reference to workmen's compensation insurance, in which the problem of a correct classification system seems to be of special importance.

NATURE OF THE INSURANCE BUSINESS

The economic function of the business of insurance has been defined as the safe and equitable distribution of the burden of contingent loss. By safe in this definition, we mean distribution under a system such that there will be no failure to spread the loss occurring to any individual, and that the proportion in which any individual is called upon is not such as to cause him serious financial distress. By equitable is meant a distribution substantially in accordance with the inherent hazard or risk of each of those whose losses enter into the general pool for distribution.

A distribution which by the above test would be condemned as inequitable may under certain circumstances be safe, but probably this never could be so under business conditions. For example were the economic function of the insurance business taken over exclusively by the State and operated as a monopoly with compulsory insurance of all risks, the distribution might be made pro rata on the volume of the exposure without regard to the degree of risk to which the insured is

exposed, much, for example, as the state may collect a school tax as a direct property levy without regard to the number of children any tax payer may have and therefore his participation in the benefits of the system.

When insurance is conducted as a business, however, with various insurers competing for the business and with various persons subject to risk of loss having the right of selection of the insurance carrier, such an inequitable distribution cannot be carried through safely as the process of competitive selection would tend to the destruction of those carriers whose rates were inadequate, or the barring from insurance of the classes for which the rates were inadequate. The failure of the A. O. U. W. and other flat assessment life insurance concerns is directly traceable to their failure to distribute the burden in accordance with this requirement of equity.

The means of distribution when insurance is done as a business, is the premium paid in advance and the business does not perform its proper economic function unless this premium provides for an equitable distribution by being closely adjusted to the inherent hazard of the individual risks. This is equally true of workmen's compensation insurance as of other lines notwithstanding the basic theory of workmen's compensation that the risk of injury is a part of the cost of production and the cost of compensation should be borne by the consumer of the product, the insurance being merely the means of passing it on. This is so because of the natural limitations imposed by competition between producers on the extent and manner of so passing the cost along.

It is unquestionably true that in all adequate cost accounting systems, the cost of workmen's compensation insurance is taken account of, and therefore, to that extent, enters into the considerations which tend to fix the price of the commodity produced. However, the entrepreneur, unless he has a monopoly of an article, cannot fix his price solely on the basis of cost of production. He cannot do so in many instances even when he has a monopoly because there are few, if any, articles for which the consuming public cannot find a more or less satisfactory substitute. Therefore, the price at which the producer may dispose of his goods is regulated by the condition of the market, by the law of supply and demand. While, if all producers are subject

to a charge for workmen's compensation, each will have a greater opportunity to recoup himself than he would were some of his competitors free from this charge, that is only one of the conditions which determine the market price he can obtain for his product and the fine shadings of the cost of insurance from risk to risk cannot be reflected in the market price and recovered from the consumer except in the most rare instances and practically as a matter of pure accident. Therefore the variations in the cost of workmen's compensation insurance directly affect the profits of the entrepreneur. Nor is this overlooked by entrepreneurs in general as witness the weighing of the relative advantages of insurance and non-insurance (self-insurance) by the operators of all large enterprises and the tendency of large risks more readily to consider mutual insurance, due to their desire to figure closely on all their costs.

It does not seem to me the indifference of the small producers to fine points of difference in cost of insurance and their less tendency to seek the lowest cost, is evidence in contravention of the above reasoning. It is notorious that the smaller producer is in general not as close a buyer as the large producer, especially of the less costly items entering into his operations. These economies are crowded out by bigger problems he cannot delegate to others, for, in considering relative values he considers it generally more to his advantage to give his attention to these wider problems.

The large purchaser of insurance of any kind is quite as keenly interested in securing sound insurance at the lowest cost as is the large purchaser of any commodity. While, if he has studied the matter, he is usually willing to admit that insurance rates cannot safely be fixed by competition and bargaining, the instinctive desire so to bargain still remains. Where he cannot, as in marine insurance, shop around for the lowest rate any insurer may offer and weight the relative advantages in rates, terms and security offered by several competitors, he usually wants as a minimum consideration, assurance that the rate quoted fits his risk as accurately as may be. Realizing that classification has a large influence on his rate, he presses for such phrasing of the classification as seems to him most nearly to describe his own risk.

Thus accurate rating of risks is called for, both as necessary to the proper performance of the economic function of the in-

surance business and to meet the demands of insurers for proper rates. Both these sources of pressure for precise rating lie in the interest of the insuring public. A certain amount of inequity in rate making is not a disadvantage to an insurance company equipped with a skillful underwriting staff as by selection of the overcharged risks and careful exclusion of the undercharged, the condition could be made a source of profit to the company. If the rate for each risk is accurately proportional to its inherent hazard only chance will determine the element of underwriting profit or loss and in the long run there will be none.

WHY ARE CLASSIFICATIONS NECESSARY?

The losses which it is the business of insurance to distribute arise out of hazards, that is, the combination of value and exposure of such value to the risk of destruction. These hazards are natural things, that is, they are the results of the action of natural forces, including in some instances psychic forces as well as physical, but nevertheless natural forces which act in uniform ways, or, as we express it, obey natural laws.

As long ago as the days of ancient Greece and Rome the gradual transition of natural phenomena was observed and set down in the Latin maxim, "Natura non agit per altum." If each risk, therefore is to be precisely rated, it would be necessary to recognize very minute differences and precisely measure them.

But just as the human mind is incapable of recognizing and wrestling with the infinite so it is not capable of recognizing and working with the infinitesimal. We do not and cannot perceive the differences in a gradual transition. For example, the rainbow appears to contain six colors, and on first appearance they seem to be fairly sharply differentiated, but as we look more closely we begin to observe they run together. As we spread the spectrum out to greater extent by the use of prisms or other laboratory apparatus so that each color as it appears in the rainbow occupies a greater space, we observe that the colors are not sharply defined but gradually merge, red into yellow through varying shades of orange, and yellow into blue through varying shades of green, but our eyes do not appreciate the infinitesimal changes in color with changing wave length. And this same limitation runs in all fields.

Since we are not capable of covering a large field fully and at the same time recognizing small differences in all parts of the field, it is natural that we resort to subdivision of the field by means of classification, thereby concentrating our attention on a smaller interval which may again be subdivided by further classification, and the system so carried on to the limit to which we find it necessary or desirable to go. But however far we may go in any system of classification, whether in the field of pure or applied science including the business or insurance, we shall always find difficulties presented by the borderline case, difficulties which arise from the continuous character of natural phenomena which we are attempting to place in more or less arbitrary divisions.

While thus acknowledging that classification will never completely solve the problem of recognizing differences between individuals, nevertheless classification seems to be necessary at least as a preliminary step toward such recognition in any field of study. The fact that a complete and final solution cannot be made is, therefore, no justification for completely discarding classification as a method of approach.

NATURE OF INSURANCE HAZARD

Since it is insurance hazards that we undertake to measure and classify, the preliminary step in studying classification theory may well be to ask what is an insurance hazard and how it may be determined. It must be evident to the members of this Society that an insurance hazard is what is termed "a mathematical expectation", that is a product of a sum at risk and the probability of loss from the conditions insured against, *e. g.*, the destruction of a piece of property by fire, the death of an individual, etc. If the net premiums collected are so determined on the basis of the true natural probability and there is a sufficient spread then the sums collected will just cover the losses and this is what should be.

The sum at risk is in general a term or condition of the policy, fixed more or less arbitrarily—entirely so in the case of life insurance, for example and indirectly so by law in workmen's compensation. Sometimes the policy covers several contingencies for each of which there is a differenet sum at risk, as for example in personal accident insurance, or in workmen's

compensation where the benefit under the law depends on the extent and nature of the injury not solely on the occurrence. Even in these cases and the still more complicated case of a fire insurance policy covering partial loss, it seems to me the true view is that the sum at risk is fixed subject to the occurrence of the contingency producing such loss. Under this view the variation from risk to risk arises from varying probabilities of occurrence of the contingencies insured against.

Such probabilities are referred to as expressions of chance and in the individual instance appear to be largely the result of chance influences, yet when taken in the mass the stability of these probabilities is well known. A little reflection of a philosophic nature will furnish us the explanation of this regularity. Events in nature do not happen without cause and causes always produce uniform effects, wherefore the probability after all is the expression for the frequency of variation in combination of causes, that is it is the expression of the operation of natural law. Philosophical reflections along these lines enabled Makeham to develop a mathematical expression for the law of variations in human mortality with age that has been repeatedly tried in the graduation of various mortality tables and has proven a substantially correct statement over almost the entire period of adult life. Professor Karl Pearson working along similar lines has broken down the mortality curve into a series of frequency curves that show the varying potency with age of groups of causes and Pearson's curves again have been verified in a number of cases.

We reach the conclusion then that the problem of adjustment of insurance rates for varying risks is the problem of recognizing in those risks variations in the combination of the several causes which tend to produce the contingency insured against and in their strength.

This conclusion, however, does not in itself solve the problem of classification for rate making since we cannot determine by experiment the actual potency of the several causes nor wait for it to be developed in the course of experience. We must learn to recognize in advance those outward characteristics which indicate the presence of particular causes and their strength. In the life insurance field for example, these are sought by means of a physical examination of the person whose life is insured and

while most of the companies confine their business to standard risks, that is, those found to have no peculiar condition indicating an abnormal presence of a particular cause, others have for some time been working in a more extended field and covering lives known to be substandard by reason either of race, of occupation or of peculiar physical characteristics. The basic index of conditions tending to cause the death of the individual of the standard risk type is his age, and this is the standard basis of classification. But where substandard risks are considered it is recognized that there are many men of fifty, for example, who are better risks than others of twenty, and while age may be made the first basis of classification, physical condition, race, occupation and other characteristics are brought in. In the companies having the most extensive substandard business, these variations are recognized by a scheme of numerical ratings analogous to schedule rating in fire insurance and workmen's compensation insurance.

THEORY OF CLASSIFICATION

As pointed out at the outset, we must expect more or less continuous variation in the risks we are compelled to deal with and yet must resort to some system of classification as a first approximation toward recognizing variations between individuals. It seems to me that in this life insurance practice we have the key to a proper treatment of risks for rating purposes, namely a classification system which will extend at least to the point of recognizing major differences in the hazards of individual risks, supplemented by a formula of some kind, following the same general principles as those used in the basis of classification, which will extend the classification system to the point of recognizing minor differences.

Since the problem of adjustment of insurance rates for varying risks is the problem of recognizing in those risks variations in the potency and combination of the several causes which tend to produce the contingency insured against, and since, because there is almost continuous variation from risk to risk both in the combination of the various causes and in the potency of each cause we resort to classification as a first approximation to correct rating with the intention of adding analysis of classification by formula as the second step; the following conclusions

seem to follow respecting the nature of classifications which will prove helpful.

1.   The classification should bring together risks which have inherent in their operation the same causes of loss.

An illustration from the field of workmen's compensation insurance may make this clearer. While the finished product of several mills producing cotton cloth from raw cotton may be considerably different; the several steps in the processes of production are identical to a very large degree, the type of help the same and the proportion of the different trades the same. The housing conditions are much alike. And, if we examine their experience over a period of time we find the accidents arising from the same causes.   Such risks clearly belong together and a system of classifications which did not bring them together would fail of its purpose. Other instances could be cited but this criterion is perhaps sufficiently obvious without further illustration.

2.   The variation from risk to risk in the strength of each cause or at least of the more important should not be greater than can be handled by the formula by which the classification is subdivided, *i. e.*, the Schedule and/or Experience Rating Plan used.

We may illustrate this by the following example.

We might start to classify all textile manufacturing in a single classification, for, though the products differ and the raw materials differ, the processes are much the same and involve the same causes of accidents. But as we pass from the finer classes of cotton and wool fabrics to the coarse products of jute and hemp we find the loss costs mounting because the strength of the causes or at least of some of them is greater. Further, the variations are greater than we find can be adequately measured by the schedule and experience rating plan.   Therefore we cannot treat these industries equitably, if we use only one classification for them. We must subdivide and separately classify different textile lines until we get groups of risks in which the same causes of accidents are present and there is not greater variation in their strength than can be measured by the schedule and experience rating plans.

3. The classification should not cover risks which include, as important elements of their hazard, causes which are not common to all.

The canning of fruit and vegetables presents about the same causes of accident and these causes have about the same strength wherever those operations are carried on. But the making of cans brings in new and totally different causes of accidents. The classification covering these operations should be so set up as to exclude this work of can making or else the schedule and experience rating plans should be worked out to take care of the added operations.

4 The classification system and the formula for its extension (Schedule and/or Experience Rating Plans) should be harmonious.

This is probably less a requirement of the classification system than a limitation of the method of construction of the schedule and experience rating plans that are to be used to modify it. Yet it must be clear that consistent results will not be obtained if, for example, the classification system is worked out on the basis of presence or absence of common causes of loss cost and by the schedule we proceeded to apply charges and credits on an arbitrary basis without considering the relation of the several items to cause and cost of losses, finally applying experience rating upon the basis of comparing risk experience with classification experience but using in working out the risk experience average values for loss items highly inconsistent with the classification averages, themselves characteristic of certain combinations of causes which define the classification.

5. The basis throughout should be the outward, recognizable indicia of the presence and potency of the several inherent causes of loss including extent as well as occurrence of loss.

Since we cannot usually determine the cause of occurrences until after the event, we must work from our knowledge of the past, through which we learn to recognize those things which go with the presence of the forces causing the events concerned. These outward indicia must be our guide in classification work.

In devising this system of classification and the formulae for its extension, however, we must not lose sight of its relation to the practical conduct of the insurance business, particularly

to the basis of premium collection. For example, in workmen's compensation insurance the hazard insured against is the requirement of monetary payments under the terms of a compensation law in consequence of injury to employees, but the premium is based upon pay-roll expenditure. So long as this practice continues our classification system must be related thereto, and in viewing causes we should view them in relation to pay-roll expenditure rather than the number of employees, quantity of output, or some other possible measure. In the practical approach to the problem this becomes of considerable importance.

APPLICATION OF THE THEORY TO WORKMEN'S COMPENSATION INSURANCE

When we approach the application of the theory to the problem of classification and rating in workmen's compensation insurance, we naturally associate the cause of accident as noted above with the process or processes carried on by the employer and in general in these will undoubtedly be found the major indicia of the causes of injury to his employes, at least of those causes with relation to the number of such employes. But along with process we must take into consideration the general level of wages and character of the workers as influencing the frequency of accidents per unit of pay-roll and also the extent of indemnity required when injury occurs. On the other hand, we cannot overlook the fact that in the conditions of American enterprise, and particularly in the utilization of by-products, processes tend to become more or less associated and to influence each other, and also that, the degree of standardization of output has a large influence on the hazard of any process.

Going to the extreme of the process point of view, Mr. Fisher some years ago (*Proceedings*, Vol. II. p. 394), suggested that the basis of compensation premium and ratemaking should be the occupation of the individual employes. As a practical proposition it is well recognized by all that it is not possible to go to anything like this length.

The present Manual has grown up out of a Manual in which the major emphasis was on product though it could not be called a purely product Manual. This undoubtedly represents the influence of the entrepreneur, the purchaser of the insurance

who feels or at least claims in almost every instance that his own individual business is unique in certain respects and deserves an individual rate, and who in any event recognizes that his principal business competitors are those manufacturing the same products he does. If he cannot secure an individual rating to his own liking, he seeks a product classification in order to be sure that he does not receive a less favorable rate than they. Indeed he would prefer, were it possible, a competitive rate such as is obtained in maritime insurance.

So far as the product is manufactured by the same process and from the same materials in all cases a Product Manual tends to recognize variation in causes in the same way as a Process Manual. The difficulty with a Product Manual lies in the multiplicity of products which have to be dealt with, the close resemblance of certain products to each other both in outward appearance and in materials and processes involved, and on the other hand the great variation which sometimes occurs in the production of practically identical commodities. A system of classification based solely on product tends to equalize the cost of production but is unfair to the entrepreneur using the less hazardous processes. The practical solution would seem to lie in something of a compromise between these two ideas, having in mind also certain practical considerations as suggested by Mr. Michelbacher in his paper on "The Technique of Rate Making" (*Proceedings*, Vol. VI p. 201), viz.:

"Classifications should meet certain general qualifications. They should be clearly phrased so that their scope may be readily understood by every one who used them. They should represent units for which accurate pay-roll and loss records can be kept. There should be no possibility of manipulation, either for the purpose of misapplication in classifying risks or of 'juggling' pay-roll from one classification to another carrying a lower rate. The statistician in the home office of the insurance carrier should be able to allocate the pay-rolls, premiums, and losses to the classification to which they belong."

The present Manual does represent something of a compromise between the two ideas of a product Manual and a process Manual but the changes which have taken place seem to have been dictated more by consideration of the extent of the practical use made of various classifications and the desire to prevent

misuse of the Manual than by any formulated theory such as we have developed.

A continuous evolution along these lines without studied guidance may ultimately produce a classification system that follows this theory we have developed. But evolution is a slow process and when precedents have much weight it is even more tedious. If in the above we have discovered the correct theory of classification, ought we not to make a serious studied effort to square our practice of Manual making with it? This may be done in either of two ways:

(1) We may discard the present Manual and seek to build in its place a new Manual by processes which, being based upon our theory, must "ipso facto" produce a Manual that conforms to it; or

(2) Taking the present Manual as the starting point, we may critically review it in all its details seeking wherein its classifications and rules conform to our theory and wherein they fall short, and endeavor to correct the deficiencies so disclosed.

While there is much to be said in favor of starting any attempt at the solution of a scientific problem with a clean slate, the first course involves an extensive amount of difficult research at no small cost in time and money. Because of the continuity of the phenomena studied the Manual so produced would still be found at times difficult to apply. And if the changes from the present Manual were extensive and abrupt there would be great disturbance of the business and opportunity might be so given for abuses which would create other and perhaps more serious difficulties than have been encountered in the past.

While I have explored this approach to the problem even to the point of laying out the general lines the research must follow if it is to serve the purpose, I doubt the expediency of the undertaking and believe procedure in the second way will in the end prove more profitable. A further advantage of working in this way will be that we need not undertake the task of a complete revision at one time but can proceed with as much or little at a time as expediency may dictate, attacking first those points where the present Manual seems weakest. The following is suggested as a plan of procedure in revision of the Manual to conform to our theory of classification.

PROGRAM FOR STUDY AND REVIEW OF THE MANUAL

1.   Having, after review of the Manual as a whole or by reason of complaint in particular cases, selected as a starting point a classification or group of classifications which are not giving satisfaction there should be obtained descriptions of all risks in such classification and in classifications in any way related to it. These descriptions should furnish a complete picture of each risk in all its aspects and should include but not be limited to an engineering description of raw material, processes, equipment, etc. The more intangible elements such as enter into the personnel arrangements, wage levels, etc., should receive full consideration. With these descriptions available a comparative tabulation should be made listing the characteristic features of each risk and special note should be taken of differences found in risks now classified together and of likenesses in risks thrown into different classifications.

2.   Complete accident records for these risks covering a considerable period of time and including an analysis by cause and cost should be obtained and an effort made to correlate the causes of accident with the characteristics noted in the tabulation already made. The effort should be to determine the importance of each noted characteristic as an index of one or more causes of loss including causes of accident and causes tending to alleviate or aggravate the results thereof.

The exact way in which this correlation study will work out cannot, of course, be foretold. Unfortunately I have not now access to data from which I can personally test by experiment how it would be likely to go. It seems fairly obvious that if we know certain accidents have so arisen in connection with the operation of certain machines that we assign the machine as the cause we may from a study of exposure to such machines in connection with such accidents work out an approximate index for the machine. We would then be able to say quite positively that the use of a process involving the presence of those machines was an indication of the probability of accidents of this type, the degree of probability varying with the proportionate exposure to such machines. To cite another example, the use of acids as raw material is an index of acid burns as a probable cause of loss and perhaps an index of explosions. We hardly need to multiply the illustrations.

There will doubtless be a large proportion of the total loss
cost in all industries which cannot be so attributed to causes as
to assist us in selecting the outward signs of its probability.
This residue, it seems to me, will be likely to be of such a nature
that it will not be of primary significance for determination of
classifications. However this may be, if classification of risks
is for the purpose of ratemaking then classification should be
based only on those characteristics which are real indicia of
hazard and unless we rely upon impression we cannot distinguish
such characteristics from others of no importance for our work
without some such study which will test whether and to what
extent a particular characteristic is an indication of the presence
of forces tending to produce or prevent loss.

In passing it may be noted that as was pointed out in Mr.
Whitney's paper at our last meeting, the problem of correlation
between loss cause and observable characteristic is an essential
feature of the problem of developing a rating schedule and if
that work has progressed to a sufficient degree it may be that
substantial help from this other study can be had.

3. If upon such study of this tabulation and these loss
records it be found that the differences in risks classified together
are with regard to characteristics which are not found signifi-
cant or important as indicia of causes of loss, then the risks
are properly associated in a single classification and the only
change indicated by the investigation would be the association
with them of other risks which might have in the past been
separately classified and which differed from them only as re-
spects characteristics found to have no considerable significance
as indicia of loss causation. If on the contrary the features
which distinguish some individuals from the class be found to
be significant indicia of loss causation, the classification phrase-
ology or rules which were responsible for their being so classi-
fied should, if possible, be so amended as to make suitable pro-
vision elsewhere for such risks.

It must be apparent that the converse of this proposition
would likewise be true, and if risks in several different classi-
fications were found to have in common all characteristics
which are really significant as indicia of loss cause and to differ
only in characteristics of no particular significance with respect
to loss causation, then the Manual probably errs in treating them

in different classifications and the several classifications should be brought together in a single classification. It might still be expedient for underwriting purposes to maintain separate classifications, but for ratemaking purposes it should be clearly understood that the intent was to treat them as a single classification.

In connection with this work the importance of the Manual rules cannot be overlooked, and in determining whether or not any change in a classification should be made in the light of the evidence brought out by this study, careful examination should be made to ascertain whether or not the Manual rules were in any respect responsible for such association or misassociation of risks. Nor should we overlook the further fact that any system of classification is more or less a network and that a single classification cannot be changed without affecting in greater or less degree the nature of the material which goes into the other classifications.

4. When revision of the classifications has been completed and certainly before undertaking a revision of rates the present grouping of classifications should also be reviewed in the light of the information we will have developed. As with the association of risks into classifications, the association of classifications into groups should be upon the basis of possession of common characteristic indicia of hazard. The process of grouping should be synthetic and may be facilitated by the use of cards on which are noted the important hazard indicia of each classification and their relative weight.

In carrying forward the differentiating of risks within classifications we use Schedule and Experience Rating Plans. The underlying theory of sound schedule rating is the recognition of the hazard (loss causation) value of physical characteristics and the placing of a proper charge against the characteristic when found more frequently in an individual risk than the classification as a whole with corresponding credit for its absence. And the Experience Rating Plan requires that classification experience be that of a body of risks of so homogeneous a character as respects total hazard that the true rate for any risk will be found by taking an average of its own indications and that of the classification weighting each by its volume of exposure.

Thus the schedule will be but a natural and logical subdivision of classifications made in the way proposed and the clarification of classifications by this analytic study will tend toward that homogeneity anticipated in the experience rating plan.

If I am not mistaken a thorough combing over of the Manual by this method would also disclose logical relations between classifications and groups which would have high utility for ratemaking purposes.

Of course, practical conditions in a competitive business world impose restrictions on our freedom of action that cannot be ignored if we are to obtain a truly scientific solution to the problem. And of this fact we must not lose sight. The nature of these limitations are indicated in the quotation I have made from Mr. Michelbacher's paper.

LEGAL NOTES

BY

RICHARD FONDILLER

(OF THE NEW YORK BAR)

ACCIDENT AND HEALTH

WAR RISK:—(State Life Ins. Co. *vs.* Allison, U. S. Circuit Court of Appeals, Fifth Circuit, 269 Fed. Rep. 93.) The defendant company issued to one Allison a life insurance policy for $5,000 to which was attached the double indemnity provision reading as follows:

"DOUBLE INDEMNITY

"During the premium-paying period of this policy and excluding any time while the same may be in force as extended insurance, all premiums having been duly paid, and this policy being then in force, in the event of the death of the insured resulting from bodily injury, sustained and effected directly through external, violent, and accidental means (murder or suicide, sane or insane, not included), exclusively and independently of all other causes, provided such death shall occur within ninety (90) days from the date of the accident, the company will pay to the beneficiary or beneficiaries hereunder, in addition to the amount otherwise due, under this policy, the sum of five thousand dollars."

The insured was an officer in the United States Army and was killed in France during a battle. It was impossible to determine whether he had been killed by a German shell or an American shell.

The company paid the face of the life insurance policy but denied liability under the double indemnity accident feature. The beneficiary brought suit to recover under this feature. The policy contained no provisions as to change of occupation to one more hazardous than that at date of issuance. The only limitation in the double indemnity clause is in the phrase "murder or suicide, sane or insane, not included."

There is no question but that the insured's death was sustained through external and violent means. Such being the case, the only open question is as to whether his death was caused by accidental means. The probability of being killed during war

is great and yet it was only chance that caused the insured's death.

During the course of its opinion, the court wrote:

"Experience convincingly teaches that the hazards incident to many lawful employments other than war are such that it is to be expected that some of those engaged therein will be injured or killed. If an accident policy contains no provision excepting such hazards, and by chance, without the insured's design, consent, or co-operation, he is injured or killed as a result of a hazard incident to his occupation, his injury or death properly may be said to have been caused by accidental means . . . .

Though the means whereby a personal injury or death is caused were put into operation with the design or intention of killing or injuring one or more persons, if chance determines what particular person or persons are injured or killed in conquence of the use of those means, as to a person so injured or killed, without his fault, consent or co-operation, such means are to be regarded as accidental within the meaning of the provision in question."

The court held that it was immaterial whether it was a German or an American shell which exploded near the insured, as it was a matter of chance whether he or anyone would be struck by it. The court affirmed the judgment of the court below, which was in favor of the beneficiary.

CIRCUMSTANTIAL EVIDENCE:—(U. S. Fidelity & Guaranty Co. *vs.* Blum, U. S. Circuit Court of Appeals, Ninth Circuit, 270 Fed. Rep. 946.) This was a suit by the beneficiary under an accident policy issued by the defendant company.

The insured a very wealthy man, had had a minor business reverse, which worried him considerably. He had a fainting spell in his office several days prior to his death. He was at the window of his office when he either fell or jumped out. It was admitted that his death had resulted from external and violent means, and the question as to whether it was accidental was answered in the affirmative by the jury.

"It goes without saying that, in order for the plaintiff to recover, there must be evidence that an accident occurred conducing to the injury. This does not mean, however, that there must be eyewitnesses to the accident or direct proof of the pertinent fact. The fact is susceptible of proof, as any other given fact, and it may properly be deducible by inference and presumption from facts proven; that is, the fact of accident may be established by circumstantial evidence, as other pertinent facts may be established under the rules of evidence."

Had there been no evidence as to the manner of death, there is no presumption that death occurred through accidental means, but the presumption is rather that it was the result of natural causes.

In the instant case, however, the insured was at an open window which was so large as to allow his falling through it. He was subject to dizzy spells, at which time he sought fresh air. These circumstances, the court held, justified the jury in its conclusion that the death was an accidental one.

A clause in the policy imposed no liability if disease operated concurrently with accident to produce death. While the insured was not entirely well, still the court observed that the proximate cause of death was the fall from the window. Since the fall was accidental, the court would not look to the remote cause, which may have originated in the disease.

The rule as laid down in the law books follows:

"The fact of death does not of itself create any presumption that it was the result of an accident; and where, in order to make out plaintiff's case, it is necessary to base a presumption that death resulted from an injury on a presumption that the insured sustained an accidental injury, no recovery can be had. Where, however, it is apparent that the injury to or death of insured was the result of external and violent means, and the issue is as to whether it was due to an accident, within the meaning of the policy, or to some cause excepted by the policy, the presumption is in favor of accident and against the existence of facts bringing the case within any of the exceptions of the policy, such as insanity of the insured, intentional injury inflicted by a third person, lack of due care and diligence, self-inflicted injuries, and suicide. These presumptions may, however, be overcome by facts and circumstances establishing the contrary."

The court upheld the verdict in favor of the beneficiary.

PARTICIPATING IN AERONAUTICS:—(Bew *vs.* Travelers Ins. Co., Court of Errors and Appeals of New Jersey, 112 Atl. Rep. 859.) The plaintiff was the beneficiary of an accident policy for $3,000 containing the following provision:

"The insurance hereunder shall not cover any person under the age of eighteen or over the age of sixty-five years, nor shall it cover injuries fatal or nonfatal sustained by the insured while participating in or in consequence of having participated in aeronautics."

The insured was a passenger on an airplane of a corporation engaged in carrying passengers for hire. He was accidentally

killed while on a trip seeing Atlantic City. The beneficiary sought to recover $6,000 under the clause:

"If such injuries are sustained (1) while a passenger in or on a public conveyance provided by a common carrier for passenger service (including the platform steps or running board of railway or street railway cars) . . . . the company will double the amount otherwise payable."

The court tried to avoid a forfeiture, under the general rule that any doubts as to construction are to be resolved against the insurer, who had drawn the contract. Here the question rested upon the construction of the words "participate" and "aeronautics". Respecting these, the court wrote:

"It seems clear that 'aeronautics' is the art or practice of sailing in or navigating the air.

"There is nothing in the definition given, or in the common use of the term, to confine it to those who are active in the piloting of air vessels and to exclude those who are inactive users thereof. If it had been intended to confine the application of this provision to those who pilot or manage the physical operations of such vessels, it would probably have been expressed by using some such language as "engaging in the piloting, management or operation of aeronautical vessels."

"I think that plaintiff seeks to give too narrow a meaning to both words. 'Aeronautics' does not describe a business or occupation, like 'engineering' or 'railroading', but an art which may be practiced for pleasure or profit, and is indulged in by all who ride, whether as pilots or passengers."

The insured's case being within the exception in the policy, a nonsuit was granted. This decision made it unnecessary to determine whether the insured was a passegner in the public conveyance of a common carrier, within the double indemnity clause. Upon appeal from the court below, this court affirmed the judgment in favor of the company.

INTENTIONAL KILLING:—(Employers Indemnity Corporation *vs.* Grant, U. S. Circuit Court of Appeals, Sixth Circuit, 271 Fed. Rep. 136.) The insured was a passenger conductor. He ordered a passenger out of a compartment in which the latter had locked himself, and was met with a refusal. He then secured a revolver to frighten the passenger out. Immediately upon his re-appearance, he was shot dead by the passenger. The insured had no knowledge that the passenger was armed. The beneficiary having brought suit for the amount of the

accident policy, the defense was that the insured's death was not accidental within the true meaning of the policy.

Here the insured was killed before he had had time to threaten with his revolver, and he had no reason to believe that his action would result fatally. In all such cases, the evidence is contradictory and it is the province of the jury to determine the facts. The jury found that the death was accidental and the judgment was consequently in favor of the beneficiary.

The following extracts summarize the cases coming under the class of intentional killing:

"In some cases, the insured met his death, as the result of an intentional and designed killing of some third person, and if such killing was not the direct result of misconduct of the deceased, or was unforeseen and not reasonably to be anticipated by him, then his death is held to be the result of external, violent, and accidental means . . . (Quoting cases).

There is another group of cases, on which the defendant mainly relies, in which the assured was killed by a third person, where recovery is not allowed; but in all these cases the deceased engaged in an encounter under such circumstances that he invited his adversary to mortal combat, and either foresaw or should have foreseen that death or injury might result . . . (Quoting cases). Of these cases Taliaferro *vs.* Travelers' Protective Ass'n 25 C. C. A. 494 may be taken as typical. The deceased had drawn a revolver and had struck his adversary in the face before the latter drew a revolver and fired and it was held that the insured's death was not accidental, because he foresaw or should have foreseen that death or injury might probably result from his own conduct . . .

Obviously, in applying these legal principles, many cases of intentional and designed killings will arise, in which it will become necessary to determine from conflicting evidence whether the deceased, by his wrongful conduct, produced his death or voluntarily and intentionally committed acts from which he foresaw or should have foreseen that death or injury might result. In all such cases the issue must be submitted to a jury under a proper charge."

VOLUNTARY EXPOSURE TO UNNECESSARY DANGER:—(Sackett *vs.* Masonic Protective Association, Supreme Court of Nebraska, 183 N. W. Rep. 101.) The insured, a physician met the town marshal late one night while the latter was shooting at a burglar. The insured volunteered to get his automobile, which he did, and took the marshall and two other men into the car. While in pursuit, the insured was shot and killed by the burglars from

the protection of their car. While the insured was unarmed, he knew the marshall was armed. He must, as a man of average intelligence, have known that he was exposing himself to danger. It was undisputed that his exposure to danger was voluntary, as was evident from his volunteering the use of his car.

Concerning the defense that the insured met death by reason of "voluntary exposure to unnecessary danger," the court held:

"In placing therein a clause defeating liability in case of 'voluntary exposure to unnecessary danger', the intent was to establish a reasonable limit and check upon the insured in order to protect the insurer against reckless acts and ventures in which the insured might engage, beyond the sphere of his ordinary avocation and mode of life. Whether any particular hazard to which he exposed himself was necessary is to be determined, however, with reference not only to his ordinary activities, but also to those unusual situations and emergencies which are likely to confront any person in the performance of his duty as a citizen. The law gives every citizen the right, when crime has been committed in his presence or within his knowledge, to assist in the pursuit and apprehension of those detected in its commission or under reasonable suspicion of fleeing from justice after perpetrating the unlawful act."

Every like case must be submitted to the jury, to say whether the insured did so recklessly expose himself as to face unnecessary danger. On the broad ground of public policy, (which it is so difficult to either limit or define), the court upheld the judgment in favor of the beneficiary.

INFERENCE OF ACCIDENTAL DEATH:—(Phillips *vs.* Travelers Ins. Co., Supreme Court of Missouri, 231 S. W. Rep. 947.) The insured was about sixty years old when he died. He visited some friends who lived in an apartment two flights up. He left and a few minutes later, was found on his knees on the landing of the floor below. He died the next day.

He had a slight bruise on his forehead; a post mortem examination showed no injury to skull or brain but revealed a severe hemorrhage in the brain. An autopsy showed advanced arteriosclerosis, enlarged heart muscles and chronic Bright's disease, any one of which would shortly terminate fatally. Even the physicians appearing as witnesses for the plaintiff admitted the seriously impaired health of the insured, they having been present at the autopsy.

In order to support his case, the burden is on the plaintiff to prove that the insured met his death through injuries that were caused by external, violent and accidental means. There was no evidence to show that insured had fallen down the flight of stairs, the slight bruise being accountable by the insured rubbing his head against a door on the landing.

"But from the inference of the fall drawn from the presence of the bruise it does not necessarily follow that such fall was accidental rather than the result of the hemorrhage of the arteries of the brain. The physical condition of the insured was such that his fall could just as well have been caused by cerebral hemorrhage, conceding that such fall occurred. With the positive and uncontradicted evidence of the diseased condition of the insured, and that an actual cerebral hemorrhage took place, it is not proper to build upon the inference of a fall from the fact of a bruise the further inference that such fall was the result of accident rather than disease. The fall can be as readily attributed to disease as to accident from the evidence before us, and it devolves on plaintiff to show that it was due to accident.

Furthermore, if the jury be permitted to indulge the inference of a fall and the further inference that such fall was accidental, yet must an additional step by inference be taken, and that is that such fall was the proximate cause of death of the insured. There is evidence that a fall might have caused a rupture of an artery of the brain and brought about the cerebral hemorrhage. None of the physicians undertake to testify as a fact that the hemorrhage was produced by the fall. They simply say that it might have been so produced. No evidence of injury to the outer covering of the skull or to the skull itself, ... or to the brain itself, was found by the physicians. It is in evidence that a jar, not sufficient to injure these parts, could still be heavy enough to rupture a blood vessel in the brain of one in the condition of insured, or that the effort expended by him in attempting to avert a fall might produce the same result. But the conclusion cannot be avoided that a finding that such fall caused the death is, after all, an inference."

Thus one inference cannot be built upon another inference, in order to establish a fact that should be proved. This is especially true in such a case as this one, where the fall was most probably caused by disease, in the absence of direct evidence to the contrary. There was no evidence to establish a fall, that such fall was accidental, and that the fall caused the death. There being no proof, the case should not have been submitted to the jury at the trial in the court below. That judgment, in favor of the beneficiary, was reversed and the suit dismissed.

WORKMEN'S COMPENSATION

PRE-EXISTING DISEASE:—(Patrick *vs.* J. B. Ham Co., Supreme
Judicial Court of Maine, 111 Atl. Rep. 912.)   Patrick was em-
ployed in lifting bags of grain, when he suffered a cerebral hem-
orrhage from which he died several hours later.   The employer
contended that Patrick was stricken before he lifted any of the
bags, and that the stroke was the result of pre-existing disease.
The Industrial Accident Commission held that the hemorrhage
began after the employee had lifted a few bags of grain.   The
court refused to reverse this ruling, becuse the Commission
is the trier of the facts; here there was sufficient evidence to
sustain the finding.

The bursting of the blood vessel constituted an accident within
the meaning of the Workmen's Compensation Act.   In affirm-
ing the award of compensation by the close vote of four to
three, the court wrote:

"That Patrick was suffering from diseased arteries predispos-
ing him to cerebral hemorrhage is of no consequence in the case.
That he might have died or would have died in his bed of cerebral
hemorrhage in a year or a week is immaterial.

The question before the commission was whether the work
that he was doing on that afternoon, caused the cerebral hemorrhage
to then occur.   If so, we think it was an accident arising out of
and in the course of his employment.

This was a question of fact.   The Industrial Accident Commis-
sion; through its chairman, has decided this question of fact in
favor of the claimant.   The finding is, we believe, supported
by rational and natural inferences from proved facts.

Accidental injury causing death is at least as believeable and
reasonable as the theory that a man continued to talk rationally
and perform manual labor for a time, however short, after an
attack of cerebral hemorrhage which causes death in a few hours.
Of the two theories, the former was adopted by the commission
as the more reasonable, and we do not feel justified in disturbing
its finding."

COAL MINING:—(Lower Vein Coal Co., *vs.* Industrial Board of
Indiana, United States Supreme Court, 41 S. C. Rep. 252.)
The Coal Company brought suit to restrain the Industrial Board
from compelling the plaintiff to come under the Workmen's
Compensation Act.   The original act was elective, permitting
both employer and employee to reject it.   It was later amended,
making it compulsory as to coal mining companies and munici-

pal corporations, leaving the power of election with all other industries. The plaintiff urged that such compulsion and classification denied the equal protection of the laws guaranteed by the Constitution of the United States and of Indiana.

The court held that the Legislature was well within its powers in classifying coal mining in the compulsory class.

"There are facts of especial pertinence that make the principle apply in the present case and justify the legislation of the state. That coal mining has peculiar conditions had been quite universally recognized and declared. It has been recognized and declared by this court and is manifested in the laws of the states where coal mining obtains. There is something in this universal sense and its impulse to special legislation—enough certainly to remove such legislation from the charge of being an unreasonable or arbitrary exercise of power.

The action of the Coal Company indicates that it considered the coal business distinctive. Other businesses, though according to the Coal Company's assertion as hazardous as coal mining, accepted the law, the Coal Company and the other coal companies rejected it. To this, of course, the coal companies were induced by comparison of advantages but the inducements to reject the legislation might well have been the inducement to make it compulsory. At any rate, there is, taking that and all other matters into consideration, ground for the legislative judgment expressed in the amendment of 1919 under consideration, that is, section 18 as amended. And the fact is to be borne in mind that there are 30,000 employees in the state engaged in coal mining."

The court also held that the law includes all employees of coal companies, whether engaged in the hazardous portion or those not so engaged. Such a distinction would result in controversy as to whether an employee came under the law.

SUICIDE:—(Lupfer *vs*. Baldwin Locomotive Works, Supreme Court of Pennsylvania, 112 Atl. Rep. 458.) While at work as an electrician, Lupfer received a shock which disabled him in a few days. He was sick at home several days, suffering great pain and became irrational. Pleurisy developed from the electric shock to his chest. While in this mental state, he committed suicide by shooting.

The court held that the evidence supported every finding of the referee, who had awarded compensation to the claimant. The employee had killed himself while under the influence of an

uncontrollable insane impulse. Such insanity was caused by pain from a diseased condition resulting out of and in the course of his employment.

EXECUTIVE OFFICER:—(Hubbs *vs.* Addison Electric Light & Power Co., Court of Appeals of New York, 130 N. E. Rep. 302.) The claimant was the owner of a large portion of the stock of a small electric light and power corporation, of which he was secretary and treasurer. He was employed by the corporation at a weekly wage of twenty-five dollars, for which he performed manual labor at the plant and away from the plant. In his capacity of employee and while engaged in manual labor he was injured. The defense was that he was an executive officer and hence not entitled to compensation. The court affirmed the award of compensation, upon the ground that his weekly wage was paid to him for services performed as an ordinary employee and not as salary for being an officer.

In another case (Skouitchi *vs.* Chic Cloak & Suit Co., 130 N. E. Rep. 299) which was sent back to the State Industrial Commission for a re-hearing, the court indicated the line of demarcation between an executive officer and an employee. The claimant was president and treasurer of a very small corporation, but performed no duties as an officer, not even signing checks. He was employed as manager at a weekly wage of thirty-three dollars, and his work consisted of packing and selling goods. He met with an accident while at his regular work. The court held that he could recover compensation, because he was actually employed to perform services as an employee, for which he was paid a wage that could be definitely determined apart from any salary as an officer.

"A corporation is a complete entity separate and distinguishable from its stockholders and officers, and if it sees fit to have one of the latter serve it in the capacity of an ordinary employee, we see nothing to prevent it from so doing. That seems to us to be the present case. The claimant was 'employed' as general manager. The term 'general manager' is somewhat ambiguous and of itself might indicate either an executive and important officer, or a person performing ordinary duties of an employee. The evidence and findings in this case shows that the position was of the latter class, and that the claimant performed ordinary detail and manual work, such as would be required of a typical employee. Under these circumstances we think

that he was entitled to secure compensation as such for injuries under the general provisions of the Compensation Law. . . . ,

There is nothing in our decision in the case of Matter of Bowne *vs.* Bowne Co., 116 N. E. Rep. 364, which contravenes this view. On the other hand, the effect of what was said by Judge Pound in its entirety sustains the view which we are now taking of the facts presented on this appeal. In that case the claimant was the owner of a majority of the capital stock of a corporation of which he was the president. The Industrial Commission found that he was 'employed as president.' His ordinary duties were those which pertained to the position of a managing executive officer, and the manual work in the course of which he was injured was merely a casual occurrence. He received as a stockholder and an executive officer substantial dividends and salary, which were in no wise abated or impaired by his accident. Under those circumstances we said that it would be an unreasonable interpretation of the Compensation Law to regard him as an employee, such as was intended and provided for by that statute in awarding compensation for injured employees. It was fully recognized, however, that there was nothing to prevent a corporation, if it so desired from hiring one of its officers to be and to perform the work of such an employee as was contemplated by the statute. We simply held that 'the higher executive officers of a corporation are not, as such, its employees in the ordinary use of the word.' "

INTERSTATE COMMERCE:—(Philadelphia & Reading Ry. Co., *vs.* Polk, United States Supreme Court, 41 Sup. Ct. Rep. 518.) The deceased was employed on a freight train, which handled both interstate and intrastate commerce. Compensation under the Pennsylvania Compensation Law was awarded by the referee, upon the assumption that the deceased was engaged in intrastate commerce, although he did not so find as a definite fact; further, that the burden was upon the defendant (railroad) to prove that the injury arose out of interstate commerce in order to remove it from the jurisdiction of the Pennsylvania Law. The Supreme Court of Pennsylvania had approved the award of compensation.

In such cases, the burden of proof that the injury arose out of intrastate commerce, rests upon the claimant. Where a train is engaged in both interstate and intrastate commerce, only the Federal law is applicable. In reversing the judgment of the Supreme Court of Pennsylvania, the court wrote:

"The employment concerned both kinds of commerce and was to be exercised as much on one as on the other. In other words,

was as much and as intimately directed to the interstate cars
and freight as to the intrastate cars and freight, and that there
might have been some duties directed to the latter though there
is no evidence of it, is the suggestion of a speculation that has
no tangible prompting in the case.

Besides, we cannot accede to the view that there is a presump-
tion that duties performed on a train constituted of interstate
and intrastate commerce were performed in the latter commerce.
The presumption, indeed might be the other way. It is to be
remembered that it is the declaration of the cases that if there
is an element of interstate commerce in a traffic or employment
it determines the remedy of the employee . . .
    . . . "The train, although moving from one point to another
in the state of Washington, was hauling merchandise from points
outside of the state destined to points within the state and from
points within the state to points in British Columbia.* * *
This transportation was interstate commerce, and the train
was an interstate train, despite the fact that it may also have been
carrying some local freight. In view of the unity and indi-
visibility of the service of the train crew and the paramount
character of the authority of Congress to regulate commerce,
the act of Congress was exclusively controlling. Southern Ry.
vs. United States, 32 Sup. Ct. 2."

DEPENDENCY:—(Driscoll *vs.* Jewell Belting Co., Supreme
Court of Errors of Connecticut, 114 Atl. Rep. 109.) The de-
ceased employee was a brother of the claimant. He had made
his home with her for many years, paid her six dollars for his
board and eight dollars towards the maintenance of her home.
Her two adult children made their home with her and paid for
their board. An award of compensation was made to her as a
partial dependent of the decedent. The defendant (employer)
urged that the claimant was not a partial dependent, and that
her two children, who could be legally obliged to do so, furnished
her with sufficient support.

Upon an examination of the evidence, the court held there
was ample evidence to sustain the award. The question of
dependency was one of fact, which had been decided in the clai-
mant's favor. The award was affirmed. An extract from the
opinion follows:

"The mere existence of a right to compel by process of law
one to furnish support to another will not by itself determine
that such an one has a present and a continuing means of sup-
port so that he cannot be held to be the dependent of one who
has contributed to his living expenses.

The purpose of the Compensation Act is to provide support to dependents of one injured in industry. A dependent is one who has relied upon the decedent for support and who has a reasonable expectation that such support will continue . . . A legal obligation cannot be construed to be the equivalent of a present support. When it has been enforced it becomes such for the time. It does not follow that it will continue. A condition of dependency presupposes contributions made to and relied upon by the dependent. Such condition under our law could be found only when contributions had been in fact made, and that the contributions so made and to be made were relied upon by the claimant-dependent. If no contributions had been made, of if there was no reasonable probability of the continuance of the contributions, the basis of dependency would be absent . . . .

The Compensation Act provides compensation not only for the dependents who had the legal right to compel support from a deceased, but also for dependents who received support from the voluntary contributions of the deceased. For each class its test is 'whether the contributions were relied upon by the dependent for his or her means of living judging this by the class and position in life of the dependent.' "

MISCELLANEOUS

THEFT IN AUTOMOBILE INSURANCE:—(Rydstrom *vs.* Queen Insurance Co. of America, Court of Appeals of Maryland, 112 Atl. Rep. 586.) The plaintiff held an automobile policy insuring his automobile against theft or robbery, "excepting by any person or persons in the insured's household or in the insured's services or employment." The insured's nephew had been a guest for several days on previous occasions. The nephew went to his uncle's room one night, and secured the key to the automobile. He then obtained the machine at the public garage by falsely stating that his uncle was dying and it was necessary to secure a doctor. He drove the machine to another state, where he sold it and spent the money.

The facts were admitted by the defendant company, which claimed that as the theft had been committed by a person in the insured's household, it was not liable.

The nephew came as a guest, never paid any board on his visits and was allowed the freedom of the household. The definition of "household" includes all dwellers in the house, the freedom of which the nephew used to obtain the key in his uncle's

room.   Under this state of facts, it was clear that the nephew
was a person of the household.   The court affirmed the judgment,
which was in favor of the defendant company.

ROBBERY FROM UNLOCKED SAFE WITHIN LOCKED VAULT:—
(Mer Rouge State Bank *vs.* Employers Liability Assur. Corp.,
U. S. Circuit Court of Appeals, Fifth Circuit, 270 Fed. Rep. 567.)
While the cashier of the bank was performing his duties during
business hours, several hold-up men entered the bank.   At the
point of a revolver, they compelled him to unlock the door of
the bank's locked vault, within which was an open safe.   They
obtained the money from the safe.

The plaintiff bank had a burglary policy which made the de-
fendant insurer liable.

"for all loss by robbery (commonly known as hold-up) of
money and securities . . .   (3) From within that part of the
safe or safes or vault insured hereunder caused by robbers dur-
ing the day or night, by compelling under threat of personal
violence an officer or officer employee of the insured to unlock and
open the safe or safes or vault."

The policy covered the vault and safe in question.   The de-
fendant resisted liability, because both the vault and the safe
were not locked and also on the strength of the decision in the
case of Franklin State Bank *vs.* Maryland Casualty Co., 256 Fed.
Rep. 356, which was decided by this court.

In the Franklin State Bank case, the robbery consisted of the
taking of money from an unlocked safe within an unlocked vault.
It was held that the insurer was not liable, under a policy iden-
tical with that in suit in the case under review.

The court proceeds to distinguish between the facts of the
cited case and this case.   In the former case, both vault and
safe were unlocked, in the latter case the vault was locked.   The
policy covered a loss of money from either a vault or a safe
that was locked.   There was no requirement in the policy that
both vault and safe had to be locked, to render the insurer
liable.

The District Court had dismissed the suit feeling bound by
the Franklin State Bank case as a precedent.   The plaintiff ap-
pealed to the Circuit Court of Appeals which reversed the Dis-
trict Court, and held the defendant liable.   An extract from the
opinion follows:

"Nothing in the language of the provision, which is to be con-
strued most strongly against the insurer and liberally in favor

of the insured, indicates an intention to exclude from the protection stipulated for money within a locked vault, if such money is in an unlocked safe within such vault, access to which is obtained in the way stated. No distinction is made between a loss from a safe and a loss from a vault. The averments of the amended petition show that the robbers were enabled to get the money mentioned by compelling the cashier under threat of personal violence to unlock the vault containing that money. We are not of opinion that the fact that the money, before access to it was so obtained, was in an unlocked safe within the locked vault, had the effect of making the loss, caused as alleged, one which was not insured against."

EXCEPTION IN BURGLARY POLICY:—(Olson *vs.* Great Eastern Casualty Co., Supreme Court of Minnesota, 183 N. W. Rep. 826.) The plaintiff had a tailor shop, from which goods and garments were stolen. The insurer (defendant) refused to pay the loss, for the various reasons mentioned. The policy contained a clause that the defendant should not be liable for the loss of "anything unless books and accounts are kept in such a manner that the exact amount of loss may be accurately determined therefrom by the company." The insured had a small shop with only a few workmen, and kept his records in the simple manner used by small tradesman. The court correctly instructed the jury that if the books and accounts were so kept, that with the assistance of those who kept them, the amount of loss could be determined, that there was no violation of the condition.

Regarding the principal point under discussion, the court wrote,

"The policy by its terms covered the general stock of 'tailoring goods, and trimmings and clothing held in trust for cleaning and repairs; excluding silks, furs', etc. We cannot approve of the contention made by defendant that, since the policy contains a clause that defendant shall not be liable for loss of 'merchandise unless it belongs to the assured or is held by him in trust or on commission, or is sold but not removed from the premises, or unless the assured is legally liable to the owner thereof for such loss as is covered hereby,' therefore the garments taken in for repairs are not covered. Such garments are expressly named as insured, and cannot be excluded by a prior general exception found in the policy. The court was right in charging the jury that garments left for repairs and lost by the burglary were covered."

The policy contained a clause excluding from coverage "silks, furs, . . . and velours, or articles made in whole or princi-

pally thereof." Several of the stolen garments were fur-lined overcoats, as to which the insured urged either no recovery, or, in the alternate, the limit of recovery was the value of the coats without the fur lining. The court instructed the jury that if the overcoats were principally of fur, there could be no recovery as to them.

The verdict of the court below in favor of the plaintiff was affirmed upon the appeal to this court.

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

A STUDY OF SCHEDULE RATING—ALBERT W. WHITNEY

VOL. VII, PAGE 225.

WRITTEN DISCUSSION

MR. W. W. GREENE:

The gist of Mr. Whitney's mathematical analysis of schedule rating is contained in the formula for the schedule rate for the individual risk. This rate we find to be made up of two quantities, first the rate charged for hazards which cannot conveniently be measured by the schedule $(\epsilon'/\epsilon \cdot R)$, and secondly that charged for measurable hazards

$$\left(\epsilon'/\epsilon \cdot \frac{N}{N'} \cdot \sum_{i=1}^{i=m} \frac{N_i' D_i'}{N_i D_i} \pi_i \right)$$

In a given classification the rate for the measurable hazards varies only in proportion to the morale factor of the risk, $i.\ e.$, the "susceptibility factor" (ϵ'/ϵ), which depends upon the condition of the risk as to "safety organization", "welfare and health", "first aid and hospital," etc. This morale factor is also applied to the rate charged for those measurable hazards which are specifically treated by the schedule.

The rate charged for the measurable hazards is found to be the sum of several items which respectively correspond to particular hazards.

The hazard due to floor openings is regarded as measurable, so there would be a specific premium charge for it under Mr. Whitney's formula. It follows from the principle we have just outlined that this charge would be the product of the morale factor and a rate of premium proportional to the exposure to floor openings in the particular risk (as compared with the exposure which is standard for the classification).

Under a schedule constructed as outlined in this paper, then, to determine the "schedule rate" you add the rate charged for accident causes whose potency cannot be measured in the individual risk to another rate reflective of the extent to which the management of the risk has adopted physical safe guards against measurable hazards, and apply to the sum of these partial rates the morale factor.

The basic formula for the schedule is, then, very compact. Moreover, it justifies itself to common sense in the light of at least one comparison with an existing schedule.

The present coal mine schedules have in their favor the fact that they are based largely upon statistics. However, the maximum charge for a given hazard under these schedules is proportional to the importance of that hazard in all coal mines as reflected in the accident cost for the industry.

For coal mining as a whole the pure premium for underground fires is small. Nevertheless in the individual mine the potency of the fire hazard may at a given time be very great.

The charge in the coal mining schedule for underground fire hazard is relatively small, since it is based on that proportion of all coal mine accidents which are due to underground fires. If the coal mine schedules were based on Mr. Whitney's formula, in a mine where exposure to fire hazard is fifty times as great as normal the charge would be approximately fifty times the normal pure premium for accidents due to the fire hazard, which seems to be the logical procedure.

Professor Whitney says, "the especial province of the schedule is to carry the classification process beyond the manual." Mr. Joseph H. Woodward said very much the same thing in these pages, as did the writer. Nevertheless, I think the time is opportune to clarify, perhaps to modify this statement.

There are at least two ways in which a "schedule" may be employed in compensation rating. One way is typified by the respective rewards and penalties in the Industrial Compensation Rating Schedule for guarding and for failure to guard. Another quite different way is exemplified in the present scheme for rating chemical risks.

This last is truly an extension of the classification system, being a "two way" analysis of those features of the risk which are the fundamental criteria of classification, i. e., raw material, process, and product. It is not "schedule rating" in the original sense.

It seems to me that the term "schedule rating" should be reserved for the former type of schedule, whose function is "merit rating" as opposed to classification.

Mr. Whitney's formula, in fact, assumes a classification system already built up, with each classification covering risks which differ in "merit" rather than in the character of the several loss producing causes.

MR. J. D. MADDRILL:

The opportunities afforded by these proceedings for the profitable exchange of ideas are especially appreciated by those of us who, through calls to government or other more or less unrelated fields, have lost some of the threads of development of problems that have interested us.

When we were last in touch with the rating schedule we were decrying its shortcomings, one of them being its literal coming short of manual. As we return to it we find that it has been so developed that there has now been secured to it the requisite quality that by relating inspection value *differentially* to the normal value (previously determined statistically) the normal is now more highly probable of approximate reproduction. Moreover, we find that without essential structural change the schedule now stands so modified as to define more truly the quality of individual risks within their manual classifications. If the same schedule is to be retained, however, and is to be trained more satisfactorily on its mark, it must next be dimensioned by the statistical valuation of its various items.

The magnitude of this necessary impending task—indeed its well-nigh impossibility with the present schedule—has evidently spurred the Actuarial and Engineering Committees of the National Council to aggressive effort to discover if possible, and statistically value before its application, a schedule plan founded on more natural and simple principles.

Whether the Committee has succeeded, or to what extent, it itself feels cannot with complete assurance be stated in advance of the stages of engineering definition and statistical test which must follow the actuarial analysis of structure. Professor Whitney expresses the gratification of the Committee at the degree to which the problem as conceived has submitted to mathematical analysis; and the formulae established at the close of his paper promise that it will yield no less satisfactorily to statistical control, once the component items have been appropriately defined in the engineering stage. It is believed that a schedule of the form proposed will avoid the pronounced incongruities of its predecessors without creating new ones, and will possess the properties demanded of a satisfactory schedule.

The conception of the product and the abstract demonstration of its soundness reflect the wizardry with which Professor Whitney and members of the Committee are endowed. Genius is not always easy to follow. But it is out of the most obscure reasoning that some of the simplest verities have sprung. Conversely, the "obvious" is often the most difficult of proof; yet we feel we understand it perfectly. We have reason to hope that it will so prove to be with the projected schedule that such pains are being required to discover and establish. It would indeed be fatal to its successful use if those who have it to apply and explain, and those who have to abide by its indicia, did not feel that they understood it.

My only extended experience with the development of a schedule happens to have been with the coal mine schedule of the Associated Companies, which was essentially a charge

schedule—my particular duties in connection with it having been to value its principal statistical coefficients and to aid in giving the schedule and working formulae simple form for application in the field. I refer to it here for the reason that though the statistical workout of the schedule and plan has been more than gratifying to all its sponsors, it of course met criticism in the field for the reason just implied—that it assigned charges only.

The Committee's projected plan is based on partial pure premiums, each, for any item subject to inspection, being that which measures the hazard from a recognized and specified cause of accidents. I am impressed most, I think, with the fact that the Committee has succeeded in relating each elemental pure premium multiplicatively to the corresponding normal elemental pure premium, so that both charges and credits are permitted to result and the principles of chance have due opportunity to operate to tend to equalize them and reproduce the normal, a vital property secured to the whole plan by virtue of this truth in regard to each of the elements.

There is for the physically observable hazards of the risk, aside from morale, a certain accident frequency and severity expectation that is measured more or less approximately by manual and schedule. We may consider departure of the actual experience of a given risk from that predicted by manual and schedule to result from five elemental sources: manual error, aggregate schedule error, chance variation from manual and schedule expectation irrespective of outstanding morale, departure of outstanding morale from that of the risk of normal morale, and finally chance variation from what the plant's own morale would of itself produce. As chance variation I refer to that type of deviation from the pure expected which is itself expected in very accordance with the theory of chance. In the single throw of one hundred coins, for example, the pure expectation would be fifty heads and fifty tails, but we just as certainly *expect* a departure of several either way. No one would think of deducing from this latter simple chance deviation that the coins were lacking in homogeneity. For exactly the same reason the obvious fluctuations of experience should be restricted by limits in experience rating formulae set up to measure quality of morale.

This is not altogether a digression from the subject under discussion, for so far as I am aware, no one yet presumes to have unraveled the intereffect of welfare, safety organization, first aid and hospital upon schedule and experience. Rather it is an argument in support of the view that while the schedule should very properly rate the average salutary effect of such safety organization and welfare measures as have been intro-

duced by the assured, it must not invade the domain of the intangible. It must be confined to the measurement of the physically discernible.

I do not overlook the fact that schedule and even manual will not for a long time to come perform their own part, and that meanwhile experience rating must be depended upon automatically to take up the slack. The fact will not excuse us, however, from keeping our eyes on the mark, and improving our marksmanship as our "aim" improves. Once the schedule is trued up, a perfected experience plan would just complete the rate measure, with definite independent jurisdiction beginning where manual and schedule should stop. Until then, the experience of a risk, rationally employed as indicative of its non-physical character in comparison with that of the average physically equivalent risk, may well absorb the deviations of uncertain standards while steadfastly applied in the *form* we believe it should ultimately take to measure within the limits of reason the probable outstanding moral conditions after all that is physcially observable has been rated by manual and schedule.

In conclusion, and as a consequence of the point of view I take that the pure function of experience rating is the measurement of the altogether intangible pure residue of plant morale after manual and schedule have taken full account of the physical (the schedule refining the manual), I am led to state that to my mind, though I know the contrary view is held by some, it would be quite illogical to apply experience rating before measuring the risk by schedule.

AUTHOR'S REVIEW OF DISCUSSIONS
MR. ALBERT W. WHITNEY:

The most important thing that I can say in closing this discussion is to call attention to the fact that a very large piece of statistical work on the Schedule has not only been undertaken but is now beginning to show results. In a general way the results indicate a very great difference in importance, far greater than has been generally supposed, between the different accident causes. These results work out very happily with the general plan of reconstruction. In complete accordance with the general plan it will yet be possible greatly to simplify the Schedule for particular groups of classifications. Such simplifications, however, will vary considerably from group to group. These statistics are throwing so much light on the subject that it seems astonishing that we have not had such data before. In a general way it can be said that our faith in the soundness and practicability of the proposed plan of Schedule revision are much increased by the statistical results that have been secured.

THE DISTRIBUTION OF "SHOCK" LOSSES IN WORKMEN'S COMPEN-
SATION AND LIABILITY INSURANCE—G. F. MICHELBACHER

VOL. VII.   PAGE 235.

WRITTEN DISCUSSION

MR. S. H. WOLFE:

We are all greatly indebted to Mr. Michelbacher for his
interesting and instructive analysis of the important problem
of reinsurance. I know of no other compilation on this subject
to which the student can refer with so much benefit. There
is no phase of the business so vital to its safety as a proper
distribution of risks. For the benefit of its agency force and its
insured a company must be prepared to write policies for a larger
coverage than it can safely assume itself; to relieve this con-
dition reinsurance must be resorted to.

Mr. Michelbacher's reference to the reinsurance pools which
are maintained by the stock companies and mutual companies,
would seem to indicate that catastrophes do not occur with
sufficient frequency to enable us to establish a satisfactory loss
ratio for them without extending our observation over a great
number of years. As he very properly points out, the losses
sustained by the stock companies reinsurance pool for work-
men's compensation have been almost negligible. I had hoped
to be able to give you the exact figures today, but they have
not arrived. In the case of the mutual reinsurance pool all
of the contributions up to the year 1920 have been returned to
the contributing carriers, all of the 1920 contributions are about
to be returned, all of the interest, less the very moderate cost of
administration, has been returned and the pool still has $200,000
with which to pay any catastrophe. This is a phase of reinsur-
ance which may well attract the attention of the student.

When the stock companies' pool was first organized the ques-
tion naturally arose with supervising officials of Insurance De-
partments as to the admissibility of the deposit with the Bureau
as an asset. It may interest the members of the Society to
know that each quarter the receipts and disbursements are
analyzed and apportioned so that each company's share in the
total amount on hand is definitely known. A certificate is
then issued to each company and this certificate forms the basis
of the claim for the asset. The matter was discussed with
several of the important Departments, briefed, and as a result
the admissibility of the asset was allowed.

There is one phase of the reinsurance business which is un-
known to this country, but which is followed in some cases
in Europe. Companies sell participations to banks, other finan-
cial institutions and even to individuals. The profit from sell-

ing reinsurance in this way has been large and has been independent of any gains or losses sustained on the reinsurance itself. I am not prepared to say that this plan could be legally adopted in this country, but it is a fact which should be known.

MR. A. L. KIRKPATRICK:

This paper covers the field of reinsurance very completely in a descriptive way and leaves little to be added. There is one form of treaty which is not covered, however, probably because it is one which is not commonly used. There is only one treaty of this nature, of which the writer has knowledge. It provides for the pro-rata division of premiums and losses between the ceding company and the reinsurer, on all the Workmen's Compensation business of the former. This means that instead of receiving notice of each individual policy, and each claim, the reinsuring company is notified periodically of the total premiums written and losses paid and from these figures are computed its premiums and losses as a direct percentage.

There are two sets of circumstances under which such a treaty might be desirable. The first is the case of a rapidly growing company which is receiving from its agents a larger volume of business than its capital and surplus will permit it to retain. It may find that the legal reserves for unearned premiums and for outstanding claims cause its liabilities to be heavier than it can stand. By reinsuring on a pro-rata basis over the entire line it is able to accept all business offered without endangering its surplus by heavy reserves.

The second reason which might cause a company to adopt this method, and the reason which led to the treaty previously mentioned, is to prevent one line of business growing too rapidly, in proportion to the other lines. It is merely an application of the old principle not to "put too many eggs in one basket." During the early years of Workmen's Compensation insurance, before adequate experience had been accumulated upon which to base rates, it was not at all certain that the rates adopted would prove adequate. If the line should prove it be unprofitable, it would be advisable to have a loss on a small percentage of the total business of the company. By ceding a part of the premium volume as reinsurance, the possible profit or loss was scaled down in the same proportion.

ACTUARIAL AND STATISTICAL NOTES.

On Methods of Allowing for the Effect on Paid or Incurred Losses of a Given Policy Year of a Change in the Benefits Payable

The published descriptions* of the "projection" methods used by the National Council on Workmen's Compensation Insurance in its rate making deal only with the simple case where there has been no amendment of the compensation act in the period over which projection is made. In most states an amendment had occurred at the time of the revision and this had to be taken account of, as it rarely affected the several kinds of benefits in the same degree. Regardless of the varying effect on the different benefits the proportion of incurred losses and paid losses affected by the amendment is never the same and consequently the relation of paid and incurred losses developed from the old experience will not apply to the year in which the amendment took effect. It was therefore necessary to make adjustments for this in the work.

It is believed an account of the methods used in making such adjustment will be of interest to our members and this note is presented for this reason.

Two assumptions were made in all cases:

(1) That the business written was uniformly distributed over the calendar year of issue.

(2) That the losses in a given policy period are uniformly distributed over that period.

Some assumption along these lines is clearly necessary to permit any attack upon the problem and these two seemed simplest and best suited to a simple yet approximately correct solution.

If the losses are uniformly distributed over each policy period, then it follows that the losses incurred up to a given date on a block of business are proportional to the total exposure up to the same date on the same policies.

If, therefore, on a certain date (for example July 1st, 1920) the benefit under a given law is increased a given percentage,— say 20%, and we wish to know what has been the effect of this

*See Proceedings Vol. VI, p 272, et. seq.

upon the incurred loss under the block of policies issued in that year we require to find what proportion of the total exposure of the block was before the date of amendment and what after, applying to the latter the calculated value of the increase. This method may be used whether the total exposure of the year of issue is considered or only a part, for example, the exposure of a year's issues within the calendar year of issue.

Of course, the exact effect of such amendment on the year's issues can be ultimately determined by studying the actual experience and this is the only exact way of determining it, but the above approximate method is available at any time and is believed to give very satisfactory results, provided of course, the theoretical calculation of the effect of the amendment is based on sound data and correctly interprets the change in the law and that there is no such concentration of business around certain dates as vitiates the assumption of uniform distribution.

The following table has been made up on the assumption that all business issued in a given month may be taken as having on the average been issued on the fifteenth of such month:

TABLE A.

SHOWING EXPOSURES UP TO THE CLOSE OF THE SEVERAL MONTHS OF A BLOCK OF POLICIES ALL ISSUED IN THE SAME CALENDAR YEAR TO RUN FOR ONE YEAR, ASSUMING THEIR ISSUE TO BE UNIFORMLY DISTRIBUTED OVER THE YEAR.

31st of	Proportion of policies issued	Proportion of total exposure within calendar year of issue	Proportion of total exposures under this year of issue		31st of
(1)	(2)	(3)	(4)	(5)	(6)
Jan. (Yr. of Issue)	.083	.007	.004	.580	Jan.(Following Year)
Feb. "	.166	.028	.014	.653	Feb. "
Mar. "	.250	.063	.032	.719	Mar. "
Apr. "	.333	.111	.056	.778	Apr. "
May "	.416	.174	.087	.830	May "
June "	.500	.250	.125	.875	June "
July "	.583	.340	.170	.913	July "
Aug. "	.666	.444	.222	.944	Aug. "
Sept. "	.750	.562	.281	.968	Sept. "
Oct. "	.833	.694	.347	.986	Oct. "
Nov. "	.916	.840	.420	.996	Nov. "
Dec. "	1.000	1.000	.500	1.000	Dec. "

1. The index for column (4) is on the left of the table and for column (5) on the right.
2. If the proportion of business unexpired at a given date is desired it may be obtained by taking the complement of the appropriate figure in column (4) or (5).

Illustration of the Use of Table A.

Let us assume an amendment passed in a given state became effective June 1st. All accidents occurring after that date are to be compensated on the new scale. If the number of accidents is proportional to the exposures, then the proportion of the total losses (cases not amounts) under the new and old law will be similar to the exposures.

From Column (3) the exposure up to and including May 31, 1921 on 1921 policies is 17.4% of the total exposure in the calendar year 1921 on such policies and the exposure after this date is 82.6% of the total exposure under such policies in such year.

Therefore the incurred losses at December 31, 1921 on 1921 issues may be taken to be on the basis of 17.4% of the cases having been compensated under the old law and 82.6% under the new. If the new law were for example 20% more costly than the old, then we may say the incurred losses up to December 31, 1921 on 1921 policies were 116.5% (17.4 + 1.2 × 82.6) of what they would have been had the law not been changed.

If we are considering the total exposure under 1921 issues we find the exposure under the old law to be but 8.7% (Column 4) of the total exposure and the total losses incurred on this year of issue will be 118.2% (8.7 + 1.2 × 91.3) of what they would have been had the law remained unchanged.

Since 83.0% (Column 5) of the exposures of the 1920 issues was under the old law, the effect of the amendment would be to increase the losses on this block of policies 3.4% (83.0 + 17.0 × 1.2 = 103.4).

To determine the effect of an amendment on the paid items, it is necessary to get a distribution of the payments on account of the losses of a given year of issue within that calendar year according to the date of accident, since accidents occurring before the effective date of the amendment will continue to be compensated at the old scale while only accidents occurring thereafter will be compensated on the new scale.

On first consideration it appeared impossible that with so many differences in compensation laws from state to state this could be represented by a uniform table applicable to all states. A study of these differences as they bear on the distribution of payments within the calendar year of issue showed the situation

was not as complex as appeared. Differences in the rate of weekly compensation while affecting the absolute amounts payable do not affect the time distribution of the payments; nor do differences in the monetary limits of weekly compensation. As for the purposes in hand we were considering only payments within the calendar year in which the policy was issued the longest possible duration of payment on any case covered in this work would be fifty-two weeks. Investigation of the specific schedules showed that the greatest variation in the state compensation acts was in the length of term of compensation of serious cases, i. e., cases running beyond this term. It therefore seemed that a single table might be used with fair approximation to accuracy.

A test was made using the Maine and New York laws (as being quite different) using the American Accident Table with certain assumptions as to the speed of adjustment of cases, settlement of medical bills, etc., which seemed fair to the committee. The distribution of the year's payments was almost identical in the two cases and led to the adoption of the following table as representative of the distribution of payments within the calendar year of issue for all states under an act which remains unchanged throughout the year.

TABLE B.

DISTRIBUTION OF LOSS PAYMENTS WITHIN THE CALENDAR YEAR OF ISSUE UNDER A UNIFORM ACT ON A YEAR'S ISSUES ACCORDING TO DATE OF ACCIDENT.

Month	Proportion of payments on account of all accidents occurring up to the end of month shown
January	.012
February	.046
March	.102
April	.178
May	.272
June	.383
July	.508
August	.643
September	.780
October	.910
November	1.000
December	1.000

This table has not yet been checked against experience and it will be interesting if some of our members can find time to review it critically testing it both by comparison with the results

of theoretical calculations on different assumptions and checking it out with actual experience.

Illustration of the Use of Table B.

It is desired to know how much the payments up to December 31st, 1921 on policies issued in 1921 have been increased by the hypothetical amendment referred to. We must know something of the nature of the amendment before we can use this table. Let us assume the amendment was an increase in the rate of compensation and in the limits without other change. Such an amendment does not alter the speed of payments so that the table would apply equally well to either law.

If there had been no change in the law 27.2% of the payments in 1921 on policies issued in that year would have been for accidents under the old law and 72.8% for accidents under the new law. But by the change in law this latter proportion is increased 20%. Hence we have $27.2 + 1.2 \times 72.8 = 114.6\%$. We may say, therefore, that the amendment caused an increase of 14.6% in the payments in 1921 on 1921 issues.

The formula for converting the actual losses paid to the old level, for use in determining the ratio of losses paid within the calendar year of issue to ultimate incurred losses as used in the projection theory, and its development are as follows:

Let L_p be the actual payments for the year on the year's own issued.

L_{p_0} " " corresponding payments assuming the act had not been amended.

L_p' " " losses paid on accidents occurring during the part of the year prior to the amendment.

W_1 & W_2 be weights respectively proportional to the total payments for the two periods prior and subsequent to the amendment assuming a uniform act.

a be the value of the amendment adjusted,* if need be, to the effect upon payments for the term in which it was in effect during the year.

---

*An amendment changing rate of compensation or limits of weekly compensation was the most common encountered and required no adjustment. Any amendment such as the elimination of the waiting period which increases the speed of payments or inceases the proportionate cost of temporary cases would require such adjustment.

Then
$$L_{p_o} = L_p' + \frac{W_2}{W_1} L_p' \tag{1}$$

$$L_p = L_p' + \frac{W_2}{W_1} L_p' (1 + a) \tag{2}$$

Taking the value of L_p' from (2) and substituting in (1) gives

$$L_{p_o} = L_p \frac{W_1 + W_2}{W_1 + W_2 (1 + a)}$$

$$= L_p \frac{1}{\dfrac{W_1}{W_1 + W_2} + \dfrac{W_2 (1 + a)}{W_1 + W_2}}$$

$$= L_p \frac{1}{W_1 + W_2 (1 + a)} \tag{3}$$

Since $W_1 + W_2 = 1$.

The values in Table B are those used for W_1.

The following is a sample of the actual work sheet used during the 1920 Revision for this work. The value under item (3) was found from Table A, that for W_1 in item (5) from Table B and that for W_2 from the relation $W_1 + W_2 = 1$. The other original values were derived from the returns of the companies made for this purpose. The entry for item (20) was a factor covering the difference between the average manual rate in '19 and the final December 31st rate when a change in rate level had taken place during the year.

These entries for items (12) and (15) were the committee's judgment on the basis of the items immediately preceding.

<div align="center">PROJECTION FACTOR</div>

AMENDMENT STATE

1. Effective date
2. Value of Amendment
3. Percentage of '18 issues affected
4. Average effect on '18 incurred (2) $\times$ (3)
5. $w_1 =$ $w_2 =$ $w_2 (1 + a) =$
6. $w_1 + w_2 (1 + a) =$

LOSS FACTOR

7. '18 Reported Incurred
8. '18 Incurred on unamended basis (7) $\div$ (4)
9. '18 Paid
10. '18 Ratio Paid to Incurred as reported   —corrected (9) $\div$ (8)
11. '16 Ratio Paid to Incurred   '17 Ratio Paid to Incurred
12. Use

PROJECTION FACTOR

PREMIUM FACTOR

    13. '16 Premium factor   '17 Premium factor
    14. '18 Premium factor
    15. Use

"1919" LOSS RATIO

    16. '19 Payments reported
    17. '19 Payments on unamended basis (16) ÷ (6)
    18. '19 Projected Incurred on unamended basis (17) + (12)
    19. '19 Premiums reported
    20. Correction for rate change
    21. '19 Projected Premiums (19) × (20) × (15)
    22. Loss Ratio (18) ÷ (21)

"1916—1917" LOSS RATIO

    23. '16 and '17 Premiums @ '19 Manual
    24. Deduction for effect of Schedule & Experience Rating
    25. Net Premiums (23) — (24)
    26. Actual losses
    27. Loss Ratio (26) + (25)

PROJECTION FACTOR

    28. Projection Factor (22) ÷ (27)

From the form above shown, it will be apparent that in the work the projection factor was calculated on the basis of the old law and then multiplied by the several amendment factors to cover the change of amendment in 1919. For calculations in verifying the factor calculated in 1920 and forecasting the results on 1920 issues a revision of the sheet was made and the form now used is as shown below.

<div align="center">

PROJECTION FACTOR CALCULATION
STATE

</div>

PREMIUMS   Indemnity   Medical
                                                      Losses   Losses

Yr. Issue	1 yr. Development	Ultimate	Ultimate ÷ 1st year	Indemnity Losses	Medical Losses
'16				Rate level creased % on	
'17				Proportion of business affected: '19 Issues '20 Issues	
'18				2. Correction factor to bring to 12/31/19 level	
'19				'19 Issues '20 Issues	
'20	1. Use				

3. Net Premium Written 12/31/20 on '20 Issues
4. '20 Projection Premium (1) × (3)
5. '20   "   "   at 12/31/19 level (4) × (2)

PROJECTOR FACTOR CALCULATION

AMENDMENTS

		(a) '18 Issues	(b) '19 Issues	(c) '20 Issues
6.	Effective Date			
7.	Value of Amendment			
8.	Percentage of business affected			
9.	Aver. effect on incurred loss (7) $\times$ (8)			
10.	(W_2)			
11.	(W_2) $(1 + a)$			
12.	(W_1)			
13.	$(W_1) + (W_2)$ $(1 + a)$			

LOSS FACTOR

14.	Reported Incurred			
15.	Inc. unamended basis (14) $\div$ ((1) + (9))			
16.	Payments as reported			
17.	Payts. unamended basis (16) $\div$ (13)			
18.	Ratio Incurred Losses to			
	Payments (15)/(17)			

'16 Issues   '17 Issues   Use

	Present Law	Old Law
19. '20 Projected Incurred Losses (16c) $\times$ (18c)		(17c) $\times$ (18c)
20. '20 Projected Loss Ratio (19) $\div$ (5)		(19) $\div$ (5)

"1916-17" LOSS RATIO

21. Net Premiums (see old calculation)
22. Actual Losses
23. Loss Ratio (22) $\div$ (21)

PROJECTION FACTOR

	Present Law	Old Law
24. Projection Factor (20) $\div$ (23)		

This form is so designed as to show the loss ratio under the
present law as well as under the old law. It is also designed to
permit the calculation separately of projection factors with
regard to the indemnity or medical element of the premium.
If a slight change is made in this blank so that the premiums
on line (5) are given at the current level (and this may be done
through the insertion of an appropriate factor on line (2)) then
the loss ratio brought out on line (20) for the present law may
be compared with the standard permissible loss ratio for the
state in question (generally 62%) and an immediate indication
obtained as to the correctness of the rates now in effect.

A. H. MOWBRAY.

ON THE PENNSYLVANIA METHOD OF REPORTING WORKMEN'S
COMPENSATION INSURANCE EXPERIENCE

With policy year 1921 the Insurance Department of Pennsyl-
vania has inaugurated a new scheme of reporting compensation
insurance experience.   The reporting of classification experience
(Schedule Z, Part II) is discontinued.   In lieu thereof all losses
are to be reported by individual accidents and payroll exposures
are to be reported by individual risks.

Losses are to be reported on the forms designated as Penn-
sylvania Schedule Z, Parts III, IV, VI, and VII, relating respec-
tively, to fatal, permanent, temporary compensable and non-
compensable   injuries.   Fatal and   permanent   injuries   are
reportable annually with an annual follow-up of developments
until each case is finally closed.   Temporary compensable and
non-compensable injuries are reportable currently as the cases
are closed by the completion of compensation and medical pay-
ments.   Parts III and IV are nearly identical with the cor-
responding forms standardized by the National Council; Part
VI is similar to Part IV while Part VII is simplified in the interest
of economy.

Exposures are to be reported on Part X which calls for
insurance carrier, policy number, policy dates, name and loca-
tion of risk and audited payrolls and premiums by classifications.
These reports are to be made currently as the final audits pass
through the Home Office Records.

All the foregoing reports are called for by the Insurance
Department under authority of law and subject to statutory
penalties for omission or delay.   From the mass of records thus
obtained, classification, risk and accident experience will be
compiled by the Pennsylvania Compensation Rating and Inspec-
tion Bureau by means of punched cards.

Three checks upon the completeness of reporting are available
to the Bureau.   (1) The summary of payrolls, premiums and
analyzed losses by policy years returnable annually by each
insurance carrier (Schedule Z, Part I).   (2) The index file of
accidents reported to the Department of Labor and Industry.
(3) The index of policies filed with the Rating Bureau.   It is
planned to make an exhaustive check of Part X, reporting against
the Bureau file, at least for policy year 1921.   Several partial

checks of accident reporting have been made against the file of the Department of Labor and Industry. Whether a complete check will prove necessary depends entirely upon the insurance carriers themselves. To make such a check would saddle the Bureau with a heavy expense and will not be necessary if the carriers observe reasonable care in complying with the requirements of the Insurance Department.

Important advantages are expected to accrue from the new system of experience reporting.

(1) It will throw the tabulation of experience forward by nearly one year. Part X reports for all policies issued in January, February and March, 1921, will be in hand, audited and tabulated by September, 1922. By designating month as well as year of issue on the punched cards, the losses incurred under these same policies can be assembled at the same time. Owing to the high concentration of business about January 1st in Pennsylvania this means that some three-fourths of the total experience for Policy Year 1921 will be available for the rate revision of October, 1922. Under the former system of Part II reporting, no dependable experience of 1921 would be available before October, 1923. In this period of rapidly changing wage-levels, in face also of frequent compensation act amendments— it is highly desirable to have a current review of the trend of experience. Hitherto, the best available indicium for the last calendar year has been the highly disputable loss-ratio projected from paid losses and written premiums. The new plan goes as far in the direction of bringing actual experience down to date as appears to be feasible under the policy-year system of accounts. In this single respect the new scheme of reporting should be worth more than its cost.

(2) It is far more flexible. This feature is especially important to the Pennsylvania Bureau which has been more free than others to consolidate and re-arrange classifications. Much experience assigned to discontinued classifications belong to a variety of industries and is simply lost when reported on Part II. "Additions and Alterations," e. g., may relate to open hearth, steel mills, blast furnaces, machine shops, brick manufacturing or bituminous coal mining. The reporting of experience by

individual risks makes it possible to re-assign the "Additions and Alterations" experience to appropriate industries.   In like manner the new scheme makes it possible to combine the experience of bakery drivers and bakeries and to separate the experience of electric from that of open hearth steel foundries.

(3)   It admits a far more detailed and accurate auditing of classification experience.   No one who has not personally examined the experience reported for thousands of risks can conceive the extent to which classification experience is distorted by current practices of underwriting, audit and accident assignment.   Heretofore the Pennsylvania Insurance Department has been able to audit Schedule Z, Part II against risk reports for risks subject to experience rating.   Now the payrolls and losses of all risks subject to either experience or schedule rating will be assigned in accordance with risk-classification cards promulgated by the Bureau and based upon actual inspection.   Even the fact that all classification assignment is made by a central statistical organization, as against assignments by the underwriting, auditing, claim and statistical divisions of forty-odd insurance carriers, will make for far greater uniformity and accuracy.

(4)   It makes available a mass of information heretofore obtained only in fragmentary and un-malleable form by way of special calls.

(a)   Wage data.   Everyone now recognizes the vital relationship of wage levels to compensation insurance rates.   By means of individual accident reports the Pennsylvania Bureau will have at all times up-to-date authentic and ample wage data.

(b)   Accident causes.   Analysis of accident causes is indispensable to any sound system of schedule rating.   For this purpose individual accident reports are far more satisfactory than punched cards supplied by insurance carriers.   The coding of accidents and verification of the punched cards by fifty insurance offices, each acting for itself and many but little interested in the result, can never be uniform or dependable.   Revisions and refinements of the code so used are very difficult; re-analysis and re-grouping of the tabulated results are altogether impossible.

(c)   Experience analysis by size of risk.   No such analysis on a comprehensive scale has ever been attempted.   It should throw much light upon reasonable minimum premiums and upon the equity of experience rating plans.

The Pennsylvania Bureau (including the Coal Mine Section) will annually receive some 40,000 Part VI, 60,000 Part VII, 2,000 Parts III and IV and 150,000 Part X reports.   The annual total of punched cards (e. g., one for each classification for each risk) will exceed 500,000.   The actual coding of all reports is performed by three experienced and highly trained coders.   The clerical work of indexing, checking and filing the reports, punching and verifying cards, and inaccuracies occupies the entire time of twelve employees.   The cost to the Bureau of the entire plan will be in the neighborhood of $25,000 per annum.   To compile Schedule Z, Parts II, III and IV, by the former plan cost the Bureau yearly $10,000.   The cost and trouble to the Insurance Department is about the same under either plan. The writer is not in a position to estimate comparative costs of the two plans to insurance carriers.

It is prima facie probable that a similar plan could be applied with the like advantages to automobile insurance and perhaps to other casualty branches.   Recent experience, flexibility of tabulation, analysis of accident causes, are no less desirable in automobile than in compensation insurance.   The business is rapidly growing, and the experience is in a state of rapid flux. It is known already, by the public as well as by insurance carriers, that premium rates are haphazard and grossly inequitable, that risk classification is unscientific, that excessive loss ratios in certain territories and on some risk classes are counter-balanced by ridiculously small loss ratios in other territories and on other classes.   Already there is public inquiry and some demand for public supervision.   It is none too soon to set the house in order. Better statistics, a more refined analysis of territorial and class experience, a closer scrutiny of accident causes, might well point the way to more effective prevention and more adequate classification.   The present method of experience reporting will never furnish the information needed for radical reform.   The reporting of exposures by individual risks and of losses by individual claims will supply the requisite basis for thorough-going analysis.

A word of warning to conclude: The Pennsylvania plan will prove a delusion and a snare unless handled by a competent statistical organization and backed up by compulsory reporting. Men do not gather figs for thistles, nor are useful statistics compiled by clerks.

E. H. DOWNEY.

REVIEWS OF PUBLICATIONS

A Treatise on Probability. J. M. Keynes, Macmillan & Co., London, 1921. Pp. xi, 466.

This is a very interesting and valuable contribution to the extensive but extremely scattered literature on probability. It is a most stimulating work because it presents a new conception of fundamental principles. Notwithstanding the author's reservation in his preface, "There is much here * * which is novel, and being novel, unsifted, inaccurate or deficient"; the subject is presented in a convincing and vigorous fashion, so much so that in the closing chapter the author feels that he should perhaps make some reservations along the line intimated in his preface. He says,

In writing a book of this kind the author must, if he is to put his point of view clearly, pretend sometimes to a little more conviction than he feels. He must give his own argument a chance, so to speak, and not be too ready to depress its vitality with a wet cloud of doubt. It is a heavy task to write on these problems; and the reader will perhaps excuse me if I have sometimes pressed on a little faster than the difficulties were overcome and with decidedly more confidence than I have always felt.

The basic conception of this work is that probability is not, as it is usually presented, a branch of mathematics, but rather a branch of logic. The author does not claim originality for this, prefacing his first chapter with a brief quotation from Leibnitz indicating that he had first conceived of probability from that point of view. To one who has been trained in the theory of probability as it is usually taught in English speaking countries the implication of this conception is at first decidedly disconcerting. Under this theory probabilities are not objective and the actual probabilities of occurrences of real events but are subjective and express the probability that a conclusion that the event will occur is correct. Expressed in the author's own language,

The terms *certain* and *probable* describe the various degrees of rational belief about a proposition which different amounts of knowledge authorize us to entertain. All propositions are true or false, but the knowledge we have of them depends on our circumstances; and while it is often convenient to speak of propositions as certain or probable, this expresses strictly a relationship in which they stand to a *corpus* of knowledge, actual or hypothetical, and not a characteristic of the propositions in themselves.

Under the operation of the physical law of cause and effect we must admit that when certain forces are at work certain results must follow. For example, it is conceivable that a machine could be invented that would toss a true coin dropped into a slot so that it would always fall head or always fall tail. In the ordinary tossing of a coin the same motion may be imparted and other conditions may be identical so that if we knew just what forces were used we could say just how it would fall. But since we do not know any of them we say the probability is equal for a head or a tail. Thus as to single events, it certainly seems true, as the author maintains, that the foundation of probability lies in the knowledge we have or have not about the proposition.

But when we deal with repeated cases it is a little hard for one trained to the usual mathematical point of view to convince himself that the probability is not related to the event itself but is based rather on his knowledge about it. It would seem that if this is so, the whole structure of insurance is erected on a false foundation. Yet we do know that the force of selection may produce a body of risks whose experience does not at all conform to our estimated probabilites. Mr. Keynes, if I correctly understand him, would approve as correct two widely different estimates of a given probability if only the estimator used all the relevant knowledge he had about the contingency. I cannot go this far with Mr. Keynes. Such a theory could have no practical application for us. And yet some of Mr. Keyne's arguments are so persuasive and the implications of his point of view so helpful in understanding certain parts of the theory that it seems we must accept it.

It seems to me some of the difficulties may be met by a slight modification of the author's theory. He insists that the probability estimate must take account of all relevant knowledge we have about the proposition when we make it. If this be taken to include all the relevant knowledge obtainable in the world, then there could be only one correct estimate of any probability and the reconciliation between our business use of probabilities as objective and inherent in the order of the universe and Mr. Keynes' conception of probabilities as subjective and dependent upon knowledge or the lack of it would be fairly complete.

The conception of probability as a function of knowledge or

the lack of it certainly simplifies the notion of *a posteriori* or inverse probabilities. Speaking for myself, I had never been able until I met this conception of probabilities to find anything interesting or useful or even understandable about inverse probabilities, and the testimony of Professor Chrystal and others indicates that I am not alone in this difficulty. When an event has occurred there is no question in actual fact as to what caused it to occur, although there may be grave question in the minds of many or all persons as to what those causes were. The only valid theory of probability which it seems to me can apply to such cases is a theory which deals with the probability of the correctness of the conclusion that the event did occur from this, that or the other cause.

The casualty actuary does not so often as the life insurance actuary deal with combinations of probabilities derived from one or several mortality tables. It is the duty of the casualty actuary rather to determine loss rates which may form the basis of future premiums, and such loss rates are in essence probabilities. In other words the problem of the casualty actuary is that of statistical inference, which as the author shows is closely associated with the theory of inverse or *a posteriori* probabilities. As indicated by the summary of contents given below, the closing sections of the book deal with this subject. The point of view derived from a careful study of this section of the book will be invaluable to the casualty actuary, although it is probably necessary in order properly to get that point of view to study the entire work.

The book is well arranged, especially from the logical point of view. It is divided into five parts as follows: Part I, Fundamental Ideas, Part II, Fundamental Theorems, Part III, Induction and Analogy, Part IV, Some Philosophical Applications of Probability, Part V, The Foundations of Statistical Inference. The chapters within each part fall in a like logical order.

Part I, of course, lays the foundation both for the criticism of the theory of probabilities as it has heretofore been presented and for the constructive contribution the author himself makes. The conception of probabilities which are not numerically measurable as presented in Chapter III is certainly novel and, notwithstanding the use of diagrams, is difficult of thorough com-

prehension. The discussion of the principle of indifference in Chapter IV, it seems to me, is excellent, but the conception of weight of argument in Chapter VI is another conception which is rather abstract and difficult to grasp.

Part III is not primarily concerned with probability but discusses inductive reasoning generally as a foundation for Part V which deals with inductive determination of probabilities by the use of statistics. Here the author lays down his canons for sound induction and correct reasoning by analogy. His discussion of positive and negative analogies and discrimination of value of data according to extent of concomitant variation as against mere volume is both interesting and of practical value to one having occasion to solve problems on the basis of inductive reasoning or to prepare statistical data for those who do.

If I were to make a general criticism of the book it would be that the examples used by the author to illustrate his principles are too abstract and mathematical and that apprehension of his proposal might be considerably facilitated if concrete and practical examples drawn from actual problems in the fields of science or insurance were used more often to illustrate the theories presented.

Taken as a whole, the book is well worth intensive study and not the least valuable portion of it is the bibliography of references on the subject. The author says that this bibliography "does not pretend to be complete but it contains a much longer list of what has been written about probability than can be found elsewhere." He characterizes it as a list, "which I drew up for my own convenience without much attention to bibliographical nicety or to exact uniformity in the style of entry." The bibliography covers more than twenty-five closely printed pages.

<div align="right">A. H. MOWBRAY</div>

Statistical Analysis of Coal Mine Accidents in Pennsylvania 1916 to 1920 Incl. Compiled jointly by The Insurance Department of Pennsylvania and the Coal Mine Section of the Pennsylvania Compensation Rating and Inspection Bureau, Harrisburg, 1921. Pp. 123.

Comprehensive is the one word which best describes this most recent publication of the Pennsylvania Insurance Department. With regard to thoroughness, detail and clarity of presentation,

this analysis exceeds, if possible, the standard set by the Pennsylvania Department in its previous publications. Although presumably primarily intended to serve as a basis of determining Pennsylvania Coal Mine Workmen's Compensation Rates, the publication contains a mass of experience of value not only to the insurance fraternity but also to operators and organizations interested in the prevention of coal mine accidents. The analysis contains three sections: A, B, and C,—the first two devoted to anthracite and bituminous fatalities respectively, and the third devoted to coal mine insurance experience.

The analysis of fatalities in Sections "A" and "B" involves fatality rates per unit of production, as well as per one thousand 2000-hour workers. Fatalities have been analyzed to Place and Cause of Accident and Occupation of Injured, and statistics have been segregated for the various counties within the state, as well as in the bituminous section for various coal seams. Accidents falling within the catastrophe class have been segregated and reported separately.

In comparing causes of fatalities as between anthracite and bituminous mining, it is interesting to note certain specific causes which tend to have more effect in one branch than in the other. Taking into consideration the fact that approximately the same number of 2000-hour workers were employed in each branch of mining during the period 1916-1920 and that the production of bituminous was approximately twice that of anthracite, the following comparison of the more important causes serves to bring to mind the difference in the hazards which are peculiar to each branch:

ORDINARY ANTHRACITE AND BITUMINOUS FATALITIES, 1916-1920.

COMPARISON BY CAUSE OF ACCIDENT

(Only the more important causes are compared.)

	Anthracite	Bituminous
Outside Accidents—All.............	358	187
Machinery and Boilers...........	114 (Breakers 76)	27
Mine Haulage..................	113	63
Railroad Cars.................	51	35
Inside Accidents—All.............	2283	2075
Explosives....................	287	65
Mine Haulage..................	377	557
Gas and Fires.................	219	34
Falls of Roof and Coal..........	1253	1231
Electricity	32	80
Mining Machines...............	2	45

The reason for the greater number of outside accidents occurring under anthracite is largely explained by the presence of the breaker hazards which are, of course, not found in bituminous mining.

With regard to inside accidents, the large difference in fatalities due to explosives is to be expected inasmuch as the amount of explosives required per ton of coal in anthracite mining, as shown in the 1918 Report of the Department of Mines of Pennsylvania, is over three times that required in bituminous mining. The ratio of dynamite used per ton of coal is greatly in excess of this, being approximately 14 to 1. It is only natural that mine haulage should cause the greater number of accidents under bituminous due to the greater production and, consequently, the greater amount of haulage necessary inside the mines. The difference in the number of fatalities caused by gas and fires is very pronounced. There are two possible explanations. In the first place, about 70% of the total anthracite mined is obtained from gaseous mines whereas in the case of bituminous the proportion is about 50%. Secondly, it is found much more difficult to ventilate mines in the anthracite region on account of the geological formation of the coal bearing strata. One would expect that the falls of roofs and coal would be more numerous in bituminous than anthracite due to the larger number of mine workings, but it is noticed that this is not the case, the number of fatalities due to this cause being even less in the case of bituminous than in anthracite. This may be explained by the fact that it is much more difficult to timber an anthracite mine due to the formation of the strata. Also the constant drilling and use of explosives tend to weaken the roof. Inasmuch as the greater proportion of fatalities due to electricity is caused by coming in contact with exposed trolley wires, it is to be expected that there will be a greater number of such cases in bituminous mining due to the greater number of workings. Also the number of fatalities due to mining machines is greater in bituminous as should be expected inasmuch as machine cutting cannot be made use of to any great extent in anthracite mining.

Immediately preceding Section "C," there appears Chart I— Anthracite and Bituminous—illustrating the variations of the fatality rate in thousand tons per ordinary fatal accident. This exhibit bears mute testimony to the success attending the

efforts of the Department of Mines to reduce coal mine fatalities in the state of Pennsylvania—more particularly in the bituminous field. The chart covers the period from 1891 to 1920 and, while the increase in thousand tons of anthracite mined per ordinary fatal accident is fairly steady, there is a distinct change in the nature of the experience in the bituminous field, starting with 1911, which coincides exactly with the creation of the Department of Mines by the Pennsylvania legislature. From 1891 to 1905 fatalities were becoming more frequent in the bituminous field per thousand tons mined. From 1905 to 1911 attempts made by the mine owners to improve conditions had apparently met with some success. In 1905 there was one ordinary fatal accident per 270,000 tons mined, and by 1911 this figure had increased slightly to 300,000. In 1912, however, the chart indicates but one ordinary fatal accident for every 365,000 tons mined and, in 1916, just prior to the advent of the war, conditions had improved to such an extent that there was but one ordinary fatal accident per about 410,000 tons mined. During the four subsequent years there was a period of distinct retrogression, the experience comparing with that suffered between 1911 and 1912, but in 1920 reverting to but slightly below that of 1916. Rather than connect this period of retrogression with any slackening of efforts on the part of the Department of Mines, one should consider how much worse the experience for these four years might have been, had it not been for the strenuous and productive effort of the Department in the preceding five years.

Section "C" besides containing the accepted exhibits of premiums, pay-rolls, losses and expenses contains some very useful comparisons of Temporary Disabilities and Medical Costs under the Acts of 1915 and 1919, as well as instructive information with regard to Dependency under "Remarriage of Widows." Worthy of separate mention is Table XL showing the Dependency Distribution from Fatal Accidents and also Tables XLIX and LI which show Causes of Fatal and Permanent Injuries and Causes of Compensable Disabilities, respectively.

A comparison of the coal mine Dependency Distribution— Fatal Accidents with a similar distribution for industrial accidents as presented in an exhibit prepared for the Statistical and Actuarial Committee of the Pennsylvania Compensation

Rating and Inspection Bureau, September 6, 1921, discloses some interesting facts.

DEPENDENCY DISTRIBUTION OF COAL MINE
AND INDUSTRIAL FATAL ACCIDENTS
1916-1920.

Dependency Group	No. of Deaths			Per cent of Deaths		
	Anth.	Bit.	Indus.	Anth.	Bit.	Indus.
All Deaths...............	406	1388	2930	100.0	100.0	100.0
No Dependents..........	112	438	816	27.6	31.6	27.8
Dependents Unknown....	..	12	5	..	0.9	0.2
Widow Only.............	27	119	629	6.7	8.6	21.5
Widow and Child........	33	138	322	8.1	9.9	10.9
Widow and Two Children	39	113	257	9.6	8.1	8.8
Widow and Three Children...	40	120	211	9.9	8.7	7.2
Widow and Four Children	58	124	128	14.3	8.9	4.4
Widow and Five Children	25	70	75	6.2	5.0	2.6
Widow and Six Children..	10	33	29	2.4	2.4	1.0
Widow and Seven Children...	4	25	13	1.0	1.8	0.4
Widow and Eight or More Children.............	2	8	5	0.5	0.6	0.2
One Child..............	1	17	37	0.2	1.2	1.3
Two Children...........	..	11	27	..	0.8	0.9
Three Children..........	..	4	12	..	0.3	0.4
Four Children..........	..	4	8	..	0.3	0.3
Five or More Children....	1	5	7	0.2	0.4	0.2
Both Parents............	26	79	138	6.4	5.7	4.7
Mother Only............	22	56	164	5.4	4.0	5.6
Father Only............	4	11	45	1.0	0.8	1.5
Brothers or Sisters.......	2	1	2	0.5	..	..

The outstanding feature of interest in this comparison is the proportion of the total number of deaths which fall within the groups "widow only" and "widow and children" respectively. In the coal mine dependency distribution, there are noticeably few cases of widow only, the percentages being 6.7% in anthracite and 8.6% in bituminous. The percentage of cases of widows with children is considerably higher, being 52% in anthracite and 45.4% in bituminous. In the industrial dependency distribution, the ratios are 21.5% for widows only, and 35.5% for widows with children.

DEPENDENCY DISTRIBUTION
COAL MINE AND INDUSTRIAL

(Percentage of total deaths in each classification)

Dependency Group	Anthracite	Bituminous	Industrial
Widow Only......................	6. 7%	8. 6%	21. 5%
Widow with Children.............	52. 0%	45. 4%	35. 5%
Combined.......................	58. 7%	54. 0%	57. 0%

A comparison of the percentages in the case of widows only as between coal mine and industrial experience brings out rather conclusively that in calculating death benefits for at least those two general lines of business, cognizance must be taken of individual characteristics such as these. It is interesting to note, however, that the combined percentages of cases of widows only and widows with children are very nearly the same in the two general classifications, the coal mine experience showing 58.7% for anthracite and 54.0% for bituminous, and the industrial experience indicating 57.0%. Thus, it is seen that, although the same proportion of coal mine and industrial workers are married, there is considerable difference in the matter of surviving children. This is further illustrated by the fact that in all cases involving widows and children or children only, the average number of dependent children per case is 3.28 for anthracite, 3.12 for bituminous and 2.53 for industrial cases.

From the humanitarian point of view, the tables of Causes of Fatal and Permanent Injuries and Causes of Temporary Compensable Disabilities would appear to contain information of the greatest importance. Causes of accidents have been segregated to outside and inside the mine, respectively, and in turn with extensive detail to the individual, approximate causes of accident. The number of accidents and incurred cost have been allocated to each individual cost, and the percentage of total cost calculated. These tables should serve as direct notices to an employer of prolific sources of disability-producing accidents in his operations. To the Safety and Inspection Division of the Department of Mines, they should prove a real indication as to the direction of their future efforts in accident prevention; to the inspection departments of insurance carriers, they should indicate what recommendations should be made to coal operators

which would be productive of the greatest improvement in the experience of their mines, and to underwriters they should serve as criteria from which the desirability of covering certain individual operations should be determined.

<div align="right">SANFORD B. PERKINS</div>

Lectures on the Fundamentals of Mathematical Statistics. (Vorlesungen über die Grundzüge der Mathematischen Statistik) C. V. L. Charlier. Verlag Scientia, Lund, Sweden, 1921. Pp. 125.

The book under review brings together for the first time the substance of a number of Charlier's contributions to the field of mathematical statistics.

In Part I of this treatise the author deals with homograde series, shows the necessity of investigating certain essential properties of such series, and to this end discusses the arithmetic means and dispersions of the series of Bernoulli, Poisson and Lexis. The formulae for the probable errors of these functions and a discussion of their importance are included. Charlier then develops his coefficient of disturbancy and also coefficients for both periodic and secular fluctuations. The mathematics required for an appreciation of Part I are most elementary.

Part II deals with heterograde statistics, the normal curve of error, Charlier's generalized frequency series of types A and B and correlation. These frequency functions are not developed in this book, but the author states the hypothesis which he used elsewhere in developing them. Inasmuch as the mathematics which would be involved in the course of a thorough treatment of the subject of frequency distributions are by no means elementary, and as Charlier has written this text to suit the needs of students desiring an elementary treatise, it is natural that Part II is not as complete as some readers may desire. These may read with profit Charlier's "Ueber das Fehlergesetz", "Die zweite Form des Fehlergesetzes" and "Ueber die Darstellung willkürlicher Functionen," *Arkiv för Matematik, Astronomi och Fysik*, Stockholm, 1905.

Students unable to read German may refer to *Arkiv för Matematik* (from 1911 on) wherein can be found several original contributions of Charlier which appeared in English. Thus

Chapter I, Part I of the book under review is merely a translation into German of "Contributions to the Mathematical Theory of Statistics", vol. 8, 1912.

<div align="right">HARRY C. CARVER</div>

Mathematics of Finance. H. L. Rietz, A. R. Crathorne, and J. Chas. Rietz. Henry Holt and Co., New York, 1921. Pp. xiii, 280.

The past decade has witnessed the introduction into many of the colleges and universities, of courses in the application of the compound interest theory to financial problems. The attention given to this field of mathematics is rapidly increasing, both as introduction to actuarial studies and as preparation for connection with bank or bond house.

The demand for a text suitable for use with American college students has in the past few years been met only by Professor Skinner's *Mathematical Theory of Investment.* The new text by Professor Rietz and Crathorne is very welcome. As is to be expected a similar list of topics is treated and, as the notation is so well standardized, the treatment is itself, in many cases, similar.

However, in the later book, much fuller treatment has been given a number of topics, such as valuation of bonds, amortization of premium, purchase of bonds between interest dates. In the chapter on Depreciation the mathematical basis of several practical methods in use by accountants is treated. The sections on actual computation of tables by the continuous process are valuable, since nothing so clearly impresses on the student's mind the relation of the several quantities as knowledge and actual use of methods of computation. The chapters on probability, life annuities, life insurance premiums and reserves present in an admirably clear and concise way the basis of actuarial science which should be part of the knowledge of any person who is directly interested (and who is not?) in matters of life insurance.

In a subject of this kind the selection of problems offered is perhaps the point of greatest importance in the judgment of the teacher. In this respect this text can be most highly commended. Not only are the problems under each section well chosen and practical, but the large numbers of miscellaneous problems

taken from many sources of live interest furnish material for drill in the application of the principles, which is invaluable.

A short chapter on logarithms, series, and geometrical progression has been added for the benefit of those who lack knowledge of those essential parts of the algebra.

<div align="right">E. I. SHEPARD</div>

Tables of Compound Interest Functions and Logarithms of Compound Interest Functions.   James W. Glover and Harry C. Carver.   George Wahr, Ann Arbor, 1921.   Pp. 77.

The authors' preface to this volume, describing its contents, reads as follows:

> These tables are intended to be used in connection with college texts on the mathematics of investment and finance. Bankers, engineers, and actuaries will also find them of service in compound interest calculations.
>
> Fourteen tables of values of compound interest functions are given, eight of which are expressed in natural numbers and six in logarithms. The natural numbers are given to eight and the logarithms to seven places of decimals.   They are given for 100 years or periods and for the following sixteen rates of interest: 1%, $1\frac{1}{4}\%$, $1\frac{1}{2}\%$, $1\frac{3}{4}\%$, 2% $2\frac{1}{4}\%$, $2\frac{1}{2}\%$, $2\frac{3}{4}\%$, 3%, $3\frac{1}{2}\%$, 4%, $4\frac{1}{2}\%$, 5%, $5\frac{1}{2}\%$, 6%, 7%.   These rates will be found to cover most of the financial transactions occurring in practice.
>
> The auxiliary tables VI, VII, VIII IX, X, XI, will be found very useful in connection with calculations involving frequent interest conversions and installment payments.
>
> The logarithmic tables are designed to facilitate the work of computation where arithmometers are not available, they may also be employed to familiarize the student with the use of logarithms.

As indicated by this description, the tables should prove very serviceable in the great majority of compound interest calculations.   The interest rates that have been chosen, as well as the auxiliary tables, make for flexibility and a broad field of usefulness.   The casualty actuary, however, will discover that, despite this flexibility, they do not provide for his most frequent need, namely, tables of annuity values applicable to the valuation of benefits running for various periods of weeks and payable weekly, semi-monthly or monthly, where the effective rates of interest lie within the usual limits.   It is true that the tables of values of $a_{\overline{n}|}$ and $s_{\overline{1}|}^{(p)}$ enable one by multiplication to obtain values of $a_{\frac{(p)}{n}|}$, but these values will not be applicable to the

vast number of cases where the duration of the benefit is not expressible as an integral number of years, half years or quarter years. This comment is not intended to detract from the value of the book, but merely to emphasize the fact that it has been prepared for general use and has not been designed to meet the specialized needs of the casualty actuary.

WILLIAM LESLIE

The Law Relating to Automobile Insurance. John Simpson. The Eastern Underwriter Co., New York, 1921. Pp. viii, 202.

For those who have an intimate knowledge of the various forms of coverage given on automobiles, of the policy contracts and underwriting practices in general use Mr. Simpson has added a statement of the weight of authority in the present interpretation of the various policy provision. For the student of the business his book provides a complete but concise discussion of the legal phases of automobile insurance. The method of presentation is such that it is easy for the layman to understand the legal interpretations given.

The book is divided into two parts, the first of which is devoted to "automobile insurance generally". This section deals with the legal view of contracts, cancellations, proofs of loss, relations of an insurance company to its agents, adjusters and brokers, and other matters which are common to practically all lines of insurance.

The second part of the book takes up "matters peculiar to the different kinds of automobile insurance" and devotes a section to each form of coverage granted on automobiles. The collision insurance section deals principally with the definition of a collision, and the exclusion or roadbed and upset accidents. Since these kinds of accidents are now generally covered under collision policies, that part of the book is not of immediate importance. The section on indemnity insurance, which is of particular interest to students of casualty insurance, interprets the policy provisions limiting coverage as to use and driver, during a violation of the statute, and the relations of the insurer and insured in effecting settlement of a loss under the policy.

There is no information which is really new to one who is familiar with the business. The book takes up each phase of the policy contract, its agreements, provisions, and limitations, and summarizes the legal and judicial interpretations which govern them. In this way it serves as a review and summary for the insurance man and as a text book to the student of the business.

<div align="right">A. L. KIRKPATRICK</div>

CURRENT NOTES

A. L. KIRKPATRICK, CURRENT NOTES EDITOR.

NATIONAL COUNCIL ON WORKMEN'S COMPENSATION INSURANCE.

During 1921 the activities of the National Council have been largely those imposed upon it by new legislation. It has been necessary to prepare new rates applicable to states where, for the first time, workmen's compensation laws have been enacted, and also for states in which the benefit schedules have been materially amended. The same general ratemaking methods as were employed in the countrywide revision of rates in 1920 have been followed throughout 1921.

In Georgia a workmen's compensation law became effective January 1, 1921, and in Missouri another attempt has been made to adopt similar legislation. For the moment, however, the Missouri act hinges upon a referendum to be taken at the next general election in 1922. The Georgia law became effective concurrently with a provision for the regulation of rates by the Insurance Commissioner. This necessitated an effective rating machinery in the creation of which the National Council cooperated with the National Association of Mutual Casualty Companies and the National Workmen's Compensation Service Bureau (now the National Bureau of Casualty and Surety Underwriters). In two states, namely, Vermont and New Hampshire, statutory provision has been made for the regulation of rates and for their administration through a regional bureau approved by the Insurance Commissioner. This is the so-called regional bureau measure which was recommended by the National Convention of Insurance Commissioners at its December, 1920 session. At this writing the regional bureau plan has not actually gone into effect in these states; the rates are being administered with the sanction of the respective insurance departments by the Maine Branch of the National Bureau of Casualty and Surety Underwriters. In June, 1921 rate regulation became effective in Minnesota and there also the Council assisted in establishing a local, autonomous rating bureau.

The Council recently issued a classification of workmen's compensation states according to the type of rate administration

prevailing and their relative importance, the latter being judged by the premium volume developed during 1920. As regards importance the states are divided into five classes designated respectively, A, B, C, D, and E. Each of these classes is subdivided according as there is or is not statutory provision for the regulation of insurance rates.

The class A states are those which have each developed during 1920 more than $10,000,000 in premium income and include New York, Pennsylvania, Massachusetts, California and Illinois. Of this list, Illinois is the only state which remains outside the realm of rate regulation. Class B takes in states which have developed between $5,000,000 and $10,000,000 in premiums and include New Jersey, Wisconsin, Texas and Michigan. The first two states of this group are under rate regulation with an autonomous bureau for the administration of rates. Texas, although a state having rate regulation, does not have the autonomous bureau system, but the rates are administered through a branch of the National Bureau of Casualty and Surety Underwriters and local rating service is afforded to "participating" as well as to "non-participating" carriers. Michigan requires rates to be filed, but otherwise there is no supervision. The class C states are those which have developed between $3,000,000 and $5,000,000 in compensation premiums, namely, Minnesota, Indiana and Connecticut. Minnesota, during 1921, came into the sub-class of states exercising regulation. The remaining states are relatively unimportant from the present viewpoint of compensation premium volume, each having developed less than $3,000,000 in premium during 1920. There are twenty-two of these states, thirteen of which have rate regulation and either autonomous rating bureaus or branches of the National Bureau.

An important undertaking in which the National Council is engaged is the development of a means of measuring accurately the current industrial and economic situation so that violent changes in wage scales can be promptly detected and applied to the processes of rate determination. In times when wage rates are fairly stable no particular difficulty is presented, but between 1916 and 1920 ratemaking has been carried on at great disadvantage because of the lag in experience statistics.

These, due to prevailing methods of accounting, have usually been almost two years in arrears so that in times of violent change in wage levels even the latest available experience of particular policy years has been out of date before it could be applied. In order to take up this slack a method of projection has been devised which to a very great extent has bridged the gap between the period of experience and the future period to which rates are to be applicable. Researches are now in progress with a view to developing accurate and up-to-date particulars of prevailing wage rates.

Another matter of importance which is having active attention by the National Council is an extensive study of the present system of schedule rating, with a view to the elimination of waste motion in the application of the schedule to specific risks. A basic formula has been developed upon which to erect a new schedule whenever the necessary detailed information shall be ready. It has already been demonstrated that most of the accidents occurring in each particular industry are attributable to relatively few specific causes. This concentration of accidents according to causation appears to point the way to simplification of the schedule both in point of construction and of application.

At the Louisville meeting of the National Convention of Insurance Commissioners a proposal was submitted advocating the appointment of a committee of three insurance commissioners to supervise the ratemaking activities of the National Council on Workmen's Compensation Insurance. This proposal was referred by the Convention to its Committee on Workmen's Compensation Insurance. The Committee gave a hearing on the proposal at its next subsequent meeting in New York, December, 1921. The resolution as first suggested was not adopted, but in lieu thereof the following action was taken by the Convention:

> RESOLVED: That a committee of not less than three be appointed by the Convention, whose duties shall be to confer and cooperate with, on behalf of members of the Convention, any organization collecting, auditing or revising statistics and advising in the making of workmen's compensation insurance rates and to report back to the Convention from time to time.

The National Council has been designated by the insurance departments of six states having regulation of rates as their official agency for the audit and compilation of Schedule Z. These are, namely, Virginia, Tennessee, Kentucky, Maine, Utah and Colorado.

Among important matters which are likely to be considered by the National Council in the near future are:

1. Consideration of plans for the establishment of non-partisan rating associations in states which are not under regulation so that notwithstanding the absence of such regulation there may be put into effect a system of rating procedure which will resemble as closely as possible the systems in vogue in the regulated states. A committee of stock companies has been appointed to confer with a similar committee composed of mutual companies whenever, in the judgment of the two committees, the time is opportune for such conference. It is believed that such committees will develop the necessary details and recommend a general plan to the carriers at a special meeting to be called for the purpose.

2. Plans for future ratemaking. While the view is generally held that the 1920 rate revision of compensation rates was the most satisfactory of any that have yet been conducted, there still remain many difficulties on account of the complexity of the rate making procedure. Casualty ratemakers are always on the defensive because there is no absolute standard by which rates may be judged. There is evidence of a desire for simplification both among the ratemakers themselves and on the part of the supervising officials who are commencing to feel the burden that rests upon them to justify rates which they are obliged to approve. In this same connection there is a real need for "standards of judgment" by which the states may determine, with some degree of expedition and facility, whether or not rates submitted for their consideration should receive official sanction. This subject has been treated at some length in the present number of *Proceedings* by President Mowbray in his semi-annual address.

AIRCRAFT INSURANCE IN 1921

The company members of the National Aircraft Underwriters Association realized, early in 1921, that something had to be done to put the aircraft business on a better footing. The experience in previous years has been very poor. Only a few companies are writing aircraft insurance and these companies are prepared to do their bit toward the development of the business. They are not content, however, to suffer loss ratios in excess of 100% year after year.

The National Aircraft Underwriters Association became affiliated with the National Workmen's Compensation Service Bureau (now the National Bureau of Casualty & Surety Underwriters) in March, 1921, the latter organization carrying on the work of compiling accident data (insurance and otherwise), analysis of accidents with view to measuring and placing the hazard, cooperation with the Bureau of Standards in fixing standards for material, manufacture and operation, compilation of experience and formulation of rates and coverages, and other work of a similar nature.

One of the first jobs of the year was the compilation of experience. There was not much experience available, but such as it was it indicated very high loss ratios.

The data had been separately collected for each type of ship, for each territory, and for each class of use, but there was not sufficient volume of exposure to indicate the relativity of hazard between planes, territories or uses. The "internal" fire hazard for airplane insurance depends very largely on the engine, the fuel system and the extent of upkeep and repair. Some engines are inherently a better fire hazard than others. As for instance, an engine of light construction is very apt to be completely destroyed by the action of fire due to the excessive warping of valves or other parts. The air-cooled type presents a worse hazard because of excessive heating under loads. The radial type of engine is an increased hazard because there is a possibility of oil and gas dripping down on one of the hot cylinders. A rotary engine is considered a bad hazard due to the leakage of oil and gas while running.

As a rule, the plane with two or more engines, is more likely to catch fire than a single engined plane. On the other hand, there

is less likelihood of the fire spreading to other parts of the plane and there is more opportunity of bringing the plane down to a safe landing.

The gravity system presents a lesser fire hazard than the pressure feed. If a break occurs in the gas line the fire hazard is aggravated under the pressure feed by the spray of gasoline over the hot engine and elsewhere about the plane. There is more chance of a break in a gas line under pressure than in a gas line under the gravity system. A modification of the pressure system wherein the pressure is utilized to pump gasoline to an overhead tank from whence it flows to the engine by gravity is considered less hazardous than the direct pressure system.

It is conceded that benzol in the gasoline creates a greater hazard due to the fact that benzol is very apt to crystallize and clog the feed lines. The use of benzol indicates that the pilot is either trying to get more power out of the engine than it was originally designed for or else the engine is in need of overhaul and has lost considerable power, which loss is being overcome by the use of benzol. Therefore, the use of benzol indicates that the hazard is worse than the average.

It is generally conceded that, other things being equal, the rates should be lower on a ship where spare parts are available at reasonable cost.

Ways and means were discussed for improving the experience for the season of 1921. There are five general ways of accomplishing this: (a) increased rates; (b) better selection of risks; (c) safer flying and education in accident prevention work; (d) limited coverage; (e) reduced loss costs and repair bills.

It was not feasible to increase the rates over those of the previous year, because the rates were already so high that the selection was apt to be against the companies. It is possible to continually improve the experience by a better selection of risks and as the companies gain experience and knowledge of the business, they are enabled to weed out the poor risks.

Efforts are constantly being made to improve flying conditions throughout the country and bring about government control. Undoubtedly this will have its effect on the experience as time goes on.

The most drastic step taken by the insurance companies was

the limitation of coverage. The following outline will serve to show the more important limitations that were adopted:

Fire. Similar to automobile fire insurance but with company's liability limited to 75% of the amount of loss.

Theft. Similar to automobile theft insurance but written with a fixed deductible and subject to the 75% loss payable feature.

Collision. (Land Planes) Covers direct loss or damage caused by collision of a plane with any other object, either moving or stationary, including the earth, occurring during flight or while descending from flight or while plane is under its own power, or by collision of said plane with another plane while on the field. This coverage is limited by being written with a named pilot clause, wherein the company's liability is limited to loss occurring only while plane is in charge of named pilot. Written with only a fixed deductible and 75% loss payable clause.

Windstorm, Cyclone or Tornado. (Land Planes) Covers loss or damage caused by windstorm, cyclone or tornado, excluding loss or damage caused by running motor in hangar or place of housing. The 75% loss payable clause applies here also.

Flight Collision. (Seaplanes) Covers direct loss or damage caused by collision with the water, or with any object in or over the water, occurring during flight, while descending from flight or while plane is under its own power. This coverage excludes all loss or damage caused by collision or, in any manner, contact with the earth or any object thereupon other than water as described above. Also excludes all damage caused by windstorm, cyclone or tornado unless such loss shall occur while plane is under its own power in flight and shall fall upon the water and not upon the earth. The 75% loss payable clause applies here also.

Mooring Perils. (Seaplanes) Covers direct loss or damage to plane while in or upon the water and not under its own power, caused by: (1) Collision with any object, (2) Stranding or sinking, (3) Windstorm, cyclone or tornado. The 75% loss payable clause applies.

Many of the policies specifically exclude all liability for loss or damage while a plane is being used for exhibitions, acrobatics or stunts. Higher rates are charged for instruction, photography or cross-country flying. Rates, with the exception of Liability and Property Damage, are quoted as a given percentage of

the amount of insurance and vary according to the locality, type of plane, class of use and grading of pilot.

A method of grading pilots was adopted whereby certain points or credits are allowed for a pilot's experience on various types of planes and in various kinds of service, his physical condition, training, etc.

Before insurance is granted on a given risk, the insurance company must have a pilot statement containing full information regarding the pilot, and, in addition, a doctor's certificate filled out on a form, prepared by the insurance companies, designed for the purpose of determining the pilot's physical fitness for his task.

An important move made by the insurance companies for safer flying and for education in accident prevention was accomplished with the announcement by Underwriters Laboratories, Inc., that, beginning July 1st, its Aircraft Register would be operative. Hitherto no organization in this country had attempted to define aircraft uses, to classify aircraft or to provide a register whereby formal identification may be secured. The Laboratories has prepared its register at the request of the National Aircraft Underwriters' Association and the Association members are hereafter to require registration of aircraft which they insure against Fire, Theft, Collision, Stranding, Sinking, or other hazard.

Generally speaking, the rates and coverages are not much different in this country than in the foreign countries. If anything, the rates are higher in this country and the coverage is broader in its general aspect, although the foreign companies have not gone quite so far as to put a 75% loss payable clause on top of a deductible feature.

Aircraft insurance in this country is expected to show quite an improvement over preceding years, with the adoption of legislation now pending, which will provide for government supervision of landing fields, air routes and hangar conditions. It is also expected that the government will take some hand in the matter of providing for inspection of aircraft similar to the present supervision of vessels.

With laws properly enforced, it will become practically impossible for an in-experienced operator to take into the air a craft which is unfit for service. There will naturally be a reduc-

tion in the loss ratio with the corresponding reduction in rates, which will put the cost of aircraft insurance within reach of the average operator.

NATIONAL BUREAU OF CASUALTY AND SURETY UNDERWRITERS

The National Workmen's Compensation Service Bureau has been reorganized as the National Bureau of Casualty and Surety Underwriters. The outstanding features of the new organization that distinguish it from the old are, first, a structure that is broad enough to take in all the casualty and surety lines, and second, the fact that each of these lines when taken in will be handled by a separate department, each of such departments being autonomous with regard to matters that are exclusively within its own field while matters that have a more general interest will be handled by the Bureau as a whole.

At present, there are only two of these departments, the Automobile Department of which Mr. A. Ryder is Manager, and the Compensation and Liability Department, of which Mr. G. F. Michelbacher is Acting Manager, but it is hoped that eventually there will be departments for all the casualty and surety lines and that the Bureau as a whole will serve as a clearing house and service organization for all such interests. The new Bureau is exclusively a stock company organization.

The officers of the new Bureau are:

MR. JESSE S. PHILLIPS, General Manager
MR. ALBERT W. WHITNEY, Associate General Manager
MR. G. F. MICHELBACHER, Secretary-Treasurer.

WORKMEN'S COMPENSATION FOR MARITIME WORKERS

There is probably no class of employees which has been subjected to greater uncertainty concerning the application of the principle of workmen's compensation than the class of maritime workers.

It was assumed at the outset, when workmen's compensation laws were first enacted, that these laws would apply to injuries suffered in maritime employments provided the accidents causing these injuries occurred within the jurisdiction of the state law. This assumption was soon found to be incorrect. In the

California case entitled "Jensen vs. Southern Pacific R. R. Co. (1917), 244 U. S. 205" the U. S. Supreme Court decided that no state workmen's compensation law applied to an injury suffered on a vessel subject to the maritime law.

Still believing that the principle of workmen's compensation should be applied to these injuries, Congress promptly after this decision was handed down amended Section 24 of the Judicial Code for the purpose of giving to persons employed on vessels all rights and remedies under the workmen's compensation laws of the several states. For a time under this legislation maritime workers were subject to state workmen's compensation laws but they were again thrown under the maritime law by a decision in the New York case of "Knickerbocker Ice Co. vs. Stewart (1920), 253 U. S. 149." In this case the U. S. Supreme Court ruled that Congress had no power to legislate as it did because such legislation had the effect of destroying the uniformity in the maritime law required by the Federal Constitution.

We are therefore, today in the position of denying to maritime workers the legal advantages of workmen's compensation. Provision has been made, however, by the insurance carriers to offer forms of coverage which will meet this situation. In addition to a form of liability coverage which covers the liability of the employer in the Admiralty Courts and such residual liability as may exist under state workmen's compensation laws, the carriers are offering a form known as "voluntary compensation" coverage which obligates the carrier in every instance to tender to injured employees the benefits of the workmen's compensation laws of the state in which the accident occurred. The acceptance of this offer is of course optional with the injured employee but this plan nevertheless affords him an opportunity to accept workmen's compensation coverage if he so desires.

Congress is still interested in this situation and at the present moment legislation is being considered which is designed to solve the difficult problem which has so far defied solution.

There are now pending before Congress two bills relating to compensation for maritime injuries.

The first of these is Senate Bill No. 745-Johnson (same as House Bill No. 5351-Mills). This bill amends Sections 24 and 256 of the Judicial Code so as to give "longshoremen" and "ship-repairmen" injured on vessels all the rights and remedies under

the workmen's compensation law of the state in whose jurisdiction the injury occurs.

The second bill is Senate Bill No. 746-Johnson (same as House Bill No. 5352-Mills). This bill is modelled somewhat after the Ohio workmen's compensation act. It provides for a monopolistic Federal insurance fund, to be managed by the same board or commission that is to administer the compensation, in which insurance would be compulsory. This bill applies only to "seamen"—i. e., the "master" and "crew" of vessels. It does not apply to "longshoremen" or "ship-repairmen" who may be injured on vessels.

It is apparent from this legislation that what is being attempted is the amendment of the Judicial Code in a manner which will avoid the point used as a basis for decision in the Knickerbocker Ice Company case which was, namely, that "seamen," "longshoremen" and "ship-repairmen" can not constitutionally be put under the state workmen's compensation laws because that would destroy the required uniformity of the maritime law. In these measures it is proposed to draw a distinction between "seamen" on the one hand and "longshoremen" and "ship-repairmen" on the other. The former class would be covered by a uniform Federal law of universal application; the latter would be subject to the jurisdiction of state workmen's compensation laws.

If this legislation is enacted it will be interesting to see how the U. S. Supreme Court will view this attempted distinction and the latest solution of the problem which is based upon it.

ELECTRIC MOTOR INSURANCE

The analysis of the policy contract of the pioneer company in Electrical Equipment Insurance shows that it is designed to indemnify the purchaser against breakdown, costs of motors, generators, transformers, compensators, synchronous condensers, switches and instruments. It contracts to indemnify for any breakdown except such as would be taken care of under fire or riot policies, or would be caused by wear only.

The burning out through short circuiting, or grounding from whatever cause, or the breaking of any part of the equipment from any cause, is covered as respects the object insured and

the coverage extends to other property of the insured. Coverage is also offered by endorsement against damage to property of others than the insured.

The rates applicable to the policy contemplate speed of rotating objects, type of object covered, whether alternating or direct current is used, and the capacity. Non-rotating equipment rates contemplate type, method of cooling and capacity. The frequency of breakdown and cost of repair has had considerable influence upon the adoption of the particular refinements mentioned above. Many other considerations could have been taken into account, such as voltage and phase, but it was found that too many refinements made any rating system impracticable both from the Agency and Home Office standpoints. The decision as to what cost influences should be eliminated rested upon those whose influence was the greatest.

On or before January 1, 1922, at least five casualty companies will be writing this new line. The coverage granted by these carriers varies somewhat and present rates vary as much as 200% on various objects and conditions. Great interest on the part of the public has been evidenced in this line of insurance and it is expected that its satisfactory growth will continue.

MASSACHUSETTS LEGISLATION

A Massachusetts Committee headed by Insurance Commissioner Clarence W. Hobbs has just reported to the Legislature on the following topics:

1. Broadening of classes of prescribed securities in which insurance companies may invest.

2. The placing of automobile insurance by finance companies.

3. The issuance of policies by mutual companies without contingent liability.

4. Transacting of additional classes of business by mutual companies.

5. Requiring owners of motor vehicles to carry liability insurance.

These topics are covered in Senate Documents 282, 284, 285, 286.

PREPARATION FOR EXAMINATIONS OF SOCIETY

To Students Preparing for the Examinations of the Casualty Actuarial Society:

The Casualty Actuarial Society, through the courtesy of the Insurance Society of New York, has been granted the privilege of establishing its library in the quarters of the latter organization, 84 William Street, New York City.

As a nucleus there have been purchased as many of the books listed in the "Recommendations for Study" as are obtainable. Other publications will be added as rapidly as possible. These are at the disposal of registered students preparing for examinations on authorization of the Secretary of the Casualty Actuarial Society and subject to the rules of the library.

In order that students living outside of New York may have readier access to publications recommended for study an attempt has been made to learn where these publications may be found in the various centers. Inquiries concerning specific publications should be addressed to the Chairman of the Educational Committee who will give such information as is available.

Students who find it impracticable to purchase or borrow books otherwise may, on authorization of the Secretary, borrow books from the library of the Society in New York City. Students who cannot visit the library may have available books sent to them by mail on payment of the necessary postage and a small fee to cover costs.

Students are earnestly advised to purchase the more important books and to subscribe for actuarial periodicals wherever possible. The formation of a working library on actuarial subjects will be found stimulating and helpful in a practical way both in preparing for the examinations and in later work.

RALPH H. BLANCHARD, Chairman
Educational Committee,
2960 Broadway, New York City.

BURGLARY INSURANCE

The companies writing Residence Burglary and Theft Insurance have lost a considerable amount of money on this line during the last few years. Rates have been raised from time to

time but the loss ratio has continued to rise. After giving careful consideration to various plans for writing this class of insurance, with the object of placing the business on a profitable basis without restricting the coverage, a new policy form was adopted. Instead of the customary blanket coverage on all household goods and personal property, this policy classifies the property into three sections: (1) jewelry, silverware and furs; (2) money and securities, to an amount not exceeding $50, wearing apparel, laces, rugs, etc.; (3) wines, liquors and other alcoholic beverages.

Under the former method of writing this business, fixing the amount of insurance was purely arbitrary, simply an amount which the policy holder decided would be sufficient to cover a small loss which he might suffer. Therefore, the amount of insurance did not bear any fixed relation to the value of the property exposed to loss. The amount of insurance was in most cases but a small fraction of the value of the property exposed. As the premiums heretofore were based on these arbitrary amounts of insurance, there was no proper distribution of cost among policy holders in proportion to the amount at risk. As a consequence, the policy holder whose total exposure to loss was relatively small usually took a policy of $1000 and paid the minimum premium, whereas another policy holder having a larger exposure to loss may have taken a policy for the same amount and paid the same premium, and yet the chances of a loss of $1000 in the case of the second policy holder were very much greater than in that of the first. Practically, the policy holder with a small value was not only paying a sufficient cost to enable the Company to carry the risks of his class, but he was also helping to pay for the greater risk which the Company assumed when carrying policies for the same amount but covering much greater values.

The one practical remedy for this situation which would effect an equal distribution of cost is the application of Co-Insurance, which simply means, basing the premium on the value of the property exposed to loss in each case instead of on an arbitrary amount of insurance which the policy holder may elect to carry. Therefore, the fundamental requirement of Co-Insurance is a statement from the policy holder as to the value of the property to be insured. In order to insure compliance with this requirement, on the part of the policy holder, it is necessary to attach

some penalty for failure to properly observe it. This penalty does not deprive the policy holder of any of his rights under the policy, but simply makes him assume a part of the loss in case he is under insured. The enforcement of the penalty, however, is not the object of the co-insurance clause. The real object is to enable the companies to obtain a premium in proper proportion to the risk assumed.

PLATE GLASS INSURANCE

It has not yet been possible to tabulate the experience of the year 1921 in Plate Glass Insurance as reports from the companies have not yet been received. The indications are, however, that the volume will be less than 1920, due to reductions in premium rates, which reductions will be more or less off-set by an added business from owners who were formerly insured by companies which ceased doing business about the first of the year.

A lower glass market on the other hand, has reduced actual losses and the expectation is that the 1921 business, as a whole, will show a loss ratio materially less than in 1920 and there will be a closer approach to a normal ratio than heretofore.

The Plate Glass Insurance manual which has been in use for many years was based originally upon the Plate Glass Price List of 1885 and while some changes were made from time to time in the rate tables contained in the manual, it was never actually brought up to date.

During the year 1920 a new manual was prepared with the latest glass price list as a basis and the rules and regulations were redrafted in order to simplify the rating of risks. This manual went into effect January 1, 1921 and was applied to the whole country, excluding the City of New York. The new manual is known as the "Standard 1920 Manual." A number of changes have been made in the manual charges during the year 1921, which affect certain kinds of glass and there are few if any further changes contemplated.

The perforated card system has not been found to accomplish good results because but few of the companies have responded to the request to furnish information in this way and in any event, it has been found that the geographical differential required is not brought out by the use of the cards. This is due

largely to the fact that the price of glass varies in different parts of the country, whereas the cards are used entirely upon the table rates in the manual.

It seems necessary, therefore, to base geographical differentials upon the actual experience of the companies, giving due attention to changes in rates and glass prices. There is no question as to existing imperfections in the basic rates in the manual, but even if these were amended the same conditions would still exist as to the necessity for differentiating the changes for various parts of the country. A change in the manual would either merely increase some rates and decrease others, leaving the geographical situation the same, or if the average of the manual rate is altered up or down there would remain the necessity for changing the geographical percentages in order to reach the same result.

The years 1918, 1919 and 1920 have been tabulated on the perforated cards, but only to a small extent. A very negligible proportion of the whole business has been reported and none of the old or large plate glass insurance companies have adopted this plan of keeping experience. It has been estimated that not exceeding $12\frac{1}{2}\%$ of the total business for these years has actually been reported for tabulation, and while there are two companies whose business is so tabulated in their own offices, the total amount of carded business including these two companies would be less than 20% of the whole.

It has not been possible thus far to induce more than a few companies to use the perforated card method of statistics and, therefore, the Rate-Maker has concluded to discontinue this system from the first of the year 1922. There are, however, in his office approximately 500,000 cards which might be tabulated as a test of the basic manual rates for comparison, but the volume represented by these cards is relatively so small as to make doubtful the value of the information that would result.

It may be that we shall eventually conclude that experience on the basis of actual exposure of various kinds, sizes and uses of glass will produce a much more satisfactory guide for fixing manual rates comparably. In such event, the premiums need not be used at all, as the basis would be the frequency of breakage in each case, and with information thus obtained the manual rate for each group could be established with some accuracy.

The geographical differences would then be determined by actual experience based upon premiums.

A standard form of Plate Glass Insurance Policy has never been adopted, but the policies in use by the various companies contain practically the same coverage. For more than a year work has been going on in the preparation of a standard form of policy which it is believed will be acceptable to all companies but there are still some differences of opinion which must be disposed of before the work can be completed. The principal difficulty arises as respects flood losses. Some companies do not exclude such losses from their policies and others pay flood losses notwithstanding their exclusion. The same may be said of some other hazards which are common to the whole country, such as riots, strikes, civil commotion, etc. The fact remains, however, that there is a general desire for a standard form of policy, or, in any event, standard provisions which will accomplish the same result. It is hoped that during this year the work on the policy will be completed and adopted by the companies.

There have been changes in State and City rates during the year due to the fall in the cost of replacement and a recent further reduction in glass costs will undoubtedly bring about a further reduction in premiums in the near future, but it is contemplated that any reductions in premium rates will be made with a view of keeping all rates on a par as nearly as possible with the glass market.

DIGEST OF WORKMEN'S COMPENSATION LAWS

The National Bureau of Casualty & Surety Underwriters has recently completed a digest of workmen's compensation laws which it is distributing to members and others desiring them. It is put out in loose leaf form and the Bureau proposes to maintain a reprint service to permit the digest to be amended with each change in the laws.

At the present time there are two other digests in use. The particular purpose of making another digest was to furnish a bird's eye view of the chronological developments of the schedule of benefits for each law. This meets the demand of claim and statistical departments for a concise compilation of laws for use in the valuation of new reserves, in the valuation of reserves on old cases, in the calculation of benefits due to claimants and in the analysis of closed claims.

CHECK FORGERY INSURANCE

The growth of Check Forgery Insurance during the past year has been exceptionally rapid.

During the last few weeks an even greater interest than before has developed, owing to the additional coverage which is being given.

Originally the policies covered loss due to the alteration or forgery of checks issued by the assured. The policy as now written covers not only such checks, but also other forms of negotiable paper, such as notes, trade acceptances and bills of exchange. This additional coverage has proved to be of great interest to all commercial houses.

In addition to the increase of coverage in regard to negotiable instruments, the policies now also give coverage for loss due to the "exchange of merchandise," or "for services rendered" in exchange for an altered or forged check. This is of special interest to department stores, hotels and retailers. All these classes of business are accustomed to taking checks in payment for merchandise delivered. The losses have been extremely heavy. So that while this new policy in its greatly broadened form is for the present being sold at the same rate as for the old form, that is, $5.00 per thousand of indemnity per year, with a 15% discount when written on the three-year basis, it is more than possible that there will be an increase in the rate.

CASUALTY INSURANCE DURING 1920

The following is taken fron the Sixty-Sixth Annual Report of the Massachusetts Insurance Commissioner:

"All of the principal casualty lines registered notable gains in premium income during the past year. For the purpose of showing how the conditions of the past few years have affected the companies writing these classes of business a table is appended showing the experience of the companies for eight years. This table shows the premiums earned, the ratio of losses incurred to premiums earned and the acquisition ratios, that is to say, the percentage of acquisition costs to premiums. No figures are given as to the other expenses of the companies, but by adding the loss ratio to the acquisition ratio an approximate idea can be obtained as to what portion, in any given year, of the earned premiums was available for those other expenses."

COUNTRYWIDE EXPERIENCE OF CARRIERS ENTERED IN MASSACHUSETTS BY LINES

Year	ACCIDENT AND HEALTH			LIABILITY AND WORKMEN'S COMPENSATION			FIDELITY AND SURETY		
	Premiums Earned	Loss Ratio	Acqui-sition Ratio	Premiums Earned	Loss Ratio	Acqui-sition Ratio	Premiums Earned	Loss Ratio	Acqui-sition Ratio
1913	$29,672,311	49.18	37.23	$54,004,885	62.06	24.84	$16,805,497	40.73	30.58
1914	29,760,327	47.42	37.41	62,414,864	66.88	22.11	18,810,491	42.16	33.15
1915	30,135,509	50.15	37.84	61,556,875	65.75	22.58	18,988,312	32.10	33.50
1916	32,909,714	49.09	36.84	79,376,220	66.67	21.13	20,825,103	31.04	31.06
1917	36,721,220	48.43	36.06	109,933,890	64.85	19.80	24,850,504	36.12	29.60
1918	38,076,024	52.49	35.38	156,233,710	65.01	18.81	28,865,331	36.34	30.14
1919	42,173,470	47.01	33.54	177,275,450	63.74	19.23	33,729,411	36.58	30.36
1920	53,210,475	50.34	35.49	212,423,793	56.67	19.79	42,743,500	33.18	30.95

Year	PLATE GLASS			STEAM BOILER			BURGLARY & THEFT		
	Premiums Earned	Loss Ratio	Acqui-sition Ratio	Premiums Earned	Loss Ratio	Acqui-sition Ratio	Premiums Earned	Loss Ratio	Acqui-sition Ratio
1913	$4,427,216	43.94	36.74	$2,486,801	13.12	30.23	$3,650,857	39.53	32.16
1914	4,531,079	40.98	37.18	2,575,012	9.59	31.49	3,917,465	41.85	34.50
1915	4,365,841	38.32	37.45	2,694,696	6.66	30.93	4,094,295	41.14	34.10
1916	4,594,573	55.47	37.30	2,975,781	9.13	28.98	4,650,017	42.23	34.07
1917	5,112,644	54.17	36.37	3,233,846	14.98	28.98	5,538,032	55.99	33.63
1918	6,224,647	57.92	36.55	3,748,210	12.87	28.94	7,022,832	43.57	33.50
1919	7,726,402	53.18	36.08	4,132,726	14.60	28.31	9,946,267	65.91	33.34
1920	12,052,070	65.56	35.43	4,580,330	13.57	29.82	15,742,580	71.88	34.11

Year	CREDIT			SPRINKLER			ENGINE & FLY WHEEL		
	Premiums Earned	Loss Ratio	Acqui-sition Ratio	Premiums Earned	Loss Ratio	Acqui-sition Ratio	Premiums Earned	Loss Ratio	Acqui-sition Ratio
1913	$1,540,200	51.63	27.92	$168,377	49.20	25.11	$169,209	37.40	29.28
1914	1,478,786	53.14	28.05	189,104	53.46	28.36	191,354	28.30	30.12
1915	1,436,884	61.16	28.14	204,949	39.06	28.69	207,012	15.37	31.59
1916	1,366,765	18.18	26.62	233,619	44.07	28.55	250,058	23.72	30.65
1917	1,572,909	20.22	28.39	269,326	78.64	26.56	320,908	13.56	31.54
1918	1,780,443	26.08	26.39	343,056	86.91	27.13	396,677	30.45	30.97
1919	1,973,509	9.63	28.14	427,443	46.52	26.65	581,376	19.02	31.66
1920	2,992,430	34.52	27.37	631,049	99.95	28.39	837,958	38.78	30.94

Year	AUTO. AND TEAMS PROPERTY DAMAGE			WORKMEN'S COLLECTIVE			LIVE STOCK		
	Premiums Earned	Loss Ratio	Acqui-sition Ratio	Premiums Earned	Loss Ratio	Acqui-sition Ratio	Premiums Earned	Loss Ratio	Acqui-sition Ratio
1913	$3,834,933	47.52	26.54	$563,960	61.98	21.94	..	..	..
1914	4,552,264	44.22	27.94	382,723	62.86	24.28	...	..	..
1915	4,820,876	45.81	28.50	243,411	52.35	26.14	$87,399	59.98	40.61
1916	6,278,786	55.81	27.92	204,262	63.63	28.35	277,423	48.31	25.57
1917	8,294,539	61.92	26.37	264,705	55.75	25.85	633,457	62.90	26.34
1918	10,850,603	60.42	26.32	249,520	50.41	23.34	764,857	73.96	23.74
1919	14,908,635	73.50	26.48	299,544	44.43	28.58	903,507	54.47	21.09
1920	22,465,289	77.36	26.78	270,548	42.68	22.45	1,144,847	64.31	24.94

PERSONAL NOTES.

W. W. Greene has established himself as Consulting Actuary and Underwriter at 35 Nassau Street, New York.

C. H. Franklin is Manager of the Casualty Department of the Northwestern Casualty & Surety Company of Milwaukee, Wis.

George B. Buck has changed his address to 25 Frankfort Street, New York.

William H. Gould may be addressed at 75 Fulton Street, New York.

S. Herbert Wolfe has been honored by being appointed a Brigadier-General of the Finance Reserve Corps.

W. J. Constable has been promoted from Statistician to Assistant Secretary of the National Council on Workmen's Compensation Insurance.

David W. Miller's new address is S. W. Straus & Company, 565 Fifth Avenue, New York.

Thomas Bradshaw is now General Manager of Massey-Harris Company, Ltd., Toronto, Canada.

Edward Olifiers, Consulting Actuary, may be addressed at P. O. Box 1817, Rua dos Andrades, 64, Rio de Janeiro, Brazil.

Harry C. Carver has been made Associate Professor of Mathematics and Insurance at the University of Michigan.

Roland Benjamin is now Treasurer of the Fidelity and Deposit Company.

Robert E. Ankers has left the Virginia Insurance Department to become Actuary of the Continental Life Insurance Co., District National Bank Building, Washington, D. C.

Joseph Raywid is Vice-President of the Underwriters Statistical Bureau, 153 Fifth Avenue, New York.

Vincent G. McGuire is Assistant Actuary-Auditor, Comptroller's Department, City of New York, Municipal Building, New York.

A. L. Kirkpatrick is Actuary of the Michigan Mutual Liability Company, Detroit, Michigan.

George B. Buck and Dr. James D. Maddrill have been appointed to the Board of Consulting Actuaries for the valuation of the recently enacted government plan for the retirement of its civil employees.

OBITUARY

CHARLES T. CONWAY

Born, August 12, 1881.   Died, July 23, 1921.

FREDERICK STEPHEN CRUM

Born, December 13, 1872.   Died, September 2, 1921.

CHARLES GRANT REITER

Born, July 5, 1861.   Died, July 30, 1921.

CHARLES T. CONWAY

By the death of MR. CHARLES T. CONWAY on July 23, 1921 this Society lost one of its charter members, who though not often seen at our meetings nor contributing to our *Proceedings* had taken an active interest in the work of our profession and in our Society.

After high school training, Mr. Conway in 1900 entered the employ of the Old Colony Trust Company of Boston of which he became assistant auditor in 1909. During this time he took great interest in the business educational movement as exemplified in the American Institute of Banking and the Boston Chapter recognized this interest by making him President in 1910-1911.

When the Massachusetts Employees Insurance Association was organized in 1912 he became the first Treasurer of the Association, continuing in that office until 1917 when he was made Vice-President.

In this work he had immediate charge of the preparation of annual statements and reports to directors and influenced undoubtedly by his banking experience was always concerned that the statement of liabilities might be as accurate as possible, and to this end he kept in constant touch with the deferred loss reserve. It was in connection with his studies of this subject that he came most closely in touch with our work. The Society itself appealed to him as the natural correlative in Casualty Insurance of the American Institute of Banking in relation to his former work.

From March 1919 until ill health forced his retirement he was in even closer contact with the work of our profession, having

taken over immediate supervision in its broad aspects of his company's statistical work.

Unfortunately his physical endowment was not equal to the drains his enthusiasm for his work and efforts for others placed upon it, and in the summer of 1920 he was forced to retire from active business. He died from cerebral hemorrhage July 23, 1921.

FREDERICK STEPHEN CRUM

DR. FREDERICK STEPHEN CRUM, a Fellow of this Society since 1916, was accidentally drowned, while on a vacation in Maine, on September 2, 1921.

Dr. Crum was born in West Candor, New York in 1872. In 1893, he was graduated from Cornell University. Until 1897, he took postgraduate work in statistics and economics with Professor Walter F. Willcox, completing successfully the course and research requirements which led to his Doctor's dissertation and degree in 1897. Shortly afterward, Dr. Crum became assistant to Dr. Frederick L. Hoffman, Statistician of the Prudential Insurance Company of America. During the succeeding twenty-three years, Dr. Crum devoted his efforts to the study of the statistical, social and economic problems of industrial and allied branches of insurance. To Dr. Hoffman he was a loyal, efficient co-adjutor; to his staff associates, an inspiring teacher and leader; to his co-workers in other branches of the Prudential's Home Office, a valued counselor. His success in the statistical study of insurance fundamentals, his sound scholarship and sustained enthusiasm for this division of insurance activity, drew to him a number of young men in other departments of the Prudential's Home Office, and led them to undertake studies which eventually brought them into the statistical field. He was ever ready to devote time and effort, which he could ill spare from his duties, to the instruction of this group of students. What success these men have had in the banking and insurance fields, may well be ascribed to Dr. Crum's example and counsel.

His activities covered a wide range of subjects. During his postgraduate work at Cornell he completed studies on the Massachusetts marriage-rate and also compiled a bibliography of the writings of Johann Peter Jüssmilch, a pioneer in European

vital statistics. In connection with his work at the Prudential, he made studies into the results of preventive medicine in Providence, R. I., 1885-1902; the health and mortality of cotton mill operatives in Blackburn, England; social statistics of dependent classes; accidents to railway employees in the United States; industrial insurance; industrial accidents in Canada and in the United Kingdom; the growth of the population of the United States, 1790-1900; boiler explosions; street traffic accidents; statistical studies of the communicable diseases of children; anthropometric statistics of young children; infant mortality; and tuberculosis. During his war work as Statistician for the Emergency Fleet Corporation, which he carried on in conjunction with his duties at the Prudential, he made important contributions to the methods and results of practical labor and welfare statistics.

Members of the Society will recall his cooperation in the early plans for standards of Workmen's Compensation Statistics, in association with Messrs. Scattergood, Rubinow, Verrill, Downey and others. At the time of his death, Dr. Crum was chairman of the Committee on Statistics of the Public Safety Section of the National Safety Council. He was to have presided as a sectional chairman of the International Congress of Eugenics, for which meeting he had prepared a comprehensive study of the size of American families since 1680. His contributions to public health statistics were numerous, and contained valuable information on the prevention of communicable disease, infant and child mortality, and tuberculosis. He was keenly conscious of the lack of properly prepared information on the causes of preventable sickness and injury and endeavored effectively to compile and interpret the data which he thought were most needed for the advancement of health protection in the United States.

He had fellowships or memberships in a number of scientific societies, among them the American Statistical Association, American Economic Association, the American Public Health Association, the American Child Hygiene Association, National Safety Council and the Casualty Actuarial Society. In New Jersey, he was active in the Anti-Tuberculosis League and the New Jersey State Industrial Safety Museum. His cooperation and services were also available to State and Municipal depart-

ments of health, civic societies and welfare organizations. The results of his devotion to the sound study of the insurance sciences should act as an inspiration to the younger men at present in administrative underwriting and actuarial work in the insurance business. He demonstrated the importance, even the indispensability, of continually testing the service value of insurance in terms of its effect upon the public welfare. His attitude toward the public service relationships of insurance was never affected by partisan motives; it was founded upon an enthusiasm for the broadest facts of community life in their bearing upon the problems of the insurance business. The work, which he knew had just begun, should be carried forward by the members of the Society and others, who were privileged to know him and to work with him.

CHARLES GRANT REITER

CHARLES GRANT REITER, a Charter Member of the Casualty Actuarial Society, died at Cape Elizabeth, Maine, on July 30, 1921. He had been unwell for some time and had gone to Maine in the hope of improved health.

Mr. Reiter was born in Newport, Pa., in 1861. In June, 1881, he entered the service of the Metropolitan Life Insurance Company, and only a short time before his death celebrated his fortieth anniversary with the company. For over twenty-five years he had held the position of Assistant Actuary.

Mr. Reiter's insurance activities were confined almost entirely to the life insurance branch of the business. He had special talent for the systematizing of work involving countless small details, and the present card system of the Metropolitan by which the actuarial records of over 21,000,000 industrial policies are kept was developed mainly under his supervision. He had been a Fellow of the Actuarial Society of America since 1894.

While Mr. Reiter's delicate health had stood in the way of active participation in the affairs of the Casualty Actuarial Society, so that he had come in touch with comparatively few of its members, he was highly esteemed by his associates in the Metropolitan and others who knew him, on account of his ability and excellent personal qualities.

CASUALTY ACTUARIAL SOCIETY

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ABSTRACT FROM THE MINUTES OF THE EIGHTH ANNUAL MEETING, NOVEMBER 18, 1921.

The eighth annual and seventeenth regular meeting of the Casualty Actuarial Society was held at the Hotel Pennsylvania, New York, on Friday, November 18, 1921.

President Mowbray called the meeting to order at 10:30 A. M. The roll was called, showing the following forty-one Fellows and fourteen Associates present:

FELLOWS

BLANCHARD	HESS	PERKINS
BUCK	JACKSON, C. W.	RYAN
BUDLONG	KIRKPATRICK	SCATTERGOOD
CAMMACK	McMANUS	SENIOR
COGSWELL	MADDRILL	SMITH, C. G.
DEKAY	MAYCRINCK	STRONG, W. M.
DORWEILER	MELTZER	VAN TUYL
FALLOW	MICHELBACHER	WAITE, A. W.
FLYNN	MILLIGAN	WHITNEY
FONDILLER	MOIR	WILSON
GOULD	MOORE	WOLFE, S. H.
GREENE	MOWBRAY	WOODWARD
HAMMOND	MURPHY	YOUNG, C. N.
HANSEN	OUTWATER	

ASSOCIATES

ACKERMAN	CONSTABLE	THOMPSON, A. E.
BARBER	EGLI	WAITE, H. V.
BLACK, N. C.	NEWELL	WEBBER
BESSEY	PINNEY	WILLBACH
BROOKS	SPENCER	

The President's address was presented.

The minutes of the meeting held May 24 and May 25, 1921 were approved as printed in the *Proceedings*.

The Secretary read the report of the Council and upon motion, it was adopted by the Society. In accordance with the motion passed at the last meeting of the Society, the Council had voted to re-establish the Committee on Notation. R. S. Hull had been enrolled as an Associate without examination. The memorial

notices of Charles T. Conway, Frederick S. Crum and Charles G. Reiter, appearing in this number were read.

The Council recommended the following for election to Fellowship in the Society, without examination, under the terms of Article III of the Constitution:

> WILLIAM A. HUTCHESON, 2nd Vice President and Actuary, Mutual Life Insurance Company, New York.
>
> JAMES F. LITTLE, Assistant Actuary, Prudential Insurance Company, Newark, N. J.
>
> GUIDO TOJA, General Manager, Government Institute of Insurance (Instituto Nazionale delle Assicurazioni), Rome, Italy.

After ballot, these nominees were declared duly elected Fellows.

The Council reported that the following Associates had passed the necessary examinations and had been admitted as Fellows:

KEARNEY, T. P.	PERKINS, SANFORD B.
MONTGOMERY, VICTOR	WILSON, W. NORBERT

The Council also reported that the following candidates had passed the necessary examinations and had been enrolled as Associates:

COATES, CLARENCE S.	ROEBER, WILLIAM F.
CONSTABLE, W. J.	SHEPARD, ELMER I.
HAGGARD, ROBERT E.	SMITH, ARTHUR G.
JENSEN, E. S.	WATERS, LELAND L.
PINNEY, SYDNEY D.	WELCH, EUGENE R.

The report of the Secretary-Treasurer was read and accepted.

The report of the Editor and Editorial Committee, a summary of which follows, was read and accepted:

> The Editorial Committee reported concerning the difficulty which has been experienced during the past year in printing the *Proceedings*. This was attributed to the national printers' strike, which seriously interfered with the operations of the New Era Printing Company, which has printed the *Proceedings* since the organization of the Society. The Council appointed a special committee consisting of the President, Secretary-Treasurer and Editor with power to investigate the situation and to make suitable arrangements for the Society's printing for the coming year.

The Council had approved the following suggestions offered by the Editorial Committee:

1. The outside back cover of the *Proceedings* will give an appropriate statement with reference to the aims and objects of the Society.

2. The following departments will be removed from the *Proceedings:*

   a. Bibliography of Casualty and Social Insurance.

   b. Membership list, Constitution, By-Laws, Rules regarding Examinations for admission, Syllabus of Examinations and Examination Papers. This material will be printed in a separate publication to be known as the "Year Book."

3. A new department will be added to the *Proceedings* beginning with Number 17 (Volume VIII). This will be known as "Actuarial and Statistical Notes" and will be devoted to the presentation of memoranda covering material which is not of sufficient importance to warrant presentation in the form of papers.

4. At present, papers are discussed at the meeting following the meeting at which they are presented. In the future, discussion will take place at the same meeting at which the papers are presented.

The Auditing Committee (Mr. W. H. Gould, Chairman) reported that the books of the Secretary-Treasurer had been audited and his accounts verified.

The Educational Committee (Mr. R. H. Blanchard, Chairman) submitted a report which was read and accepted.

The Examination Committee (Mr. Mervyn Davis, Chairman) submitted a report, of which the following is a summary:

1921 EXAMINATION—SUCCESSFUL CANDIDATES

The following is a list of those who passed the examinations held by the Society on May 4th and 5th, 1921:

Associateship—Part I.

BJORN, WALTER	PINNEY, SYDNEY D.
COATES, CLARENCE S.	ROEBER, WILLIAM F.
CONSTABLE, W. J.	SHEPARD, ELMER I.
FAIRBANKS, EVERETT M.	SMITH, ARTHUR G.
GINSBURGH, HAROLD J.	SOMMER, ARMAND
HALL, HARTWELL L.	WATERS, LELAND L.
JENSEN, E. S.	

Associateship—Part II.

COATES, CLARENCE S.   SHEPARD, ELMER I.
CONSTABLE, W. J.   SMITH, ARTHUR G.
HAGGARD, ROBERT E.   WALKER, CHARLES A.
JENSEN, E. S.   WATERS, LELAND L.
PINNEY, SYDNEY D.   WELCH, EUGENE R.
ROEBER, WILLIAM F.

Fellowship—Part I.

ELSTON, JAMES S.   WILSON, W. N.
MONTGOMERY, VICTOR

Fellowship—Part II.

BARBER, H. T.   PERKINS, S. B.
KEARNEY, T. P.   WILSON, W. N.
MONTGOMERY, VICTOR

The annual elections were then held, and the officers and members of the Council, as stated below, were elected in the following order:

President...................... ALBERT H. MOWBRAY
Vice President................. LEON S. SENIOR
Vice President................. HARWOOD E. RYAN
Secretary-Treasurer............ RICHARD FONDILLER
Editor......................... G. F. MICHELBACHER
Librarian...................... LOUIS I. DUBLIN
Member of Council (term to expire
    November, 1923)........... ALBERT W. WHITNEY
Member of Council (term to expire
    November, 1923)........... MERVYN DAVIS

Recess was taken until 2:00 P. M.

By invitation of the President, Mr. Carl Snyder, Statistician of the Federal Reserve Bank of New York, addressed the Society upon "Statistical Economics"; and Mr. George E. Tucker, Medical Director of the Aetna Life Insurance Company, spoke upon "Industrial Rehabilitation."

The papers printed in this number were read or presented.

The papers read at the last meeting of the Society were discussed.

Upon motion, the meeting adjourned at 5:00 P. M.

PROCEEDINGS

MAY 17, 1922.

THE VALUE OF A SOCIAL POINT OF VIEW IN THE CONDUCT OF THE CASUALTY INSURANCE BUSINESS

PRESIDENTIAL ADDRESS, A. H. MOWBRAY.

In the course of my remarks at the opening of our last meeting I briefly traced the course of insurance rate legislation up to that time and noted the change in the public attitude from a tendency to rely on competition for the regulation of rates to a tendency toward very strict governmental supervision. During the past winter we have witnessed a state investigation into the housing situation in New York City which included in its ramifications a study of rates and rate making procedure in fire insurance and various lines of casualty insurance. Out of this has come new legislation governing the regulation of rates for all of these lines. To many this undoubtedly seems to be an unwarranted interference with the conduct of private business. Rate regulation in workmen's compensation insurance has come to be accepted, but when similar regulation extends to lines like public liability and automobile liability undoubtedly many will think it is extended much too far.

But actions public and private can rightly be judged only in relation to their time and place. The age in which we live is primarily one of investigation, of question and of reorientation on fundamentals. Certainly this is true in the field of natural science. Since the publication of Darwin's "The Origin of Species" and the subsequent work of Huxley and those who came after, the biological notions theretofore entertained generally have completely changed. The investigations of Pasteur have had a revolutionary effect upon the practice of medicine. The discovery of radium and its emanations have shaken the faith in the previously held theories of the conservation of energy and

the immutability of the chemical elements. Very recent dis-
coveries have carried this still further. Einstein's new Theory
of Relativity which is now coming into general acceptance has
revolutionized previous theories with respect to physics and the
laws of mechanics and gravitation. And so we might go on.

But the spirit of investigation, question, and research has not
been confined to the physical sciences. It has extended into
politics, sociology, and economics. We do not need to cite the
extreme illustration of Russia. Even before the war there was
not a country of the world that did not feel this urge. The
disruption of the Guild System and the Industrial Revolution
tended to establish as paramount the right of private contract
and the general theory that private enterprise should be relied
upon for the solution of economic problems and that there should
be no interference with private business. But in the present
day private business and the right of private contract do not
stand so sacred and inviolate as they then did. The State does
not now hesitate to alter and even prohibit many kinds of private
contracts. The adoption of the principle of workmen's compensa-
tion throughout the world is but one illustration of an inter-
ference with the right of private contract and of a reconstitution
in the interest of all of the relations of employer and employe.
Yet, today generally speaking, legitimate private business is
not interfered with except when it tends toward monopoly or.
when it performs or attempts to perform public or quasi public
services. As to private business performing such services,
however, the political motto of earlier years "The greatest good
for the greatest number" is more and more being applied. The
day when the management of public service corporations could
be typified by the expression "The public be dammed" used by a
railroad president of a former generation is gone. There was
long and bitter opposition from the express companies and their
friends to the post office entering their field through the establish-
ment of the parcels post, but the public feeling that the manage-
ment of the express companies held the views of this former
railroad president was far too strong to be overcome.

When, a few years since, Oklahoma passed its statute establish-
ing a general guarantee fund to which all the banks were required
to contribute in order that depositors might not suffer in the
event of the insolvency of any bank, it was much criticized on

the ground that it violated the constitutional guarantee against taking of private property without due process of law.   But in Noble State Bank vs. Haskell (219 U. S. 104; 55 L E 112) the matter went to the United States Supreme Court and the legislation was held to be within the police power of the state, that regulative power which endeavors to bring the "greatest good to the greatest number."   Further illustration of this tendency in our political and economic life, is, I think, unnecessary.

According to a decision of the United States Supreme Court (German Alliance vs. Lewis 233 U. S. 389) the insurance companies generally are conducting a business which is strongly impressed with a public interest and therefore they are subject to the closest kind of supervision and regulation.   In passing, it should be noted that there was a vigorous dissent to this decision, the dissent going so far as to point out that the principles followed in arriving at this decision might equally be applied to any case of merchandizing in a public necessity. Personally I agree with the dissenting opinion in this regard, but it is also my view that if these transactions in a public necessity tended to create a monopoly of that necessity there would be, in view of the temper of the times, no hesitancy at like interference in such enterprises.

The case above cited dealt with fire insurance which, theoretically at least, no individual is compelled to carry, however necessary it may be toward the maintenance of his credit standing.   But certain lines of casualty insurance are actually compulsory by law, notably workmen's compensation insurance and more recently in certain states and for certain occupations automobile liability insurance.   Whatever may be the attitude as to the other insurance lines, as to these the tendency to class insurance as public service will be much stronger.   Further, the business of workmen's compensation insurance itself, originating through a reconstitution of the relations between employers and employes, focuses attention on carriers of this line of insurance. Public investigation and continuous scrutiny of the business, it seems to me, are to be expected by insurance carriers writing workmen's compensation insurance.

Under these circumstances it would appear that those types of carriers which are to survive must be so conducted as to lead to a public belief that their presence in this field leads to the

"greatest good for the greatest number." When the public has that belief, attempts to remove them from the field will be futile and until the public has that belief their presence may well be considered as experimental and on sufferance, subject to revocation at any time the public becomes convinced some other means of providing the required economic service will be more effective.

The insurance executive who is to make his organization a success under these circumstances, and not only the executive but all those who are associated with him, must, I believe, cultivate a social point of view. It is true that the primary concern both of the executive and his advisers is the success of their own company, but in our complex civilization no one institution stands alone and the long term success of any individual or institution may be jeopardized not only by mistakes of his own but by those of his associates and even of his competitors when those mistakes arise from a selfish and narrow point of view. I recently had the pleasure of listening to an address on European conditions delivered by one of our leading financiers and I was deeply impressed by the breadth of his viewpoint and by his pointing out wherein a selfish attitude on the part of the United States with respect to the debts owing it from European countries will in the long run react to the detriment and economic loss of our own country.

But illustrations more closely connected with our own business will perhaps be clearer. Prior to the establishment of workmen's compensation insurance, and also since that time some of the companies have written personal accident insurance on a monthly premium basis. There has always been keen competition in this field and considering the expense at which the business was conducted and the benefits promised in the policy, the rates a few years back tended toward the point of inadequacy. Many of these companies in consequence took a narrow attitude and in the adjustment of their claims construed their policy contracts very technically, and this with a class of claimants who were ill prepared to defend their rights. This matter came to the attention of the supervising Insurance Departments and received a public airing. As it happened, this occurred just before the passage of the first workmen's compensation laws, and the records show plainly that much of the opposition of organized labor to the conduct of workmen's compensation insurance by

private corporations arose from this unsocial policy of certain private corporations in their dealings with members of the laboring population under personal accident insurance. Whatever the temporary gains may have been to these companies the ultimate net result to the casualty insurance business in general and these companies in particular has been on the wrong side of the ledger.

I am happy to say that most of the well managed companies realize that a fair and liberal construction of their contracts to carry out the spirit of the compensation laws is their first duty. To any who have not learned this I do not hesitate to say that each bad settlement of a compensation claim by a private carrier is a blow at the conduct of workmen's compensation insurance and indeed at all insurance as a private business. And I do not hesitate to say further that, notwithstanding the slowness and difficulty attendant on the government retiring from a line of work it has once undertaken, a policy of slow, or inequitable claim settlements is an equally bad advertisement for the management of a state Fund, competitive or monopolistic.

Notwithstanding his tendency to be a trader and to secure for himself the best bargain he can in each economic transaction, the American essentially believes in fair play. The American business man in purchasing his own insurance will drive the best bargain he can, but when publicity is given to rate wars, competitive abuses of classifications and other like practices his indignation is aroused and his confidence in the business as a whole and the honesty of its methods is severely shaken. So called "protection" of its business under competitive conditions may please a company's field representatives and placate the complaining insured in isolated cases, but in the end its general practice cannot fail to throw discredit on the entire insurance business.

Although the advocates of certain types of insurance organizations may insist that a fundamental of insurance as a business, is the accumulation of capital against future losses, the public at large has come thoroughly to understand that insurance itself is a distributive service. The accumulation of capital may be a necessary part of a properly functioning distributive system, but this does not change the idea in the mind of the general public that the essential economic service is distribution of losses. Presistent low loss ratios then unquestionably tend to cause the

thoughtful part of the public to consider the expense element of this distribution. They come to look upon the matter in the same way as we look upon freight charges upon our coal and other commodities, something unavoidable, perhaps, but a constant irritation. Not long since at a public hearing relative to the rate for workmen's compensation in an important industry in one state, the counsel for a large employer who also had a large branch in a state where workmen's compensation insurance is conducted by a monopolistic state fund, spoke at length and emphatically on the overhead cost of the business as conducted in the first state, calling attention to the fact that a 50% loss ratio represents a distribution cost equal to 100% of the amount distributed, and a loss ratio of 60% represents a distribution cost of $66^2/_3\%$ of the amount collected for distribution. I answered him at the time by saying that a part of the difference in cost between the two states to which he referred was caused by taxa-tion in the state which permitted private carriers to conduct the business that in the other state had to be paid otherwise by the citizens of the state, the basic overhead for like services being substantially the same. I also called to his attention the fact that the acquisition expense was largely due to the public atti-tude in allowing questions of personal friendship and similar considerations to determine the placing of their insurance, leaving to the broker or agent the selection of the company. This creates a condition which permits the agency staff to drive bargains with the company executives that would not be possible if the insured in every case determined the company in which he wished to place his insurance and insisted on its going there. While admit-ting this as a general principle, he still expressed dissatisfaction that the condition was allowed to exist and felt that the responsi-bility for high acquisition costs rested with the companies and their officers.

I have also talked with the Chairman of the Industrial Com-mission of one of our largest states, a gentleman who never has believed in monopolistic insurance but has successfully advocated the establishment of a competitive State Fund in his state as a regulator of insurance practice, and this gentleman has roundly criticized the private carriers and their representatives for spending their time and efforts in a competitive endeavor to secure for one company insurance heretofore carried with another

equally good company instead of directing all their efforts toward preventing accidents and rendering other direct service. The public understands that the expense of the conduct of our business is similar to transportation expense in general merchandizing operations, and it behooves us to look at the matter from the social point of view and ascertain wherein this overhead may be reduced by the elimination of activities which appear to the public either to be useless or worse because tending to bring about socially undesirable conditions.

But negative virtues never have been the dominating characteristic of any great life nor the basis of success of any enterprise. It is the positive and active that carry us through. If the companies are to make a long run success in the various lines of casualty insurance, they must, I believe, seek out the insurance needs of the public and be prepared to meet them both in relation to the lines in which they are engaged and kindred lines which have not yet been undertaken. They must find out what the public expects of them and be prepared to do it before that expectation find public expression.

In recent years the more progressive life insurance companies are coming to be governed by these considerations. We find the monthly income policy offered in addition to the old standard single payment type to meet the demand for protection against the lack of financial acumen of the beneficiaries. More recently, still, permanent disability benefits have been added to provide a family income in the case of invalidity as well as death. We also find many of these companies actively interested in health conservation work not only for their own policyholders but for the public at large. Without even attempting adequately to cover this topic, I might call attention to the activities of two or three of our own members connected with large life insurance companies. The public health work in this country owes much to the studies and researches of Dr. Hoffman, Dr. Dublin and the late Dr. Crum.

District nursing, health conservation, and other like activities are by-products of the main business and organization of the companies. It has been said that the essential characteristic of American manufacturing is the utilization of by-products. At first sight there does not seem to be room in the insurance business for the development and use of by-products, yet when

the conduct of the business is guided by those considerations arising from a broad social point of view by-products have been and may further be discovered.

The extensive safety movement in this country is undoubtedly a by-product of casualty insurance and it may be pointed out that this movement has received much greater impetus in those jurisdictions where private enterprise is allowed to compete in the conduct of workmen's compensation insurance than in those where the conduct of such insurance is monopolized by a government bureau.

In connection with workmen's compensation insurance also we have recently developed a plan for securing certain data with respect to the trend of wages and employment. These data will be secured as a by-product of the business and mainly for use in ratemaking. Under this plan there will undoubtedly be accumulated a mass of statistical information dealing with fundamental economic problems which the national and various state governments have been seeking to secure at much labor and expense. A broad social point of view points out the desirability of freely tendering the results of such statistical work to the public and the extension of the statistical work of the companies and their organizations in like fields wherever results meeting a public need may be secured. Is it too much to hope that as the work develops the companies will come to take this attitude?

But even these lines are not the only ones along which it seems to me the companies' activities may well be extended if guided by a broad social point of view. If there are public needs of insurance which private enterprise either has not discovered or has not sought to supply, can we condemn as radicals those men who seek to have the government undertake to supply such needs? Is it not a common policy of our government to undertake to meet those needs of the public which either are not or cannot be met by private enterprise unaided by the government? Is there any occasion for surprise, then, at finding an agitation in Congress for governmental activity in extending certain lines of insurance to the agricultural community? In view of the recent tendency for the population to drift to the cities and the general feeling that this drift is contrary to the best interests of the public and that it is in part at least due to superior economic conditions

of city residents, there is a well founded public sentiment that no real need of the rural community which can properly be met should go unfilled.

Undoubtedly it is our function as technical men to seek out the opportunities for developing by-products in our business which may be prized by the public and to explore the new lines of insurance needs and the ways of meeting these in an economical way, bringing all of these to the attention of our company executives. But we cannot perform these functions unless we ourselves achieve a broad social point of view. As we gain it, will not our value to the executives of our companies increase?

Although I have generally referred to ourselves as though we were all in company service, all that I have said in this connection applies equally if we are connected with state or other government institutions.

It seems to me it is a part of the Society's work to develop within itself and for its members such a social point of view. It is this which has led me to arrange for the discussion this afternoon of Agricultural Insurance, the announcement of which may have puzzled you as introducing something rather far from our beaten track.

May I close these remarks with the repetition of a thought expressed earlier in the discussion. When the public at large has come firmly to believe that the presence of any organization or type of organization in any business field results in public good, attempts from any quarter to drive it out will be futile. Undoubtedly the best means for securing this public confidence is the consistent following of those courses of action which are indicated by a broad social point of view.

AGRICULTURAL INSURANCE

BY

V. N. VALGREN*

U. S. Department of Agriculture.

Few economic groups have a greater need of insurance than do the farmers. This need embraces nearly all the forms of protection offered by fire, life, and casualty insurance companies.

Insurance against fire and lightning is quite as necessary to the farmer as to the city man, while such coverage against windstorm is even more generally needed in the country than in the city. Farm property is more exposed to wind, as well as to lightning, than is city property, and, in the case of severe storms, the farm building is more subject to destruction because of the relatively light frame work that characterizes the great majority of such buildings.

Insofar as life insurance is concerned, the farmer is essentially in the same position as the city man. For all classes the need for this form of protection may be said to vary directly with the number of those dependent on the individual and inversely with his accumulated wealth relative to the amount that constitutes economic independence under the standard of living to which the dependents have become accustomed. The need for accident insurance on the part of the farmer exceeds that of the average city dweller, though falling somewhat below that of the miner, the railroad employee, and a few other occupations. The employer of labor on the farm needs liability insurance, as well as coverage for accidents occurring to himself.

In addition to these relatively common forms of insurance which may be said to apply in greater or less degree to all industrial classes, the farmer needs live-stock and crop insurance. It would be futile to attempt to cover even in outline these various insurance needs and the facilities for supplying them, in a paper such as present circumstances warrant, and I infer

*Address delivered by V. N. Valgren, U. S. Department of Agriculture, on invitation of the Committee on Program; published at the request of members attending the meeting.

from the letter of your President that you are particularly interested in discussing the problems of crop insurance. I shall therefore limit my further remarks entirely to this phase of the farmer's insurance needs.

CROP DAMAGE DISTINGUISHED FROM FINANCIAL LOSS

One of the striking peculiarities of crop insurance as contrasted with other forms of property insurance is to be found in the nature of the risk itself, using the word risk for the object insured, rather than for the hazard or contingency against which protection is provided. Most forms of property insurance are written on material things of value which are already in existence. Crop insurance, on the other hand, deals with prospects, rather than goods in existence. In fact, the latter form of insurance expires almost co-incidently with the transformation of prospects of wealth into actual wealth, consisting of useful and marketable products. This peculiar nature of the risks insured promptly raises the question of what is meant by loss in the case of crop insurance. In order to clarify our thinking on this point, a simple illustration may be found useful.

Let it be assumed that farmers X, Y and Z are engaged during a given year in producing wheat in three distinct semi-arid regions of the West, and that the average yield of wheat in each of these regions for the last 20 years has been 8 bushels per acre. Let it be assumed, also, that this average yield has, at the price received, given returns covering all proper charges against the production of an acre of wheat under the methods of tillage followed by these men. On each of the farms in question 35-bushel yields have been harvested.

In the territory where X operated, average conditions prevail throughout the year in question. X grows and actually reaps an 8-bushel crop. In Y's territory the season proves extremely adverse, a late spring frost, followed drought causing his crop to be a total failure. Finally, in the territory where Z is farming, climatic and other conditions prove highly favorable during the greater part of the season. Until within two weeks of harvest time, Z figures that he has a 35-bushel crop in prospect. At that time, however, a hail storm passes over his farm and destroys 60% of his crop, resulting in an actual yield of 14 bushels per acre, instead of 35 bushels.

Let us now make a brief analysis of what has happened. Had it not been for drought, excessive heat, untimely frost, hail, or some other cause or combination of causes, X, Y and Z would each have reaped a 35-bushel yield.   In a certain sense, therefore, all may claim to have suffered loss.   Farmer Z who had in immediate prospect a 35-bushel yield when he suddenly suffered a 60% damage by hail is, perhaps, the most emphatic of all in claiming to have suffered a serious loss.   He actually reaped a harvest of 14 bushels per acre, while his cost of production was only the equivalent of eight bushels.   Nevertheless, if Z had carried hail insurance on his crop, he would have been entitled to indemnity under the prevailing plan of settlement, equivalent to 60% of his insurance.   It must be conceded, therefore, that Z suffered a recognized form of loss even though the loss, related to wheat in prospect, rather than to wheat already in existence, and in spite of the fact that his hail-damaged crop yielded him a material profit over and above his cost of production.   The fact that the loss or damage suffered by Z on his crop was sudden and spectacular does not, however, make it materially different from the losses or damages suffered by X and Y.   In each case, it was wheat in prospect and not wheat in existence that was lost.   At the time of planting, the prospects of a perfect yield may have been equally good for each of the three men. The prospects of X were early reduced by certain natural causes; those of Y were entirely eliminated, also in the early part of the season; while those of Z continued good until nearly harvest time when they were suddenly reduced.

From this illustration it becomes apparent that the word "loss" in connection with crops may have either of two different meanings.   The kind of loss suffered by Z when his prospective 35-bushel crop, was reduced to a 14-bushel crop, as well as the less spectacular but more severe loss which caused the prospects of X to shrink from 35 to 8 bushels an acre, is perhaps best termed "crop damage" by way of distinguishing it from the kind of loss suffered by Y, which was not only crop damage or a diminution in prospective yield, but a "financial loss" on the season's operations.

Adhering to this terminology, it may be said that X and Z suffered crop damage on their wheat, which, however, was not sufficiently severe to prevent X from breaking even, or Z from

making a profit on the year's operations. Y, on the other hand, suffered crop damage which resulted in a financial loss equal to his entire expenditures in connection with the crop which failed to yield a harvest. It is against such experiences as that of Y that crop insurance is particularly needed.

Even after this attempt at clarification, one of the terms, "crop damage", retains a vagueness which it seems impossible entirely to remove. The concept of crop damage here arrived at implies the difference between the best crop yet reaped on the farm in question and the actual yield harvested. In criticism of this concept, it may, of course, be said that a no-damage crop may not as yet have occurred. Various other objections could be pointed out if time permitted. In view of those difficulties and in order to make possible the compilation of data on crop damage, the United States Department of Agriculture has arbitrarily assumed that a crop exceeding by 10% the normal yield is a perfect or no-damage crop for the territory in question. The normal yield may in turn be defined as the yield that the crop reporter has in mind as one which in good years actually occurs over extended areas. The raising of the normal yield by 10% in order to arrive at the no-damage yield is an attempt to make suitable allowance for the fact that the yield which the crop reporter has in mind as a normal yield for his locality is not strictly a perfect or no-damage yield. The difference between a perfect or no-damage yield and the actual yield is taken as a measure of crop damage.

Using the term "crop damage" as just defined, the Department about twelve years ago began to require of its thousands of crop reporters in all parts of the country, estimates of the percentage of damage caused to leading crops from specified causes. The crops covered are corn, wheat, oats, barley, flaxseed, rice, potatoes, tobacco, hay and cotton, while the specified hazards to which crop damage is attributed include deficient moisture, excessive moisture, floods, frost, hail, hot winds, storms, plant diseases, insect and animal pests.

Time does not permit any detailed discussion of the data obtained. Summaries of this data have been published in tabular form in the monthly Crop Reporter of the Department of Agriculture for August, 1920, and in the Department of Agriculture Bulletin 1043, which deals specifically with crop insurance.

Taking wheat as an example, it was found that on a percentage basis covering the United States as a whole, the average annual crop damage from the various causes during the decade 1909 to 1918, inclusive, was as follows: deficient moisture, 12.38%; excessive moisture, 2.03%; floods, .33%; frost, .7%; hail, 1.1%; hot winds, 2.02%; storms, .26%; other climatic, 4.13%; plant diseases, 2.65%; insect pests, 2.12%; animal pests, .19%; other and unknown, .86%; average annual crop damage from all causes, 28.77%.

For the other crops the percentage, representing average annual crop damage from all causes for the country as a whole are as follows: corn, 31.99%; oats, 24.52%; barley, 28.65%; flaxseed, 36.44%; rice, 19.04%; potatoes, 30.12%; tobacco, 20.50%; hay, 20.35%; cotton, 35.49%.

Translating the above percentages into quantity figures, it means that the average annual damage from all causes on the crops in question amounted to the following figures: corn, 1,345,600,000 bushels; wheat, 301,200,000 bushels; oats, 414,300,-000 bushels; barley, 74,100,000 bushels; flaxseed, 10,200,000 bushels; rice, 7,400,000 bushels; potatoes, 164,800,000 bushels; tobacco, 296,300,000 pounds; hay, 20,414,000 tons; cotton, 3,731,000,000 pounds.

It has also been calculated that on the basis of prevailing prices during the different years the annual damage to these ten crops amounted to a total sum varying from a minimum of $2,054,000,000 in 1912 to a maximum of nearly $3,066,000,000 in 1918, the average annual crop damage during the eleven years, 1909 to 1919, being $2,620,000,000.

As would doubtless occur to each of you without my calling attention to it, the value figures just quoted represent in part a theoretical loss only. While an increase of 10 or 20 per cent. in the crop yield of a given farm will increase the gross income of the farmer by the same percentage, this relationship between increase in yield and increase in gross income does not hold when all or even a large proportion of the entire farmer group is considered. In this case increase in yield will, of course, materially affect the total supply of the commodity in question, which naturally affects the price. No attempt has been made to allow for this fact in translating the quantitative crop damage into terms of dollars.

CROP INSURANCE FACILITIES

The only insurance hitherto generally available for the risks or hazards in crop production has been that of hail insurance. This form of insurance on growing crops has developed during the last decade into a business of considerable magnitude. The total premiums for 1919, which marks the highest point yet reached, exceeded $30,000,000. More than half of these premiums were collected by joint-stock fire insurance companies, about 60 in number, which write hail insurance more or less as a side line. The remainder was divided almost equally between a group of 41 specialized hail insurance companies doing business on the mutual plan, and State hail insurance funds or departments, the latter being found in four States, namely, North Dakota, South Dakota, Montana and Nebraska. A certain amount of fire insurance has also been written on standing grain in some States of the West.

While much can be said in favor of hail insurance for sections where the hail hazard is severe, such insurance is very poorly adapted to the farmer's real need for crop insurance. From one point of view it requires the farmer to buy more protection than he really needs while from another point of view, the coverage falls far short of meeting the needs. A large part of the hail insurance indemnities are paid out to farmers who, like Y in the illustration just used, have suffered partial crop damage from hail, but who, even without any insurance indemnity would show a profit on the year's operations. On the other hand, many farmers buy hail insurance and then find that their crops are lost by reason of other hazards. Such farmers, are, of course, worse off for having insured their crops on this plan by the amount of premiums paid. Crop insurance like life insurance should cover all hazards the control of which is beyond the power of the insured.

In recent years attempts have been made to work out a more adequate form of insurance protection for farm crops. The first attempts of this kind were made in 1917, when three joint-stock fire insurance companies offered general crop insurance coverage in North Dakota, South Dakota and Montana.

The insurance covered all the hazards to which crops are subject, with the exception of fire, floods, winterkill, and failure on the part of the farmer properly to till and care for his crops.

The hail hazard was specifically included in the coverage offered by this form of policy. The amount of insurance in the case of at least two of the companies was fixed at the relatively low figure of $7 per acre and the insurance applied to a specified field area, the crops on which might include any or all of the following grains—wheat, flax, rye, oats, barley, and spelt. In case of total failure of the crop on such area, the company agreed to pay the face value of the policy, or $7 per acre. In the event of partial loss, the indemnity provided for was equal to the difference between the value of the crop harvested on the field area insured and the face of the policy, it being specifically stipulated that the entire area insured in a given policy should be considered a single risk. Furthermore, the partial crop was valued at prices stipulated in the policy, namely, wheat, $1; flax, $1.75; rye, 70 cents; and oats, barley, and spelt, 50 cents a bushel. The insured under this policy was almost completely protected against severe crop damage, but not against a possible drop in the prices of the crop produced. Adjustment of all partial losses was necessarily postponed until after the insured crops had been thrashed.

These first attempts at general crop insurance proved rather disastrous for the companies that undertook them, owing, in part, to the severe drought that occurred in large sections of the States mentioned and, in part, to inadequate safeguards by the companies against the assumption of risks after severe damage had already taken place. The losses incurred under these contracts were to a considerable extent repudiated by the companies. Inability to settle in full was pled. In some cases fraud on the part of the insured was alleged and many claims were tentatively settled by the return of the premium collected. The outcome of this first attempt to provide a general crop coverage is much to be regretted.

For two years following these experiments of 1917, no general crop insurance, so far as I am aware, was written in the United States. During the last two years, however, the plan of offering a general crop insurance contract has been revived, at least two of the larger fire insurance companies having written such contracts.

One form of policy which was written during 1920, in effect guaranteed the farmer a specified income from each acre insured

unless damage resulted from fire, hail, wind, tornado, failure of the seed to germinate, or failure on the part of the farmer properly to do his part in seeding, cultivating, or harvesting the crop. Loss or damage through the elements, including frost, winter-kill, flood, drought, and from insects or disease was specifically covered by the policy.

The amount of insurance per acre was based on the investment in the crop as determined by allowing a fixed amount for each process in preparing for, cultivating, and harvesting the crop in question, plus an allowance for seed and for rental value of the land. Unlike the contract already described, the policy did not place a fixed value on the grain harvested, but provided instead for valuation on the basis of market price at the time of adjustment. The company, therefore, in effect, gave protection against a drop in prices, as well as against crop damage. This feature of the policy caused the venture to prove a costly one to the company using it in 1920 because of the unexpectedly heavy drop in prices.

A crop policy even more recently devised involves a plan materially different from either of those already described. The coverage as to hazards insured against is, however, practically the same as in the contract just outlined. In neither of these policies is the hail hazard covered. Under the plan embodied in this policy, however, the amount of insurance to the acre that an applicant may receive is based on a certain percentage of his average yield during the past five years, such part of the average yield being translated into dollars by applying to it a value per bushel or other proper unit of measure based on the price prevailing during the period in question. Thus a farmer who on a given farm during the past five years has averaged 48 bushels of corn per acre may be offered insurance in an amount equal to the value of about 36 bushels at the average price for corn during the past five years. If such average price were found to be 50 cents a bushel the insurance might be placed at $18 per acre.

One of the most important differences between this policy and either of those previously described is the plan provided for settlement of losses. In the case of total destruction of the insured crop the company agrees to pay 75 per cent. of the cost of the field operations actually performed, such indemnity not

to exceed 75 per cent. of the total insurance carried.   Further-
more, it is provided that the indemnity shall in no case exceed
the cost of replacing all or any part of the quantitative returns on
which the insurance is based with products of like kind and sound
quality.   Finally, it is provided that indemnity shall in no case
exceed the amount, if any, by which the amount insured exceeds
the market value of the crop harvested.   Under this provision a
change in price in either direction may be taken advantage of
by the company.

The determination of the amount of insurance per acre to be
written is particularly important in the general coverage plan
of insurance here considered.   In the ordinary insurance con-
tract the amount of insurance placed on the various risks de-
termines the size of the indemnity in case of loss, but does not,
barring a moral hazard, affect the number of losses.   Under the
plan involved in each of the crop insurance contracts hitherto
written, however, the insurance per acre determines not only
the size of the indemnities, but also the number of cases in which
indemnity will be due.   To insure the corn fields in a given State
or locality at $24 per acre, or the equivalent in a stipulated yield,
on the plan of any of the three crop insurance contracts de-
scribed, obviously involves not only twice, but many times, the
risk involved in insuring the same fields at $12 per acre.   From
the farmer's standpoint the chance of collecting all or part of
the second $12 per acre would be several times the probability
of collecting any part of the first $12.   To a large extent, there-
fore, the company can give justice between good and poor land
as well as between good and poor farmers in a particular locality,
merely by an adjustment of the amount per acre written, and
without making any change in the rate of premium.   This plan
is not uniformly applicable, however, for the reason that cli-
matic conditions make wide variations from the average yield
much more frequent in some localities than in others.

The first of these three methods of determining a proper
amount of insurance per acre, namely, that of an arbitrarily
fixed sum, has the advantage of extreme simplicity.   Obviously,
however, the unmodified plan could not be applied to a wide
range of crops in different sections of the country without either
greatly underinsuring some risks or overinsuring others.   Also,
it fails to allow for good and poor land and good and poor farming

in the same locality. For general application some method of adjusting the insurance per acre to the investment involved, or the probable crop value, is essential.

The question may then be raised: Is the investment in the crop as determined by the number and cost of the field operations performed plus seed and rental, or the average income over a period of former years as determined by yield and price, the better basis for arriving at a safe and proper amount of insurance to be written?

As between these two methods, the first may be said to be the easier to apply in so far as the agent writing the insurance is concerned. The field operations already performed or to be performed before the crop is ready for market are easily translated into terms of dollars by means of simple tables showing the cost of each operation; and the cost of seed and fertilizer, if any, as well as the commercial rental value, can no doubt be determined with a fair degree of accuracy. The plan does not readily lend itself, however, to a differentiation between good farming and poor farming except as these factors are evidenced by the number of field operations performed.

The other method, that of average yield and price, has the disadvantage of being somewhat cumbersome and difficult to apply. Not many farmers keep records of their yields from year to year, and without such records few will be able to give with any degree of accuracy the yield obtained for each of five years past. The plan has the merit, however, of measuring past results insofar as it is possible to secure the facts, and these results form the most reliable basis for estimating the future results which are the subject of the proposed contract.

The best method of determining the indemnity due in case of loss raises an equally difficult question and one quite as important as that of determining the amount of insurance that may be written. The first of the three forms of contract outlined provided that in case the yield per acre, valued at the price stipulated in the policy, does not equal the amount of insurance per acre, the company will indemnify the insured to the amount of such difference. Under this plan it is of no financial consequence to the company whether prices go up or down. The risk involved in price fluctuations, insofar as it affects income from yield obtained, rests entirely on the farmer. A simple illustration will make this point clear.

A farmer insures his wheat at $7 per acre under this plan. The wheat is valued by agreement in the policy at $1 a bushel. By reason of drought or other cause the yield is reduced to 5 bushels per acre. The indemnity due under these conditions is $2 per acre, regardless of whether the local market price of wheat at harvest time is $0.80 or $1.50 a bushel. To the company it makes no direct difference, therefore, whether prices advance or fall except as the collection of premiums not fully paid in advance may be affected.

In the case of the second form of policy outlined, this situation becomes essentially reversed. Assume that a farmer insures his wheat at $12 per acre under this plan, which, as against the hazards covered, guarantees him a yield that a market price will equal the amount of insurance. In case of total destruction of his crop he will be paid for such operations and such investment as have been already made in connection with the destroyed crop. Suppose, however, that by reason of one or more of the hazards insured against, the yield is reduced to 8 bushels. If the wheat at harvest time sells for $1.50 or more, no indemnity will be due, since the amount harvested will bring a return equal to or greater than the sum stipulated in the contract. But suppose, on the other hand, that wheat falls to $0.80. The 8 bushels harvested will then be worth only $6.40 and the indemnity due will be $5.60 per acre. On the basis of this price, even a 12-bushel yield will call for an indemnity, assuming that damage has occurred from hazards covered by the contract, equal to the difference between $12 and $9.60, or $2.40 an acre. To the farmer suffering crop damage from causes covered by the contract in such degree that his actual yield at market price falls below the insurance per acre, it makes no difference under this plan whether the price is higher or lower. To the company, on the other hand, high prices mean few and small losses, while low prices mean numerous and relatively large losses.

Turning now to the third and last form of contract previously outlined, conditions based on fluctuations in price take on still another aspect. Under this plan the company in effect reserves to itself the right to make settlement in kind on the basis of the average yield used in determining the insurance per acre, and at the same time retains the option of settling the claim on a basis of dollars per acre with the crop value at market price.

Assume again that a farmer carries insurance of $12 per acre on his wheat, such figure in this instance having been determined by taking three-fourths of a 16-bushel average yield and an average price of $1 a bushel. Owing to one or more of the hazards insured against, the yield, as in the preceding illustration, is only 8 bushels per acre. Assume first that wheat following harvest is worth $1.50 a bushel. The company, of course, invokes the clause in its contract providing that its liability shall in no case exceed the amount, if any, by which the market value of the crop harvested falls short of the insurance per acre. Since the value of the 8 bushels harvested is $12, no indemnity is due. But suppose, on the other hand, that the price following harvest is only $0.80 a bushel. The company then relies on the provision that in no event shall its liability under the contract exceed the cost at the time of harvest to replace all or any part of the estimated yield with products of like kind and sound quality. The company, therefore, tenders the insured the equivalent of 4 bushels at $0.80, or $3.20. This sum together with the 8 bushels harvested, also at $0.80, makes the gross returns to the insured $9.60 per acre.

Had wheat remained at $1 a bushel the indemnity on an 8-bushel yield would, of course, have been $4 per acre, but with a market price at harvest time standing at $1.50 the company pays nothing, and with a market price of $0.80 it pays only $3.20. Such an arrangement can not be expected to be acceptable to the farmer.

Experience, on the part of the companies, with all these forms of crop insurance contract has as yet proven decidedly adverse, and the present attitude with reference to a general crop coverage seems to be one of caution. In spite of this fact it is probable that any new contracts offered will be built up largely by the selection of provisions from those here discussed.

AVAILABLE STATISTICAL DATA

The United States Department of Agriculture represents, without doubt, the most important single source of statistical data bearing on the hazards and losses in connection with farm crops. Among available information from this source may be mentioned:

1. Data on climatic conditions for all parts of the country covering rainfall, temperature, wind, date of last killing frost in the spring, first killing frost in the fall, etc.

2. Data on the amount of crop damage from the more important hazards in all parts of the country. These crop damage records now cover a period of more than ten years.

3. Records of crop yield for a long period of years for all parts of the country. These data are supplemented as well as checked up every ten years by the Census reports.

4. Actual soil surveys of about one-third of the counties in the United States.

5. The Department also has a large amount of data bearing on the localization and the spread of plant diseases and insect pests.

The agricultural colleges and State Departments of Agriculture also have a certain amount of additional data with reference to their respective states.

The most useful figures of all will probably be found, however, to be the records of actual crop yield, since these figures represent the composite net results after all factors have played their part. The greatest short-coming of the crop yield figures, as well as the other data above referred to, will, no doubt, be found in the fact that the records as preserved represent relatively wide averages which cause them to lose much of their applicability to a specific locality or a given farm. While such hazards as drought and frost usually affect relatively large areas and hence show up in the averages, the same is less true with reference to such hazards as hail and tornados, which cut narrow paths and may leave the crops on individual farms in total ruin without affecting the crops on adjoining farms or materially changing the average results for a county or some such area. Among the very useful sources of information should be found the records of Government experimental stations, since these records, in many instances, now cover a considerable period and apply to specified farms, hence making it possible to arrive at some conclusion, not only as to average yield, but the frequency of given variations from such average.

Proposals for Crop Insurance by the Federal Government

During the years of 1917 and 1918 several bills were introduced in Congress by Mr. King of Illinois providing for a Bureau of Farm Risk Insurance to be established by the Federal Government. A few months ago a similar bill was again introduced by Mr. King, known as H. R. 10294. There has also been introduced in Congress a resolution by Senator Sheppard of Texas, known as S. Res. 214 which directs the Committee on Agriculture and Forestry of the Senate "to investigate the practicability and desirability of a Bureau of Crop Insurance, to be operated by the United States Government or otherwise, as may be found desirable." Congressman Sinclair of North Dakota has introduced House Concurrent Resolution 54 providing for a joint commission of the two Houses in Congress to "investigate the subject of crop insurance with a view to determining the practicability and expediency of creating a Government crop insurance bureau or other agency." So far as I am aware, none of these measures has as yet made any progress in Congress.

The only one of these measures which proposes specific action, namely, the King bill, provides for an appropriation of $10,000,000 as an indemnity fund for the proposed Bureau and further appropriates $100,000 for defraying the expenses of the establishment and maintenance of such Bureau. None of the measures contains any definite plans as to method of operation.

Conclusion

In conclusion permit me to repeat that one of the great needs of agriculture is insurance against crop damage amounting to serious financial loss. In few, if any, other important industries is the individual called upon to carry, unprotected by insurance, such risks as are involved in crop production.

Such insurance should afford true protection and should therefore cover all unavoidable hazards. In order to get protection against serious financial loss the farmer should not in addition be compelled to buy and pay for indemnity against minor cases of crop damage which he himself can carry without undue inconvenience. The insurance, whether administered by private or

public agency, must be so handled that a minimum of loading for cost of operation becomes necessary.

To point out certain requirements is, however, a relatively easy task.   The working out of a plan which meets such requirements presents the real difficulty.   Anyone contributing toward a solution of this problem will have performed a service not only to agriculture, but to the nation as a whole.

REMARRIAGE EXPERIENCE OF PENNSYLVANIA COMPENSATION INSURANCE CARRIERS POLICY YEARS 1916-1919

BY

E. H. DOWNEY.

Most workmen's compensation laws provide that the widow's pension shall cease upon her remarriage but that the remaining dependents shall thereafter be entitled to the rate of compensation which they would have received had there been no widow. Many acts also allow a remarriage bonus. The probability of remarriage must accordingly, be taken into account in the valuation of death claims whether for reserves or for rate making. The table heretofore used for this purpose is derived from the experience of the Dutch Royal Insurance Institute. But the Dutch table is based upon a very limited exposure and is of very doubtful applicability to American conditions. It is worth while, therefore, to begin the compilation and analysis of the fast-accumulating American experience.

The data herewith presented were compiled by the Pennsylvania Compensation Rating and Inspection Bureau from the experience of compensation insurers in Pennsylvania during policy years 1916 to 1919 inclusive.[1] The record covered 2652 widows and 321 remarriages in a total exposure of 7334 years. The period of observation closed March 31, 1921; it thus comprised a little over five years for the earliest cases and three months for the most recent.   The exposure of each widow was reckoned in weeks from the husband's death until her own death or remarriage or, if still living and unmarried, to the end of the period of observation.

Several limitations upon the value of this experience are to be noted at the outset. The exposure is too small and the period too brief to give definitive results and the data for the earlier years are too crude to justify refined analysis. Under the Pennsylvania Act, moreover, the widow's pension runs only for three hundred weeks so that observation can in no case extend beyond the sixth year.   There being no life pension the

age of the widow is not an important element in the valuation of death claims and was neither invariably nor accurately ascertained by insurance carriers. This is well shown by Table VII; the great concentration at the quinquennial intervals, 20, 25, 30, etc., clearly indicates that the reported ages are approximate rather than exact. There has been a marked improvement in the quality of reporting in recent years but it is evident that the data collected under a limited pension law will never be as complete or as trustworthy as they ought to be, e. g., for New York State.

For all these reasons it has not seemed worth while to compute remarriage rates either by annual age intervals or by the attained ages of widows. The numbers at each year of age are so small that the actual rates would fluctuate erratically from zero to one hundred. A smooth curve could of course, be produced by graduation but the graduation of irregular rates derived from insufficient numbers is no more than the schematic statement of an unproved hypothesis. Neither did it seem worth while, in view of the limited numbers and inaccurate record of ages, to incur the labor and expense of compiling exposures and remarriages by attained ages. The sub-joined tables accordingly show the remarriage rates per hundred per annum for five-year age groups during the entire period of exposure. These rates are, of course, not directly comparable with the rates shown in the Dutch table which are by attained ages at annual intervals.

The most striking feature of the Pennsylvania experience is the sharp contrast, in respect to remarriage rates, between the widows of coal miners and the widows of employees in other industries. For the combined experience the remarriage rate is 4.38; for coal mining 6.38, for other industries, 3.28 (Table I). For all widows under thirty-six years of age at the husband's death the respective rates are: coal mining, 10.38, other industries 6.23. The difference is consistent for every age interval and for every family group (Table III—VI). The explanation is probably to be found in social conditions. The coal miners of Pennsylvania are preponderantly of Slavic or Italian birth, little touched by Americanization, and they live in small communities in which the number of single men largely exceeds the number of marriageable women. The like conditions, do not elsewhere obtain to anything like the same degree, except in the steel

towns.   Unfortunately the remarriage experience of steel mill widows is not available because the larger steel plants are uninsured.

The Pennsylvania experience thus goes to show that remarriage rates derived from one set of social conditions are inapplicable to a different group of wage earner's widows living under widely different conditions.   For industries other than coal mining the Pennsylvania remarriage rates correspond rather closely to the rates given by the Dutch table for similar ages;[2] for coal miners' widows the margin of error in the Dutch table is about 80 per cent.

The second tentative deduction from Pennsylvania experience is that the probability of remarriage is but little, if at all, affected by the number of dependent children.   This is well shown for the most significant age groups, by Table X, below.   The deviations from the general average for widows with one, two, three, four or more children or with none are not consistent nor in the same direction.   The frequency of remarriage at any given age is about the same in all the family groups (for details see Tables II—VI).   For this reason it does not appear worth while to set out the numbers, remarriages and years of exposure for each family group at annual intervals as is done in Table VIII for widows of all groups.

Lastly, Pennsylvania experience indicates that a majority of all remarriages occur within three years of the husband's death and that the frequency of remarriage is greatest during the second year of widowhood.   These results hold for every age interval[3] and for both coal mining and other industries.   Only five remarriages occurred after the fourth year in a total exposure of 386 widows.   The indicated deduction is contrary to the assumption in the Dutch table which makes the probability of remarriage a simple function of the attained age of the widow, without regard to the elapsed period of widowhood.   According to the Dutch table the likelihood of remarriage during the thirty-first year of life is the same for a woman whose husband has died the year before as for a woman who has been ten years a widow.   According to Pennsylvania experience a woman of thirty lately widowed, is much more likely to remarry within three years than a widow of twenty-five who has already remained unmarried for five years.   If the latter conclusion should be substantiated

it would have important results for the construction of a remarriage table to be used in the valuation of death claims. It would mean that the widow's age at her husband's death and the elapsed period of widowhood are the decisive data and that the attained age of the widow, without regard to the duration of widowhood, is an incorrect basis of valuation. Pennsylvania experience to date is, of course, inconclusive.

It is altogether too early to construct an American Remarriage Table. But the meagre data thus far published[4] raise serious doubts as to the adequacy of the Dutch table for the computation of insurance rates and reserves and point the need for thorough statistical analysis of American experience. For the present it is important to ascertain the birth rate and date of death or remarriage of every industrial widow and to compile the returns in such wise as will permit the derivation of remarriage rates both by the attained ages of widows and by age at the husband's death and the duration of widowhood. To collect an adequate volume of data will require the co-operation of many agencies. The Pennsylvania Bureau will contribute its quota by making this year the double analysis above suggested for the years 1916 to 1921, inclusive.

TABLE I.

REMARRIAGE RATES BY AGES—ALL WIDOWS

Penna. Schedule Z Experience—Policy Years 1916-1919.

Age of Widow at Husband's Death	All Industries except Coal Mining			Coal Mining		
	No. of Widows	No. Re-married	Remar-riage Rate*	No. of Widows	No. Re-married	Remar-riage Rate
1	2	3	4	5	6	7
All ages............	1665	155	3.28	987	166	7.38
Under 21..........	54	18	14.06	57	24	19.83
21 and under 26...	181	41	8.13	124	31	10.33
26 and under 31...	248	42	5.90	219	51	9.06
31 and under 36...	237	23	3.57	175	33	7.08
36 and under 41...	214	12	1.87	168	18	4.03
41 and under 46...	180	9	1.66	81	7	3.18
46 and under 51...	185	5	.93	73	..	....
51 and under 56...	123	2	.56	39	2	1.63
56 and under 61...	106	2	.66	30	..	....
61 and over.......	121	..	....	14	..	....
Age not given......	16	1	2.22	7	..	....
Average Age......	40	30	....	35	29	....

*Rate per hundred per annum.

TABLE II.

REMARRIAGE RATES BY AGES—WIDOWS WITHOUT DEPENDENT* CHILDREN
Penna. Schedule Z Experience—Policy Years 1916-1919.

Age of Widow at Husband's Death	All Industries except Coal Mining			Coal Mining		
	No. of Widows	No. Re-married	Remar-riage Rate	No. of Widows	No. Re-married	Remar-riage Rate
1	2	3	4	5	6	7
All ages	626	43	2.47	145	14	3.24
Under 21.........	14	7	25.92	8	3	17.64
21 and under 26..	39	10	8.93	14	4	10.00
26 and under 31..	44	9	7.20	16	3	6.00
31 and under 36..	38	4	3.81	11	2	5.26
36 and under 41..	45	1	0.76	16	1	1.96
41 and under 46..	51	3	2.11	7	1	3.85
46 and under 51..	97	4	1.42	21	..	....
51 and under 56..	88	2	0.78	12	..	....
56 and under 61..	90	2	0.78	24	..	....
61 and over......	112	..	....	14	..	....
Age not given....	8	1	5.00	2	..	....
Average age.....	48	32	....	43	28	....

*Only children under 16 years of age are deemed dependent under the Pennsylvania Workmen's Compensation Act. The group of widows without dependent children thus includes not only childless widows but mothers whose youngest children are past the age of sixteen. Note, *e. g.*, that almost 60 per cent. of the entire number (431 out of 771) are at least fifty years of age.

TABLE III.

REMARRIAGE RATES BY AGES—WIDOWS WITH ONE DEPENDENT CHILD
Penna. Schedule Z Experience—Policy Years 1916-1919.

Age of Widow at Husband's Death	All Industries except Coal Mining			Coal Mining		
	No. of Widows	No. Re-married	Remar-riage Rate	No. of Widows	No. Re-married	Remar-riage Rate
1	2	3	4	5	6	7
All ages	322	38	4.22	170	38	8.74
Under 21	32	8	9.52	37	16	20.25
21 and under 26..	58	13	8.55	35	10	11.36
26 and under 31..	45	7	5.60	31	7	8.24
31 and under 36..	36	2	2.15	18	1	1.75
36 and under 41..	42	6	5.08	18	4	9.52
41 and under 46..	37	2	1.85	9	..	....
46 and under 51..	34	..	....	12	..	....
51 and under 56..	18	..	....	6	..	....
56 and under 61..	10	..	....	4	..	....
61 and over......	8	..	....	..	..	....
Age not given....	2	..	....	..	..	....
Average age......	35	27	....	31	24	....

TABLE IV.

REMARRIAGE RATES BY AGES—WIDOWS WITH TWO DEPENDENT CHILDREN

Penna. Schedule Z Experience—Policy Years 1916-1919.

Age of Widow at Husband's Death	All Industries except Coal Mining			Coal Mining		
	No. of Widows	No. Re-married	Remar-riage Rate	No. of Widows	No. Re-married	Remar-riage Rate
1	2	3	4	5	6	7
All ages	259	28	3.70	153	25	5.98
Under 21	5	3	25.00	12	5	20.83
21 and under 26..	42	9	7.03	29	8	12.90
26 and under 31..	58	7	4.21	33	6	7.23
31 and under 36..	51	6	4.08	19	3	6.00
36 and under 41..	36	2	1.75	19	1	1.85
41 and under 46..	33	..	....	9	1	4.55
46 and under 51..	16	1	2.32	19	..	....
51 and under 56..	11	..	....	11	1	2.22
56 and under 61..	5	..	....	1	..	....
Age not given....	2	..	....	1	..	20.00
Average age......	34	28	....	34	28	....

TABLE V.

REMARRIAGE RATES BY AGES—WIDOWS WITH THREE DEPENDENT CHILDREN

Penna. Schedule Z Experience—Policy Years 1916-1919.

Age of Widow at Husband's Death	All Industries except Coal Mining			Coal Mining		
	No. of Widows	No. Re-married	Remar-riage Rate	No. of Widows	No. Re-married	Remar-riage Rate
1	2	3	4	5	6	7
All ages	211	23	3.85	169	31	7.56
Under 21	3	..	....	..	..	....
21 and under 26..	30	4	4.76	26	6	10.70
26 and under 31..	52	9	6.34	48	11	9.48
31 and under 36..	50	7	5.65	33	8	8.88
36 and under 41..	31	1	1.09	21	4	7.41
41 and under 46..	20	2	3.00	16	2	3.77
46 and under 51..	19	..	....	10	..	....
51 and under 56..	2	..	....	4	..	....
56 and under 61..	1	..	....	1	..	....
61 and over......	1	..	....	..	..	....
Age not given....	2	..	....	..	..	....
Average age......	34	30	....	33	31	....

TABLE VI.

REMARRIAGE RATES BY AGES—WIDOWS WITH FOUR OR MORE DEPENDENT CHILDREN

Penna. Schedule Z Experience—Policy Years 1916-1919.

Age of Widow at Husband's Death	All Industries except Coal Mining			Coal Mining		
	No. of Widows	No. Re-married	Remar-riage Rate	No. of Widows	No. Re-married	Remar-riage Rate
1	2	3	4	5	6	7
All ages	247	23	3.13	359	58	6.32
21 and under 26..	12	6	22.20	20	3	5.45
26 and under 31..	49	9	5.81	91	24	10.48
31 and under 36..	62	4	2.27	94	19	8.09
36 and under 41..	60	2	1.08	94	8	3.19
41 and under 46..	39	2	1.72	40	3	3.09
46 and under 51..	19	..	....	11	..	....
51 and under 56..	4	..	....	6	1	6.67
Age not given....	2	..	....	3	..	....
Average age......	36	30	....	35	32	....

TABLE VII.

REMARRIAGES BY YEARS—ALL WIDOWS

Penna. Schedule Z Experience—Policy Years 1916-1919.

Age of Widow at Husband's Death	All Industries except Coal Mining			Coal Mining		
	No. of Widows	No. Re-married	Years Exposed	No. of Widows	No. Re-married	Years Exposed
1	2	3	4	5	6	7
All ages	1665	155	4731	987	166	2603
14	1	..	5	1	1	....
16	2	..	6	1	..	3
17	7	3	15	6	2	14
18	9	4	24	7	3	16
19	7	3	12	11	7	19
20	28	8	67	31	11	69
21	26	7	67	10	3	25
22	32	10	90	27	5	71
23	21	5	45	20	8	47
24	28	3	83	21	5	51
25	74	16	220	46	10	105
26	41	7	105	40	8	97
27	38	9	106	37	10	91
28	46	6	132	37	7	102
29	34	3	93	29	7	78
30	89	17	276	76	19	194
31	44	3	122	33	10	91
32	42	5	113	41	6	111
33	47	7	107	29	5	67
34	39	3	100	19	4	43
35	65	5	202	53	8	145

TABLE VII—*Continued*

Age of Widow at Husband's Death	All Industries except Coal Mining			Coal Mining		
	No. of Widows	No. Re-married	Years Exposed	No. of Widows	No. Re-married	Years Exposed
1	2	3	4	5	6	7
36	41	4	127	35	3	101
37	34	2	96	28	6	56
38	45	4	135	30	5	72
39	20	1	50	23	..	64
40	74	1	232	52	4	156
41	28	1	80	18	1	50
42	47	2	151	20	3	57
43	30	3	89	14	..	34
44	24	2	65	14	2	33
45	51	1	155	15	1	44
46	30	..	74	14	..	44
47	27	..	90	7	..	24
48	31	..	95	11	..	30
49	44	2	118	13	..	38
50	53	3	159	28	..	85
51	21	1	59	12	..	44
52	28	..	82	9	1	20
53	23	..	59	5	1·	16
54	26	1	77	6	..	23
55	25	..	81	7	..	20
56	24	..	71	6	..	14
57	17	..	53	8	..	24
58	13	1	39	6	..	17
59	14	..	40	4	..	8
60	38	1	100	6	..	12
61	6	..	13	2	..	5
62	14	..	43	4	..	14
63	15	..	41	..	..	....
64	10	..	29	2	..	7
65	19	..	47	2	..	5
66	10	..	34	1	..	3
67	9	..	26	2	..	5
68	5	..	10	..	..	....
69	6	..	12	1	..	4
70	8	..	18	..	..	....
Over 70	19	..	44	..	..	....
Age not given	16	1	45	7	..	25

TABLE VIII.

REMARRIAGE OF WIDOWS

All Industries except Coal Mining.

Age Periods (Nearest Year at Death of Husband)	Years Elapsed from Death of Husband																	
	All Widows			Under One Year			One Year & under Two			Two Years & under Three			Three Years & under Four			Four Years & Over		
	No. of Widows	No. Rem.	Rem. Rate	No. of Widows	No. Rem.	Rem. Rate	No. of Widows	No. Rem.	Rem. Rate	No. Widows	No. Rem.	Rem. Rate	No. of Widows	No. Rem.	Rem. Rate	No. of Widows	No. Rem.	Rem. Rate
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
All	1665	153	3.28	1665	33	2.05	1525	69	5.12	1168	40	4.07	771	10	1.76	386	3	1.38
Under 21	54	18	14.06	54	4	7.69	47	11	28.94	25	3	13.63	17	..	....	7	..	....
21 and under 26	181	41	8.13	181	10	5.68	166	13	8.97	124	11	10.58	79	5	8.77	38	2	8.70
26 and under 31	248	42	5.90	248	8	3.33	224	16	7.96	180	17	11.41	116	1	....	61	..	....
31 and under 36	237	23	3.57	237	4	1.76	212	14	7.69	154	4	3.08	100	1	....	48	..	....
36 and under 41	214	12	1.87	214	4	1.90	204	3	1.64	162	3	2.21	104	1	....	57	1	....
41 and under 46	180	9	1.66	180	..	....	170	8	5.44	128	..	....	98	1	....	56	..	....
46 and under 51	185	5	.93	185	3	1.68	168	..	....	139	2	1.75	89	..	....	40	..	....
51 and under 56	123	2	.56	123	..	....	113	1	....	90	..	....	57	1	....	33	..	....
56 and under 61	106	2	.66	106	..	....	99	2	2.33	72	..	....	52	..	....	25	..	....
61 and over	121	..	....	121	..	....	107	..	....	84	..	....	51	..	....	17	..	....
Age not given	16	1	....	16	..	....	15	1	....	10	..	....	8	..	....	4	..	....

N. B.   This above table shows the number of remarriages and the remarriage rate per hundred per annum in the first, second, third, fourth, and fifth years of widowhood respectively.   It will be seen that few marriages occurred after the third year.   The concentration of remarriages in the early years of widowhood is still more striking in the coal mine experience shown below.

TABLE IX.
REMARRIAGE OF WIDOWS
By Age of Widow and Years Exposed
COAL MINING

| Age Periods (Nearest Year at Death of Husband) | Years Elapsed from Death of Husband | | | | | | | | | | | | | | | | | |
| | All Widows | | | Under One Year | | | One Year & under Two | | | Two Years & under Three | | | Three Years & under Four | | | Four Years & Over | | |
1	No. of Widows 2	No. Rem. 3	Rem. Rate 4	No. of Widows 5	No. Rem. 6	Rem. Rate 7	No. of Widows 8	No. Rem. 9	Rem. Rate 10	No. Widows 11	No. Rem. 12	Rem. Rate 13	No. of Widows 14	No. Rem. 15	Rem. Rate 16	No. of Widows 17	No. Rem. 18	Rem. Rate 19
All............	1010	167	6.25	1010	65	6.79	866	66	8.64	652	24	4.43	411	10	3.45	200	2	1.69
Under 21	57	24	19.83	57	10	19.23	45	11	30.56	27	3	15.00	16	..	....	5	..	....
21 and under 26	126	31	10.10	126	14	11.97	103	8	8.99	78	5	7.81	46	3	10.34	15	..	....
26 and under 31	226	51	8.73	226	20	9.43	187	19	11.38	140	8	7.02	86	3	4.62	47	1	....
31 and under 36	178	33	6.96	178	14	8.28	151	12	8.96	114	5	5.21	73	2	3.85	41	..	....
36 and under 41	170	19	4.19	170	6	3.70	148	10	7.64	111	3	3.30	71	1	....	33	..	....
41 and under 46	82	7	3.13	82	1	....	73	5	8.06	52	..	....	34	1	....	18	..	....
46 and under 51	77	..	....	77	..	....	74	..	....	60	..	....	39	..	....	19	1	....
51 and under 56	39	2	1.63	39	..	....	35	1	....	30	..	....	23	..	....	14	..	....
56 and under 61	31	..	....	31	..	....	26	..	....	19	..	....	13	..	....	5	..	....
61 and over ...	17	..	....	17	..	....	17	..	....	14	..	....	6	..	....	1	..	....
Age not given..	7	..	....	7	..	....	7	..	....	7	..	....	4	..	....	2	..	....

N. B.   This table includes beehive coke burning, culm recovery and surface coal mining which were excluded in Tables 1 to VII.

TABLE X.

REMARRIAGE RATES OF WIDOW WITH SPECIFIED NUMBER OF DEPENDENT CHILDREN

Age of Widow at Husband's Death	All Industries except Coal Mining						Coal Mining					
	All	No Children	One Child	Two Children	Three Children	Four or more	All	No Children	One Child	Two Children	Three Children	Four or more
1	2	3	4	5	6	7	8	9	10	11	12	13
21 and under 26	8.13	8.93	8.55	7.03	4.76	2.22	10.33	10.00	11.36	12.90	10.70	5.45
26 and under 31	5.90	7.20	5.60	4.21	6.34	5.81	9.06	6.00	8.24	7.23	9.48	10.48
31 and under 36	3.57	3.81	2.15	4.08	5.65	2.27	7.08	5.26	1.75	6.00	8.88	8.09

NOTES

1. The writer is indebted to Miss Myrtle E. Snyder, Statistician of Pennsylvania Bureau, for several tabulations presented below. Several of the tables were published in the *Statistical Analysis* issued by the Bureau.

2. See *Statistical Analysis*, 1916-1920, Table XII. The aggregate remarriage rate from Pennsylvania experience, exclusive of coal mining is 3.28; the aggregate rate from the Dutch table for widows of the same age distribution is 3.46. The Dutch rates are higher for the older and lower for the younger ages.

3. Some fluctuations occur in the year of maximum remarriage rate but there is no exception to the rule that few remarriages occurred after the third year of widowhood. Both because of the limited period of observation and because the widow's pension in any case runs out with the sixth year, to solve the question will require at least ten year's experience and at least ten thousand deaths under acts which pay compensation during widowhood.

4. By the Pennsylvania Compensation Rating & Inspection Bureau, the United States Employees' Compensation Commission and the Industrial Commissions of Washington and Oregon.

MORTALITY FROM EXTERNAL CAUSES AMONG INDUSTRIAL POLICYHOLDERS OF THE METROPOLITAN LIFE INSURANCE COMPANY 1911 TO 1920

BY

LOUIS I. DUBLIN AND EDWIN W. KOPF.

In November, 1918, we presented before this Society a paper which gave the mortality data relating to accidents, suicides and homicides among industrial policyholders of the Metropolitan Life Insurance Company for the six year period, 1911 to 1916. The purpose of the present paper is to extend the tables and interpretations so as to include the years 1917 to 1920. The extension of the period under review to a whole decade makes available the facts for a much larger number of deaths, close to one hundred thousand, for which detailed data are available. It also serves to stabilize the rates for the several types of accident and more especially for the finer divisions of sex, color and age at which the number of cases is never large. Finally, the experience of the latter four years, 1917 to 1920, of the decade are of singular importance because they exhibit the facts for a group of insured wage earners during the period of industrial expansion incident to and following the war. We shall be able to see how closely the industrial population reacts to serious changes in the environment such as the stresses of war and of increased industrial activity always bring about.

This discussion will attempt to answer two sets of questions:

First: What was the underlying trend of mortality from accidents, suicides and homicides during the decade? To what extent did war conditions retard or accelerate the downward fall of death rates from these conditions? What is the outlook for further control of mortality from external causes?

Second: What are the color, sex and age characteristics of mortality from accidents, suicides and homicides? What underlying changes in these characteristics of mortality are disclosed by a comparison of the first five with the last five years of the decade?

We shall, as before, consider these deaths from external violence under four main heads, the division being made with respect to the element of human volition involved in the fact of

injury.   The first group consists of the accidental deaths, those accomplished by chance or through personal negligence without deliberate intent to kill, maim or incapacitate.   The second group of external causes of death consists of the suicides, or cases where there was deliberate intent to accomplish self-destruction. Under the third class, we consider all deaths (except war deaths) which arise from the impulse of one person to kill or injure another.   These latter are "homicides."   For each of these main classes of violence, we shall endeavor further to distinguish the means or agency of injury.   The fourth class are the war deaths which in the last half of the decade formed so large a part of the total group.

During the ten year period covered by this investigation, there were 98,297 deaths from external violence of all kinds. They constituted 8.2 per cent. of all deaths in the total mortality experience of the decade.   The following table gives the incidence of the three chief groups of external causes represented in our records:

TABLE 1.

MORTALITY FROM EXTERNAL CAUSES OF DEATH.   CLASSIFIED ACCORDING TO MAIN GROUPS.

Deaths and Death Rates per 100,000 Persons Exposed and Per Cent. of Total Mortality from External Causes Represented in Each Main Group.   1911 to 1920.

Experience of Metropolitan Life Insurance Company.   Industrial Department.

Class of external violence	No. of deaths	Per cent. of total, all causes of death	Per cent. of total, external causes of death	Death rate per 100,000
TOTAL EXTERNAL CAUSES.......	98,297	8.2	100.0	96.6
Accidents and unspec. violence*	72,007	6.0	73.3	70.8
Suicides.....................	10,068	.8	10.2	9.9
Homicides..................	6,899	.6	7.0	6.8
War deaths.................	9,323	.8	9.5	9.2

*Excludes "war deaths."

The total death rate for the decade was 96.6 per 100,000, which, as we shall see later, is considerably in excess of the rate for external causes prevailing in the general population of the expanding Registration Area.   Close to three quarters of these

deaths were due to accidents. If "war deaths" were included, as perhaps they should be to follow classification practice, the proportion would reach nearly 82.8 per cent. Suicides comprise 10.2 per cent. and homicides 7.0 per cent. additional. We shall consider in detail first the group of accidents.

I. Accidents Including Unspecified Violence

The general accident problem in the United States, and especially as it affects the wage earner, should interest us because of the very considerable mortality which results from this group of causes. It would appear that the special conditions of American life and industry still give rise to hazards which result in an extraordinarily high fatal accident rate. When compared with accident mortality in England and Wales, the American figures show up especially badly. In the year 1920, the fatal accident rate of England and Wales was 36.9 per 100,000. In the Registration Area of the United States, the rate was 71.0 per 100,000. In other words, the general accident rate for England and Wales was 52 per cent. of that for the expanding Registration Area of the United States. Even when we consider the chief types of fatal accidents, such as falls, burns, drowning, and steam railroad accidents, the rates as recorded for the United States are much above the figures for England and Wales. We shall see later when we consider the facts by sex and age, that the rates for the Industrial policyholders are, for the significant periods of life, highest of all.

Trend of the Death Rate for Accidents.

Even if the accident fatality rate in America is still high as compared with European countries, the general tendency of the mortality has been strikingly downward. A more decided downward trend was observed among insured wage earners (13 per 1,000,000 fewer deaths per year) than in the population of the United States Registration Area, (ages 1 to 74 years)—11 per 1,000,000 fewer deaths per year. The accident experience of the years 1913, and 1916, 1917 and 1918 was much above the line of secular trend for the decade. In 1913, the excessive accident death rate was caused by higher death rates for burns, accidental drowning, falls, machine accidents, street car and

wagon accidents.   During the war years affecting the United States, the higher accident death rates were due to excessive mortality from burns (1916, 1917, 1918), machine accidents (1917, 1918), railroad accidents (1916, 1917, 1918), street-car accidents (1917, 1918), and automobile accidents (1917, 1918). The following table and graph show how far the war years departed from the downward trend exhibited during the six years preceding the intensification of war activities in this country and Canada.   After the war, the death rates dropped appreciably, in fact to the minimum which the improvement in the earlier years of the decade suggested as a possibility.

Death Rates per 100,000 from
ACCIDENTS AND UNSPECIFIED VIOLENCE 1911 TO 1920

Metropolitan Life Insurance Company, Industrial Department and
United States Registration Area, Ages 1 to 74 years.

Death Rate per 100,000 Metropolitan Industrial and U.S. Reg. Area. 1 to 74 years

M.L.I. Co. Ind'l.
U.S. Reg. Area

Death Rate per 100,000 Metropolitan Industrial. By Color and Sex.

White Males
Colored Males
White Females
Colored Females
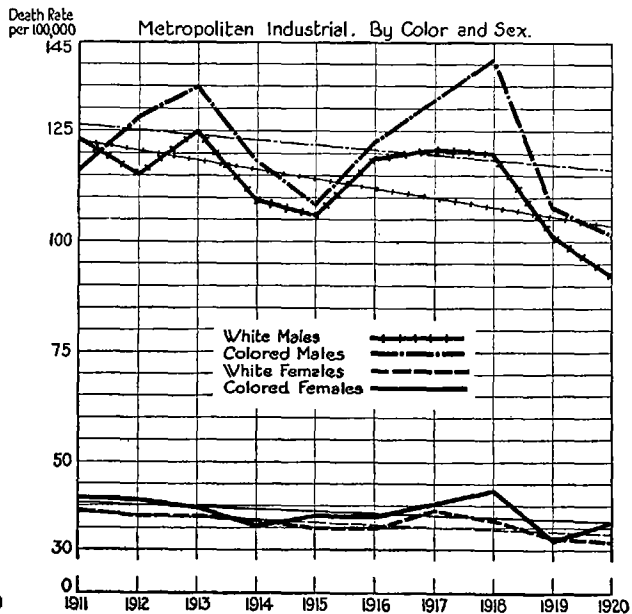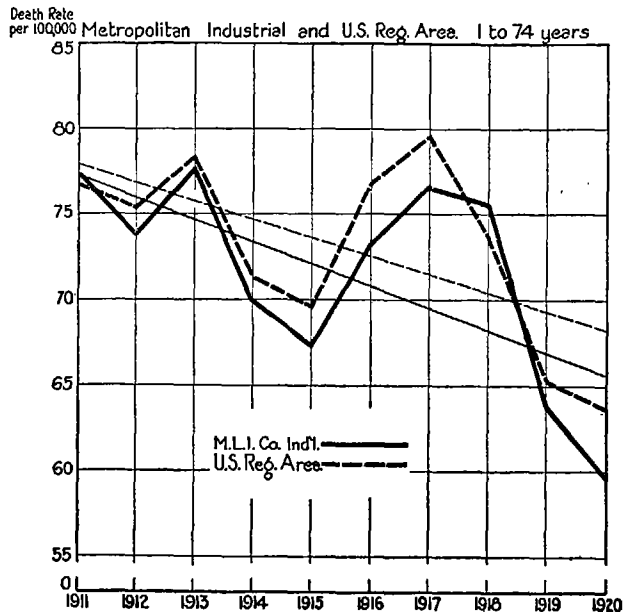
The greatest decline in the decade was accomplished among white males; among whom, the rate dropped 25.3 per cent. between 1911 and 1920. White females showed the next greatest improvement, followed by colored females and colored males, respectively. It is also noteworthy that this decline is most pronounced in the last few years of the decade, indicating that the outlook is still favorable for marked declines in the future. The mean rates for the last five years are in every color and sex class below those for the first five years.*

TABLE 2.

MORTALITY FROM ACCIDENTAL AND UNSPECIFIED FORMS OF VIOLENCE,**
CLASSIFIED BY COLOR AND BY SEX.

Death Rates per 100,000 Persons Exposed. Single Years in Period 1911 to 1920.

Experience of Metropolitan Life Insurance Company. Industrial Department, and U. S. Registration Area (Ages 1 to 74 years).

Year	Metropolitan Ind'l Dept.					U. S. Reg. Area Ages 1 to 74 yrs.
	Persons	White		Colored		
		Males	Females	Males	Females	
1911 to 1920	70. 8	112. 0	35. 5	120. 6	38. 3	72. 6
1916 to 1920	69. 2	109. 6	34. 6	120. 2	37. 6	71. 3
1920	59. 6	92. 3	31. 7	101. 8	35. 8	63. 7
1919	63. 8	101. 2	32. 8	107. 9	32. 1	65. 3
1918	75. 5	119. 5	36. 3	141. 0	43. 3	73. 6
1917	76. 5	120. 7	38. 5	131. 9	40. 3	79. 5
1916	73. 2	118. 7	34. 8	122. 7	37. 5	76. 7
1911 to 1915	72. 9	115. 3	36. 8	121. 1	39. 0	74. 1
1915	67. 3	105. 8	34. 7	108. 5	37. 7	69. 6
1914	69. 9	109. 3	36. 5	118. 2	35. 5	71. 3
1913	77. 6	124. 9	37. 2	134. 8	39. 6	78. 3
1912	73. 8	115. 2	37. 2	128. 4	41. 2	75. 4
1911	77. 4	123. 6	38. 8	116. 5	41. 6	76. 7
Uniform annual decrement, † 1911 to 1920	− 1. 303	− 2. 179	− .564	− 1. 148	− .504	− 1. 088
Per cent. decline, 1920 since 1911 ...	− 23. 0	− 25. 3	− 18. 3	− 12. 6	− 13. 9	− 16. 9
1916-1920 since 1911-1915......	− 5. 1	− 4. 9	− 6. 0	− .7	− 3. 6	− 3. 8

*Another measure of the rate of fall in the death rate is the ratio, $\dfrac{\text{uniform annual decrement}}{\text{mean death rate for decade, 1911 to 1920}}$. Computed from materials in Table 2, these ratios for, "Accidents and Unspecified Forms of Violence" are as follows: *Persons:*—1. 8; *white males:*—1. 9; *white females:*—1. 6; *colored males:*—1. 0; *colored females:*—1. 3; *U. S. Reg. Area (1 to 74 years):*—1. 5. In order to keep this paper within reasonable limits, these calculations were not shown on subsequent tables.

**Excludes "War deaths."

†Annual decrement, in units of the death rate per 100,000 lives exposed, of the straight line of secular trend for the decade 1911 to 1920. For method of determining the equation of the straight line of best fit, from a series of independent observation equations, *see* "Theory of Errors and Method of Least Squares," page 72, *L. D. Weld*, MacMillan Co., 1916.

Color, Sex and Age Incidence of Fatal Accidents

The second point of interest with reference to fatal accidents is their incidence according to color, sex and age.   The death rate already quoted, 70. 8 per 100,000, is a composite which must be broken down to disclose the inherent characteristics of fatal accidents in homogeneous groups of the population.   The facts are presented in the following table and in the chart on page 48.

TABLE 3.

MORTALITY FROM ACCIDENTAL AND UNSPECIFIED VIOLENCE,* CLASSIFIED
BY COLOR, SEX AND BY AGE PERIOD.

Death Rates per 100,000 Persons Exposed.   1911 to 1920.

Experience   of   Metropolitan   Life   Insurance   Company.   Industrial
Department.

Age Period	Persons	White		Colored	
		Male	Female	Male	Female
All ages— one and over	70. 8	112. 0	35. 5	120. 6	38. 3
1 to 4	89. 2	97. 2	75. 9	133. 0	116. 2
5 to 9	53. 1	73. 0	33. 2	68. 5	51. 9
10 to 14	43. 9	68. 6	15. 5	95. 8	23. 5
15 to 19	55. 8	91. 1	16. 9	134. 0	19. 4
20 to 24	54. 8	99. 3	16. 3	111. 2	23. 6
25 to 34	54. 5	107. 8	15. 6	108. 1	22. 3
35 to 44	66. 2	138. 6	19. 9	119. 5	25. 7
45 to 54	88. 2	178. 1	33. 4	148. 3	37. 8
55 to 64	129. 3	232. 1	67. 9	180. 9	64. 4
65 to 74	240. 5	330. 6	190. 0	260. 7	173. 5
75 and over	488. 7	512. 6	498. 7	326. 1	341. 3

*Excludes "War Deaths."

MORTALITY FROM ACCIDENTS & UNSPECIFIED VIOLENCE

Death Rates per 100,000 Persons Exposed. Classified by Age Periods.
White and Colored Groups Compared for Each Sex Class.
Experience of Metropolitan Life Insurance Co. Industrial Department, 1911 to 1920.

Death Rate per 100,000

White Males ------
Colored Males ——

Death Rate per 100,000

White Females ------
Colored Females ——

CENTRAL AGE

CENTRAL AGE
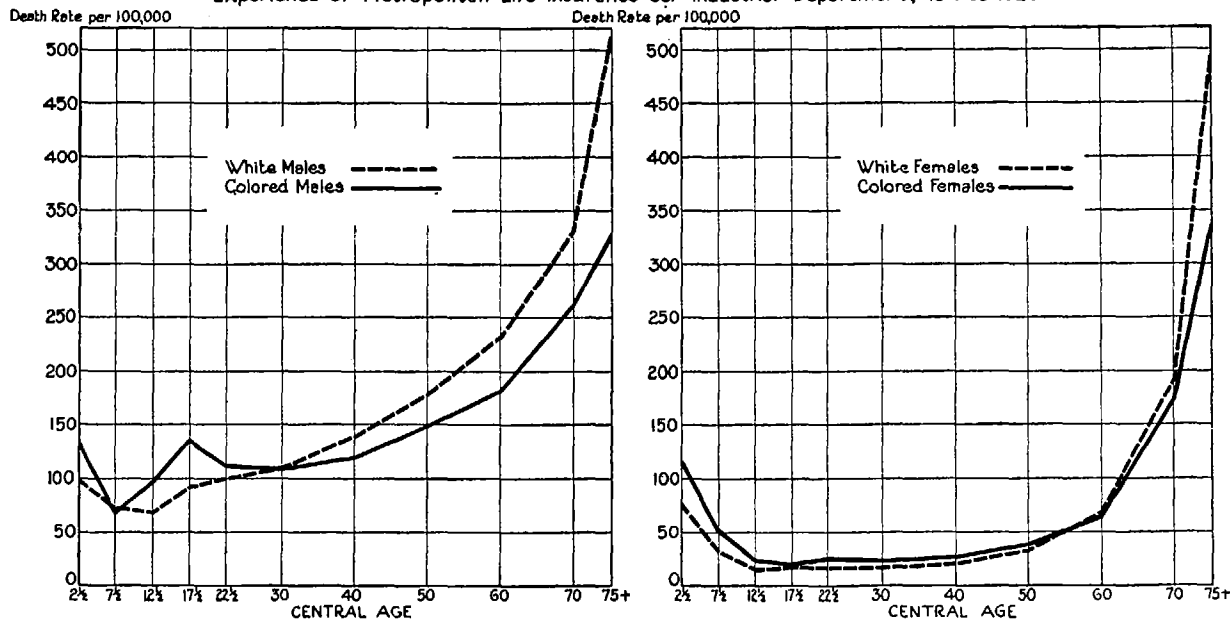
Irrespective of color or of sex, the accident death rate varies considerably with age; in fact, we may distinguish three divisional periods of modal age incidence. These are the period of early childhood, the period of occupational stress in early adult life, and finally the period of old age. Considering the group as a whole, we find that the highest accident death rate under 55 was recorded between the ages 1 and under 5 years. There is a sharp decline in the rate from the figure under 5 years of age (89.2 per 100,000) to the rate at the age group 10 to 14 years (43.9 per 100,000). This latter rate is the minimum for any age period. Beginning with the age group 15 to 19 years, there is a gradually rising rate with virtually each advancing age period. For the white male and white female groups, the minimum accident death rate is recorded, as for the total experience, between 10 and 14 years; but for colored males, the minimum rate is reached between 5 and 9 years and, for colored females, between 15 and 19 years. Only the white males exhibit a progressively increasing accident death rate with advancing age, beginning with the period 15 to 19 years. White and colored females both show a rather stationary tendency in the mortality rate between 15 and 35 years of age and a rapidly rising rate thereafter. Between 15 and 34 years, colored males show a tendency toward decline; thereafter, they exhibit a rising death rate.

Color Ratio of Accident Mortality

The fatal accident rates of the white and colored races are, as we have seen, very different. We find, for example, that under 5 years of age, colored children, both males and females show a fatal accident rate close to a half higher than that of white children. In the period 5 to 9 years, colored males show a fatal accident rate just a little less than the white male rate. Between 15 and 19 years, however, we observe the maximum percentage of excess of colored male over white male accident mortality. Colored females, on the other hand, show their maximum percentage of excess in accident mortality between 5 and 9 years of age. After the age period 25 to 34 years, colored, males show a lower mortality than white males, which condition is probably the result of their safer occupational conditions. A similar condition of lower mortality prevails among the colored females after 45 to 54 years, but the cause for this is difficult to ascertain.

Sex Ratio of Accident Mortality

The differences in the stresses of occupation and of life generally between the sexes are clearly reflected in the accident death rates. Considering white lives first, there was an excess of the accident rate for males over the rate for females in every age period. The maximum percentage of excess of male accident mortality is found between 35 and 44 years of age, when the male rate is nearly seven times greater. Among white lives, the excess of male over female accident mortality increases with each age period up to 45; after 45, the excess becomes regularly less. Colored persons did not show any such increase with age in the excess percentage of male over female mortality. The maximum percentage of excess of males over females among colored persons is found between the ages 15 and 19 years, where colored males show a fatal accident rate nearly seven times that of colored females. These facts are exhibited in the following table:

TABLE 4.

MORTALITY FROM ACCIDENTAL AND UNSPECIFIED VIOLENCE.*

Percentage, Male of Female Mortality at Specified Age Periods for Each Color Class. 1911 to 1920.

Experience of Metropolitan Life Insurance Company. Industrial Department.

Age Period	Percentage, Male of Female Mortality	
	White	Colored
All ages—one and over.....	315.5	314.9
1 to 4	128.1	114.5
5 to 9	219.9	132.0
10 to 14	442.6	407.7
15 to 19	539.1	690.7
20 to 24	609.2	471.2
25 to 34	691.0	484.8
35 to 44	696.5	465.0
45 to 54	533.2	392.3
55 to 64	341.8	280.9
65 to 74	174.0	150.3
75 and over	102.8	95.5

*War deaths excluded.

FATAL ACCIDENTS ACCORDING TO SPECIFIC MEANS OR NATURE OF INJURY

The greatest interest must always attach to the figures for the specific means of injury; for it is upon these that accident prevention campaigns must be based. From this point of view, it would seem to be of the very greatest importance that the classification of accidents would be such as to forward the prevention movement. Unfortunately, this is not quite the case. The classification of accidents according to the INTERNATIONAL LIST is not entirely suited to this purpose, since it gives at best the means of injury rather than the nature or the origin of the hazard. We must, however, present the figures as we have them arranged according to the requirements of the INTERNATIONAL LIST of CAUSES OF DEATH. In the future, we hope to present our accident experience in a more constructive manner, namely, to show the source of the accident, whether arising in industry, in or about the home, on public highways or in the use of other public facilities. Under each one of these heads, a more minute classification should lead to valuable measures of prevention. In the meanwhile, we present the figures as we have them. The following table shows the number of deaths and the rate per 100,000 for each one of the specific forms of accident:

TABLE 5.

MORTALITY FROM ACCIDENTAL AND UNSPECIFIED VIOLENCE.*

Deaths and Death Rates per 100,000 Persons Exposed by Specified Causes and by Color and Sex. 1911 to 1920.

Experience of Metropolitan Life Insurance Company. Industrial Department.

| | Persons | | Rate per 100,000 | | | |
| | | | White | | Colored | |
Cause of Death	Deaths	Rate per 100,000	Males	Fe-males	Males	Fe-males
ACCIDENTS AND UNSPECIFIED VIOLENCE—TOTAL*	72007	70.8	112.0	35.5	120.6	38.3
Poisoning by food..........	969	1.0	1.0	.8	1.3	1.4
Other acute poisonings.....	2006	2.0	2.2	1.6	3.1	1.9
Conflagration.............	1031	1.0	1.2	.7	1.8	1.8
Burns — conflagration excepted.................	8776	8.6	7.4	9.0	8.3	13.8
Absorption of deleterious gases—conflagration excepted.................	2828	2.8	4.1	1.9	2.6	1.1
Accidental drowning.......	9734	9.6	18.2	2.2	21.0	1.7
Traumatism by firearms....	2094	2.1	3.3	.4	8.5	1.5
Traumatism by cutting or piercing instruments.....	152	.1	.2	† —	.6	.2
Traumatism by fall........	11343	11.2	15.9	8.0	12.0	5.1
Traumatism in mines and quarries (total).........	1316	1.3	2.7	† —	3.8	† —
—in mines...........	1224	1.2	2.5	† —	3.6	† —
—in quarries.........	92	.1	.2	† —	.2	† —
Traumatism by machines..	1806	1.8	3.5	.2	5.2	.2
Steam railroad accidents and injuries.............	7688	7.6	14.9	1.3	15.8	1.8
Street car accidents and injuries..................	2806	2.8	4.8	1.2	3.8	1.0
Automobile accidents and injuries................	7533	7.4	12.6	3.8	7.9	2.2
Injuries by other vehicles...	2722	2.7	5.1	.7	4.5	.5
Landslide, other crushing...	654	.6	1.3	† —	1.9	.1
Injuries by animals........	377	.4	.7	† —	1.0	† —
Effects of heat.............	1754	1.7	2.5	1.0	3.5	1.3
Lightning.................	176	.2	.3	† —	.5	.1
Electricity — lightning excepted.................	877	.9	2.0	† —	.9	† —
Other accidental and unspecified violence*.......	5365	5.3	8.2	2.4	12.6	2.5

*War deaths excluded.
†Less than .05 per 100,000, or no deaths reported.

Thus, among all accidents included in the above table, falls were the most frequent of the specified forms of violence. There were 11,343 deaths from falling recorded among insured wage

earners over the ten year period 1911 to 1920, at a rate of 11.2 per 100,000 exposed.   Accidental drowning was next in importance with 9,734 deaths at a rate of 9.6 per 100,000.   Burns, excluding burns in conflagrations, followed with 8,776 deaths, or at a rate of 8.6 per 100,000 exposed.   Railroad accidents and injuries showed 7,688 deaths, producing a rate of 7.6 per 100,000.   Almost as serious were the automobile accidents and injuries recorded in 7,533 cases, with a death rate of 7.4 per 100,000 exposed.   A detailed discussion of the facts for some of the more important of these modes of injury in external causes of death follows:

This picture of the relative importance of the various forms of accident is somewhat misleading in view of the fact that it is a combination of the experience for ten years in which there has been a very marked change in the rank of the several causes. Thus, in the last five years of the decade, automobile accidents and injuries lead the list of the single causes.   They were responsible for 14.4 per cent. of all the accident fatalities.   In the previous five year period, they were responsible for only 5.5 per cent. and this cause was one of the smaller ones in the list.   As a compensation, there has been a marked decline in the proportion of fatal falls and in the proportion of drownings to total accidents.

TRAUMATISM BY FALL

The deaths from this cause present an interesting distribution by age and, also, by color and sex as is shown in the following table:

TABLE 6.
MORTALITY FROM TRAUMATISM BY FALL,* CLASSIFIED BY COLOR, SEX AND BY AGE PERIOD.
Death Rates per 100,000 Persons Exposed.   1911 to 1920.
Experience of Metropolitan Life Insurance Company.   Industrial Department.

Age Period	Persons	White		Colored	
		Males	Females	Males	Females
All ages—one and over...........	11.2	15.9	8.0	12.0	5.1
1 to 4	9.1	10.6	6.9	17.1	10.3
5 to 9	3.8	5.4	2.2	6.1	1.4
10 to 14	2.8	4.4	1.1	5.1	1.9
15 to 24	3.6	6.7	.8	5.3	1.8
25 to 34	5.9	12.5	1.7	8.4	2.1
35 to 44	10.9	25.1	3.0	14.7	2.8
45 to 54	17.5	35.7	8.0	20.1	5.3
55 to 64	33.7	54.5	23.6	30.5	14.0
65 and over	114.9	115.6	126.1	46.5	60.2

*Falls from steam railroad trains, street cars, automobiles and other vehicles, as well as falls in mines or quarries, from machinery (travelling cranes, for example), and falls in burning buildings are classified under other headings.   Not *all* falls are classified under "Traumatism by fall."

The rates are high in early childhood and decline to a minimum in adolescence or in early adult life and rise again regularly to a maximum in old age. This is in accordance with common knowledge, for children and old people suffer most from fatal falls. Males in both races have higher rates at virtually every age period than females. With the exception of the early years of childhood, the colored have lower rates than the whites. This is probably associated with the safer conditions of life in the areas where the great mass of colored policyholders live, as compared with the more hazardous conditions prevailing in the larger towns and cities where the white policyholders reside.

This is one of the forms of accident which has shown a very salutary decline in the decade. Between 1911 and 1920, the fall was 44.7 per cent. among the insured; among white females, it was even as high as 56.2 per cent. The decline is greater among the insured than in the general population of the Registration Area of the United States. Chart III, on page 75, and Table 7, show how marked is the tendency toward a further fall in the death rate from this cause.

TABLE 7.

MORTALITY FROM TRAUMATISM BY FALL, CLASSIFIED BY COLOR AND BY SEX.

Death Rates per 100,000 Persons Exposed. Single Years in Period 1911 to 1920.

Experience of Metropolitan Life Insurance Company, Industrial Department and U. S. Registration Area (Ages 1 to 74 years.)

Year	Metropolitan Ind'l Dept.					U. S. Reg. Area Ages 1 to 74 yrs.
	Persons	White		Colored		
		Males	Females	Males	Females	
1911 to 1920	11.2	15.9	8.0	12.0	5.1	9.6
1916 to 1920	9.9	14.0	7.2	10.8	4.6	8.6
1920	7.3	8.9	6.3	8.4	4.2	7.1
1919	8.0	10.7	6.1	9.3	3.5	7.2
1918	10.4	14.5	7.2	12.1	6.7	8.5
1917	11.9	17.4	8.2	12.5	4.6	10.2
1916	13.1	20.2	8.5	12.4	4.0	10.7
1911 to 1915	12.8	18.5	9.0	13.5	5.6	10.8
1915	11.9	17.0	8.5	12.4	5.5	10.3
1914	12.6	17.6	9.4	12.9	5.3	10.6
1913	13.7	19.7	9.5	16.9	6.3	11.0
1912	12.7	18.1	9.2	14.5	4.7	11.1
1911	13.2	20.3	8.5	10.5	6.3	10.8
Uniform annual decrement, 1911 to 1920......	−.627	−1.078	−.343	−.488	−.175	−.448
Per cent. decline: 1920 Since 1911.........	−44.7	−56.2	−25.9	−20.0	−33.3	−34.3
1916-1920 Since 1911-1915	−22.7	−24.3	−20.0	−20.0	−17.9	−20.4

Traumatism from Accidental Drowning

Deaths from accidental drowning are concentrated in the ages of childhood and of early adolescence when water sports are popular. The highest rate is attained in the age period 15 to 24. After that age, the death rate declines to a fairly stationary level, about 7.0 per 100,000. The death rate is very much higher among males than among females, reflecting the greater appeal of water sports to boys and young men. The rates are also higher for colored males than for white males. The figures by color, sex and age are as shown in the following table:

TABLE 8.

MORTALITY FROM ACCIDENTAL DROWNING,* CLASSIFIED BY COLOR, SEX AND BY AGE PERIOD.

Death Rates per 100,000 Persons Exposed. 1911 to 1920.

Experience of Metropolitan Life Insurance Company. Industrial Department.

Age Period	Persons	White		Colored	
		Males	Females	Males	Females
All ages—one and over............	9.6	18.2	2.2	21.0	1.7
1 to 4	5.7	8.4	3.2	4.0	1.7
5 to 9	9.8	17.9	2.0	11.2	1.8
10 to 14	13.4	22.4	2.8	39.5	2.9
15 to 24	14.1	24.6	3.7	37.1	2.4
25 to 34	7.7	15.5	1.5	20.8	1.1
35 to 44	6.4	14.8	1.0	12.7	1.5
45 to 54	7.2	16.9	1.5	12.3	1.5
55 to 64	6.7	16.2	1.2	8.9	1.2
65 and over	7.7	18.3	1.6	11.6	1.1

*Under this heading are classified, first, the deaths from drowning that are known to be accidental and, second, those which are not definitely reported as accidental but which can not be identified as suicidal or homicidal.

The incidence of drowning shows a favorable downward tendency in the ten year period as shown by the chart on page 228. The 1920 rate was 34 per cent. lower than that for 1911 and the mean death rate for the second quinquennium is 22.0 per cent. below that for the first quinquennium. The greatest declines are manifested after age 35. Unfortunately, the rate has not been much reduced at those ages where the incidence of drowning is highest.

TABLE 9.

MORTALITY FROM ACCIDENTAL DROWNING, CLASSIFIED BY COLOR AND
BY SEX.

*Death Rates per 100,000 Persons Exposed.   Single Years in
Period 1911 to 1920.*

Experience of Metropolitan Life Insurance Company, Industrial
Department, and U. S. Registration Area (Ages 1 to 74 years).

Year	Metropolitan Ind'l Dept.					U. S. Reg. Area Ages 1 to 74 yrs.
	Persons	White		Colored		
		Males	Females	Males	Females	
1911 to 1920	9.6	18.2	2.2	21.0	1.7	8.1
1916 to 1920	8.5	16.5	1.8	18.8	1.4	7.1
1920	6.7	12.5	1.6	17.2	1.4	5.8
1919	8.6	16.9	1.9	16.0	1.5	6.9
1918	9.4	18.2	2.1	20.3	.8	6.8
1917	8.7	17.0	1.5	20.5	1.2	7.4
1916	9.7	18.7	2.0	20.7	2.3	8.7
1911 to 1915	10.9	20.5	2.7	23.7	2.1	9.4
1915	11.9	21.2	4.1	24.1	2.8	9.8
1914	10.0	19.1	2.5	19.9	1.6	8.7
1913	12.1	22.4	2.8	29.6	3.5	10.3
1912	10.2	19.1	2.2	25.1	1.6	8.9
1911	10.2	20.5	1.7	19.9	.9	9.5
Uniform annual decrement, 1911 to 1920	−.378	−.710	−.070	−.825	−.069	−.423
Per cent. decline: 1920 Since 1911	−34.3	−39.0	− 5.9	−13.6	+55.6	−38.9
1916-1920 Since 1911-1915 .	−22.0	−19.5	−33.3	−20.7	−33.3	−24.5

BURNS (CONFLAGRATION EXCEPTED)

This continues to be an important source of accident mortality.
The decline during the ten year period is relatively small among
insured and does not show up at all among the general population.
The campaign against accidents has apparently had very little
influence on this mode of injury.

The deaths are heavily concentrated in early childhood,
reach their minimum in adult life, and rise again to another,
but lower, maximum in old age.   The rates are higher for colored
than for white persons; and higher for females than for males.
This is a reflection of the greater domestic accident hazard
of women than of men.   The data on color, sex and age are given
in the following table:

TABLE 10.

MORTALITY FROM BURNS (CONFLAGRATION EXCEPTED),* CLASSIFIED
BY COLOR, SEX AND BY AGE PERIOD.

Death Rates per 100,000 Persons Exposed. 1911 to 1920.

Experience of Metropolitan Life Insurance Company. Industrial
Department.

Age Period	Persons	White		Colored	
		Males	Females	Males	Females
All ages—one and over..........	8.6	7.4	9.0	8.3	13.8
1 to 4	40.3	38.8	38.5	58.6	68.8
5 to 9	9.9	6.0	12.1	8.5	30.3
10 to 14	2.6	1.4	3.5	2.5	6.9
15 to 24	2.7	1.9	2.9	2.9	6.6
25 to 34	3.1	2.4	3.2	4.4	4.7
35 to 44	4.5	4.2	4.2	5.6	5.8
45 to 54	6.6	4.9	6.9	6.0	11.9
55 to 64	10.1	6.7	10.4	10.8	22.4
65 and over	22.8	10.2	26.6	22.4	59.1

*Burns and scalds due to railroad machinery, and mining accidents,
as well as those caused by electricity and lightning are not classified under
this heading. This explains, to some extent, the comparatively low rate
for males.

As previously noted, the accident prevention programme has
not affected the incidence of this cause. Among white males,
the rate in 1920 was actually higher than in 1911. It was also
higher among colored females. The higher incidence among
females and also at the ages of childhood and extreme old age
point very definitely to the home as the principal source of the
hazard. The trend of the death rate for this cause is shown in
Chart III on page 75, and the figures are shown by single calendar
years in Table 11.

This high domestic hazard shows no tendency toward improve-
ment. Apparently, no effort has as yet been directed to safe-
guarding conditions of the home.

TABLE 11.

MORTALITY FROM BURNS (CONFLAGRATION EXCEPTED), CLASSIFIED BY COLOR AND BY SEX.

Death Rates per 100,000 Persons Exposed.   Single Years in Period, 1911 to 1920.

Experience of Metropolitan Life Insurance Company, Industrial Department, and U. S. Registration Area (Ages 1 to 74 years).

| Year | Persons | Metropolitan Ind'l Dept. | | | | U. S. Reg. Area Ages 1 to 74 yrs. |
| | | White | | Colored | | |
		Males	Females	Males	Females	
1911 to 1920	8.6	7.4	9.0	8.3	13.8	7.4
1916 to 1920	8.5	7.6	8.7	8.3	13.2	7.5
1920	8.1	6.8	8.3	7.8	15.1	7.0
1919	8.1	7.1	8.6	7.5	10.4	7.1
1918	9.0	8.3	8.7	9.8	14.2	7.7
1917	8.9	8.0	9.2	7.7	12.6	8.4
1916	8.8	7.7	9.0	8.5	13.8	7.5
1911 to 1915	8.8	7.1	9.4	8.3	14.4	7.2
1915	8.6	7.1	8.9	8.1	15.3	6.7
1914	8.4	6.7	9.5	6.7	12.3	7.1
1913	9.0	7.9	9.4	8.5	13.9	7.4
1912	9.1	7.6	9.5	8.7	15.7	7.6
1911	8.8	6.3	9.8	9.6	14.8	7.3
Uniform annual decrement, 1911 to 1920.......		−.070	+.045	−.146	−.089	−.203	0.0
Per cent. decline: 1920 Since 1911....		− 8.0	+ 7.9	−15.3	−18.7	+ 2.0	− 4.1
1916-1920 Since 1911-1915		− 3.4	+ 7.0	− 7.4	—	− 8.3	+ 4.2

RAILROAD ACCIDENTS AND INJURIES

Fatalities arising out of railroad accidents are still an important element in mortality, even if the number of deaths has declined appreciably in recent years.   The 7,688 deaths registered in the ten year period corresponded to a rate of 7.6 per 100,000 insured. The deaths occurred very largely among males.   The white male rate was 14.9 and the colored male rate 15.8 per 100,000. The rates for white and colored females were 1.3 and 1.8 per 100,000 respectively.   Among the males, the deaths become frequent after age fifteen and continue at a level of about twenty per 100,000 up to age 55.   The rate rises to its maximum after 55.   The table below shows the data for railroad accidents and injuries according to the several color, sex and age classes:

TABLE 12.

MORTALITY FROM RAILROAD ACCIDENTS AND INJURIES, CLASSIFIED
BY COLOR, SEX AND BY AGE PERIOD.

Death Rates per 100,000 Persons Exposed.   1911 to 1920.

Experience of Metropolitan Life Insurance Company.   Industrial
Department.

Age Period	Persons	White		Colored	
		Males	Females	Males	Females
All ages—one and over..........	7.6	14.9	1.3	15.8	1.8
1 to 14	2.4	4.0	.9	3.7	.7
15 to 19	8.1	14.6	1.4	19.0	1.2
20 to 24	10.3	21.7	.8	22.5	1.4
25 to 34	10.1	23.8	.9	17.1	1.9
35 to 44	9.4	22.0	1.2	19.3	2.2
45 to 54	10.3	23.7	2.0	21.3	2.1
55 to 64	13.8	31.0	3.3	24.9	2.9
65 and over	16.7	37.2	4.3	25.7	8.0

The decline in the mortality rate during the ten year period
is very marked.   The rate for 1920 is close to 45 per cent. less
than for 1911 and the rate for white males has declined almost to a
half of the original figure.   The tendency is still markedly
downward and there is every indication that the next few years
will see a continuation in the improvement.   There is still much
to be accomplished before the figures reach the low levels for
railroad accidents in European countries.   The following table
presents the data for railroad accidents and injuries by single
years from 1911 to 1920.

TABLE 13.

MORTALITY FROM RAILROAD ACCIDENTS AND INJURIES, CLASSIFIED BY
COLOR AND BY SEX.

*Death Rates per 100,000 Persons Exposed.   Single Years in
Period 1911 to 1920.*

Experience of Metropolitan Life Insurance Company, Industrial
Department, and U. S. Registration Area (Ages 1 to 74 years).

Year	Metropolitan Ind'l Dept.					U. S. Reg. Area Ages 1 to 74 years
	Persons	White		Colored		
		Males	Females	Males	Females	
1911 to 1920	7. 6	14. 9	1. 3	15. 8	1. 8	10. 6
1916 to 1920	6. 9	13. 2	1. 5	14. 9	2. 0	9. 4
1920	5. 2	9. 9	1. 2	10. 6	1. 8	7. 3
1919	5. 7	10. 5	1. 6	11. 5	1. 9	7. 4
1918	7. 8	14. 7	1. 6	17. 9	2. 8	10. 3
1917	8. 5	16. 5	1. 8	17. 5	1. 7	11. 4
1916	7. 9	15. 3	1. 3	18. 5	1. 8	11. 4
1911 to 1915	8. 5	17. 2	1. 1	17. 0	1. 6	12. 0
1915	7. 4	15. 0	1. 0	16. 0	1. 1	9. 9
1914	7. 5	15. 1	1. 0	16. 0	1. 3	10. 7
1913	9. 0	18. 8	1. 1	16. 9	1. 2	13. 0
1912	9. 2	18. 5	1. 4	17. 6	2. 2	13. 6
1911	9. 5	19. 2	1. 3	18. 6	2. 2	13. 0
Uniform annual decrement, 1911 to 1920.......	−. 398	−. 944	+. 035	−. 622	+. 025	−. 634
Per cent. decline: 1920 Since 1911....	−45. 3	−48. 4	− 7. 7	−43. 0	−18. 2	−43. 8
1916-1920 Since 1911-1915	−18. 8	−23. 3	+36. 4	−12. 4	+25. 0	−21. 7

AUTOMOBILE ACCIDENTS AND INJURIES

Automobile accidents and injuries now constitute the most
important single cause of accident fatality; for the ten year
period combined, this cause occupied fourth place in the list.
The increase in the rate from 2.3 per 100,000 in 1911 to 11.1 in
1920 is one of the truly menacing features in the whole mortality
experience of the insured and of the general population of the
United States and Canada.   The increment has been at an annual
average of one per 100,000 in the death rate and among white
males this annual increment is close to two per 100,000.   Chart

III, on page 75, shows how truly serious the phenomenon is in the utter lack of any tendency toward abatement of the rate. The present situation obviously calls for vigorous measures on the part of the constituted authorities, especially in view of the ever-increasing use of this method of transportation.

The deaths are much more frequent among males than among females and are concentrated heavily among children. In this experience one-third the deaths are among children under fifteen years. The rates reach a maximum at ages five to nine, when children play more or less unprotected in the streets and highways. The rates stay fairly level between ages 15 and 45 when they begin to rise again to the maximum, which is attained after age 65. The following table presents the death rates by color, sex and age. But this is obviously only a temporary picture representing what has happened in a period of rapid change. It is at best only suggestive of what is now occurring in the several classes of the population.

TABLE 14.

MORTALITY FROM AUTOMOBILE ACCIDENTS AND INJURIES, CLASSIFIED BY COLOR, SEX AND BY AGE PERIOD.

Death Rates per 100,000 Persons Exposed. 1911 to 1920.

Experience of Metropolitan Life Insurance Company. Industrial Department.

Age Period	Persons	White		Colored	
		Males	Females	Males	Females
All ages—one and over...........	7.4	12.6	3.8	7.9	2.2
1 to 4	7.1	8.7	5.6	7.0	3.3
5 to 9	14.0	20.5	7.9	15.7	5.0
10 to 14	8.0	13.2	3.0	10.9	1.4
15 to 19	4.8	8.1	2.0	4.5	1.0
20 to 24	5.1	9.1	2.3	5.2	1.9
25 to 34	4.3	8.5	1.8	4.4	1.8
35 to 44	4.8	9.5	2.1	7.2	1.8
45 to 54	6.3	12.7	3.1	6.5	2.0
55 to 64	11.1	19.7	6.4	14.1	3.6
65 and over	16.7	30.8	9.0	19.9	5.2

The death rates for the single calendar years 1911 to 1920 are shown in Table 15.

TABLE 15.

MORTALITY FROM AUTOMOBILE ACCIDENTS AND INJURIES, CLASSIFIED BY COLOR AND BY SEX.

Death Rates per 100,000 Persons Exposed. Single Years in Period 1911 to 1920.

Experience of Metropolitan Life Insurance Company, Industrial Department, and U. S. Registration Area (Ages 1 to 74 years).

Year	Metropolitan Ind'l Dept.					U. S. Reg. Area Ages 1 to 74 yrs.
	Persons	White		Colored		
		Males	Females	Males	Females	
1911 to 1920	7.4	12.6	3.8	7.9	2.2	6.8
1916 to 1920	10.0	16.7	5.1	11.3	3.3	9.0
1920	11.1	18.9	6.0	10.1	3.2	10.2
1919	10.7	18.0	5.5	12.8	3.6	9.3
1918	10.3	17.2	5.3	12.7	3.2	9.1
1917	9.7	15.9	5.0	12.5	3.6	8.9
1916	7.4	12.9	3.4	8.2	2.5	7.3
1911 to 1915	4.0	7.0	2.0	3.8	1.0	3.9
1915	5.4	9.4	2.6	5.7	1.3	5.9
1914	4.8	8.5	2.4	4.2	.8	4.3
1913	4.1	7.5	1.9	3.8	1.2	3.9
1912	3.0	4.8	1.8	2.9	.7	2.9
1911	2.3	4.0	1.1	1.9	1.1	2.2
Uniform annual decrement, 1911 to 1920....	+1.096	+1.822	+ .579	+1.303	+ .356	+ .958
Per cent. decline: 1920 Since 1911	+382.6	+372.5	+445.5	+431.6	+190.9	+363.6
1916-1920 Since 1911 -1915............	+150.0	+138.6	+155.0	+197.4	+230.0	+130.8

STREET CAR ACCIDENTS AND INJURIES

Fatalities registered as street car accidents and injuries in this experience included deaths, not only of persons riding on or operating street cars, but also those deaths on elevated and subway trains and on tracks and rights of way of street railways, interurban roads operated electrically, subways and elevated railroads. There were registered 1,600 deaths from this cause, the corresponding rate being 3.0 per 100,000 exposed in the ten

years under observation. The rate is highest among white males and least among colored females.

The rates are higher under age 5 and after age 35 than at other periods of life. There is considerable variation, however, from age to age as is shown in the following table:

TABLE 16.

MORTALITY FROM STREET CAR ACCIDENTS AND INJURIES, CLASSIFIED BY COLOR, SEX AND BY AGE PERIOD.

Death Rates per 100,000 Persons Exposed. 1911 to 1920.

Experience of Metropolitan Life Insurance Company. Industrial Department.

Age Period	Persons	White		Colored	
		Males	Females	Males	Females
All ages—one and over..........	2.8	4.8	1.2	3.8	1.0
1 to 4	2.4	3.0	1.8	3.0	1.7
5 to 9	2.2	2.8	1.5	3.4	1.6
10 to 14	1.5	2.6	.5	1.9	.5
15 to 19	1.7	2.7	.5	3.6	.7
20 to 24	1.4	2.7	.6	1.4	.1
25 to 34	1.8	4.1	.4	2.0	.2
35 to 44	3.1	7.0	.8	4.4	.8
45 to 54	4.5	9.7	1.6	5.5	1.8
55 to 64	7.3	14.2	3.4	9.8	2.9
65 and over	11.7	22.2	5.7	15.8	4.0

It is important to note the great decline in the rate in the ten year period. The figure for 1920 is exactly half that for 1911. A curious change of tendency occurred in the years 1916, 1917 and 1918 when the rate went up very appreciably, both in the experience of the Metropolitan and in the general population. Since then, however, the rate has declined rapidly, making the picture for the decade a satisfactory one. The experience by single years between 1911 and 1920 is given herewith:

TABLE 17.

MORTALITY FROM STREET CAR ACCIDENTS AND INJURIES, CLASSIFIED BY
COLOR AND BY SEX.

*Death Rates per 100,000 Persons Exposed.   Single Years in
Period 1911 to 1920.*

Experience of Metropolitan Life Insurance Company, Industrial
Department, and U. S. Registration Area (Ages 1 to 74 years).

| Year | Metropolitan Ind'l Dept. | | | | | U. S. Reg. Area Ages 1 to 74yrs. |
| | Persons | White | | Colored | | |
		Males	Females	Males	Females	
1911 to 1920	2.8	4.8	1.2	3.8	1.0	2.6
1916 to 1920	2.5	4.3	1.2	3.5	1.0	2.4
1920	1.8	2.9	1.1	1.4	.5	1.9
1919	2.4	4.4	.9	1.5	1.6	2.2
1918	3.1	4.8	1.7	5.6	.4	2.8
1917	3.0	5.1	1.2	5.8	1.7	2.9
1916	2.6	4.4	1.2	3.5	.9	2.4
1911 to 1915	3.1	5.5	1.2	4.2	.9	2.8
1915	2.2	3.9	.9	2.1	.9	2.3
1914	2.7	4.5	1.1	4.2	1.4	2.5
1913	3.6	6.4	1.4	4.6	1.2	3.1
1912	3.5	6.4	1.4	4.6	.5	3.0
1911	3.6	6.7	1.3	5.8	.5	3.2
Uniform annual decrement, 1911 to 1920	−.152	−.327	−.019	−.304	+.028	−.106
Per cent. decline: 1920 since 1911	−50.0	−56.7	−15.4	−75.9	—	−40.6
1916-1920 since 1911-1915	−19.4	−21.8	—	−16.7	+11.1	−14.3

TRAUMATISM BY MACHINES

A total of 1,806 deaths from traumatism by machines is
recorded. This title includes deaths by means of machines in
most industries and through mechanisms such as elevators which
are not always concerned in industrial processes. The deaths
are almost entirely among males, the rates for white and colored
males being 3.5 and 5.2 per 100,000, respectively. The rates
for females may be disregarded. The deaths are concentrated
in the age periods of working life as is shown in the following
table:

TABLE 18.

MORTALITY FROM TRAUMATISM BY MACHINES,* CLASSIFIED BY COLOR FOR
MALES, AND BY AGE PERIOD.

Death Rates per 100,000 Persons Exposed. 1911 to 1920.

Experience of Metropolitan Life Insurance Company. Industrial
Department.

Age Period	Persons in Total Experience	White Males	Colored Males
All ages—one and over	1.8	3.5	5.2
1 to 14	.4	.6	1.3
15 to 19	2.6	4.7	6.7
20 to 24	1.9	4.0	5.2
25 to 34	2.0	4.0	6.8
35 to 44	2.7	6.9	5.3
45 to 54	3.3	7.7	9.4
55 to 64	3.5	8.7	7.2
65 and over	2.9	7.3	5.0

*Deaths caused by machinery accidents in mines and quarries are classi-
fied under title No. 173 (Traumatism in mines and quarries); those due
to locomotives are charged to one of the subtitles of title No. 175 (Steam
railroad accidents and injuries) of the INTERNATIONAL LIST OF CAUSES
OF DEATH, (1909 Revision).

There has been virtually no improvement from this cause of
accidental mortality. In fact, the trend in this ten year period
is slightly upward among the insured, and decidedly so in the
general population. This points definitely to the effect of war
conditions upon the trend of fatal industrial accidents. Prior
to 1916 the tendency of this death rate was downward and during
the war decidedly upward. Since 1919 no marked downward fall
has been observed. The following table, and Chart IV on page
76, presents the figures for the individual years in the decade:

TABLE 19.

MORTALITY FROM TRAUMATISM BY MACHINES,* CLASSIFIED BY COLOR FOR
MALES AND FEMALES.

*Death Rates per 100,000 Persons Exposed.   Single Years in
Period 1911 to 1920.*

Experience of Metropolitan Life Insurance Company.   Industrial
Department, and U. S. Registration Area (Ages 1 to 74 years.)

Year	Metropolitan Ind'l Dept.					U. S. Reg. Area Ages 1 to 74 yrs.
	Persons	White		Colored		
		Males	Females	Males	Females	
1911 to 1920	1.8	3.5	.2	5.2	.2	2.4
1916 to 1920	1.8	3.6	.2	5.6	.3	2.6
1920	1.7	3.5	.1	4.0	.2	2.5
1919	1.6	2.8	.2	5.9	.6	2.5
1918	2.4	4.6	.2	8.2	.4	3.0
1917	2.0	4.0	.2	5.0	.1	2.9
1916	1.7	3.4	.1	5.3	.2	2.3
1911 to 1915	1.7	3.3	.1	4.8	.1	2.2
1915	1.4	2.9	.2	3.4	—	1.9
1914	1.5	3.3	.1	2.9	.2	2.0
1913	2.0	4.1	.1	5.4	.3	2.5
1912	1.7	3.2	.2	5.6	—	2.4
1911	1.8	3.4	.2	6.9	.2	2.2
Uniform annual decrement, 1911 to 1920....	+.013	+.019	−.001	−.011	+.028	+.055
Per cent. decline: 1920 Since 1911	−5.6	+2.9	−50.0	−42.0	—	+13.6
1916-1920 Since 1911 -1915.............	+5.9	+9.1	+100.0	+16.7	+200.0	+18.2

INJURIES BY OTHER VEHICLES

With the development of the automobile in the last decade
as the chief mode of transportation, there has been, of course, a
marked decline in the use of other vehicles and a corresponding
drop in the mortality arising out of the use of vehicles.   In 1920,
the rate per 100,000 had declined to 1.8 from a figure of 3.1 in
1911, which represents a decline of 42 per cent.   In the ten year
period, a total of 2,722 was registered.   These were concentrated
heavily among the males, the white males showing a rate of 5.1,
colored males a rate of 4.5 per 100,000, respectively.   The

rates for white and colored females were .7 and .5 per 100,000, respectively. The distribution of the deaths and the corresponding rates show considerable variation from age period to age period with a general tendency toward increase with advancing age. The following table gives the rates per 100,000 by color, sex and age period:

TABLE 20.

MORTALITY FROM INJURIES BY OTHER VEHICLES, CLASSIFIED BY COLOR, SEX AND BY AGE PERIOD.

Death Rates per 100,000 Persons Exposed. 1911 to 1920.

Experience of Metropolitan Life Insurance Company. Industrial Department.

| Age Period | Persons | White | | Colored Males |
		Males	Females	
All ages—one and over............	2.7	5.1	.7	4.5
1 to 4	3.0	3.9	2.1	3.7
5 to 9	2.9	4.7	1.2	3.6
10 to 14	1.6	2.7	.5	2.3
15 to 19	2.0	3.5	.4	3.8
20 to 24	2.4	5.1	.4	2.9
25 to 34	2.2	5.1	.3	3.3
35 to 44	2.6	6.4	.3	4.4
45 to 54	3.5	8.0	.7	7.9
55 to 64	4.2	9.7	.7	10.2
65 and over	6.9	14.0	2.4	14.9

It is noteworthy that the marked decline in the incidence of this form of fatal accident has been accomplished almost entirely in the last half of the decade. This is consistent with the increased use of the automobile. The figures for the individual years of the decade are given below:

TABLE 21.

MORTALITY FROM INJURIES BY OTHER VEHICLES, CLASSIFIED BY COLOR AND BY SEX.

Death Rates per 100,000 Persons Exposed. Single Years in Period 1911 to 1920.

Experience of Metropolitan Life Insurance Company. Industrial Department, and U. S. Registration Area (Ages 1 to 74 years).

Year	Metropolitan Ind'l. Dept.					U. S. Reg. Area Ages 1 to 74 years
	Persons	White		Colored		
		Males	Females	Males	Females	
1911 to 1920	2.7	5.1	.7	4.5	.5	3.0
1916 to 1920	2.3	4.6	.6	3.8	.3	2.6
1920	1.8	3.6	.3	2.8	.4	1.9
1919	2.2	4.4	.5	3.2	.3	2.2
1918	2.5	5.0	.7	3.4	.5	2.6
1917	2.5	4.9	.6	3.9	.4	3.0
1916	2.8	5.4	.7	6.0	.2	3.2
1911 to 1915	3.1	5.8	1.0	5.5	.6	3.6
1915	3.0	5.6	.8	6.2	.2	3.4
1914	2.9	5.4	.9	4.4	.6	3.6
1913	3.4	6.4	1.4	3.6	.7	3.7
1912	3.4	6.2	.9	7.3	1.0	3.6
1911	3.1	5.5	1.0	6.0	.7	3.7
Uniform annual decrement, 1911 to 1920	−.158	−.233	−.082	−.365	−.056	−.203
Per cent. decline: 1920 Since 1911	−41.9	−34.5	−70.0	−53.3	−42.9	−48.6
1916-1920 Since 1911-1915	−25.8	−20.7	−40.0	−30.9	−50.0	−27.8

ABSORPTION OF DELETERIOUS GASES

Nearly all of the deaths reported under this heading were caused by the accidental inhalation of illuminating gas. There was, of course, a small number of deaths due to the absorption of other poisonous gases and vapors such as, sewer gas, anaesthetic vapors, and gases evolved in the domestic and industrial operation of stoves and furnaces. The facts on the color, age and sex incidence for this cause of death are given in the following table:

TABLE 22.

MORTALITY FROM ABSORPTION OF DELETERIOUS GASES,* CLASSIFIED BY
COLOR, SEX AND BY AGE PERIOD.

Death Rates per 100,000 Persons Exposed. 1911 to 1920.

Experience of Metropolitan Life Insurance Company. Industrial
Department.

Age Period	Persons	White		Colored	
		Males	Females	Males	Females
All ages— one and over.....	2.8	4.1	1.9	2.6	1.1
1 to 14	.8	.9	.6	.7	.6
15 to 24	1.5	2.0	1.1	1.9	.9
25 to 34	2.2	3.6	1.4	2.8	1.3
35 to 44	3.4	6.6	1.9	3.3	.9
45 to 54	5.6	10.6	3.2	6.0	.8
55 to 64	9.1	17.0	5.7	2.6	1.7
65 and over	16.8	27.9	12.0	6.6	5.7

*Deaths reported as due to "asphyxia by gas," "gas poisoning," "il-
luminating gas poisoning," etc., although not reported as accidental, are
classified here unless identified as due to suicide or homicide.

There is a successive rise in the death rate from one age group
to the other. The minimum rate was observed in early child-
hood and the maximum in old age.

We show below a table for the single calendar years 1911 to
1920.

TABLE 23.

MORTALITY FROM ABSORPTION OF DELETERIOUS GASES, CLASSIFIED BY
COLOR AND BY SEX.

*Death Rates per 100,000 Persons Exposed. Single Years in
Period 1911 to 1920.*

Experience of Metropolitan Life Insurance Company, Industrial
Department, and U. S. Registration Area (Ages 1 to 74 years).

Year	Metropolitan Ind'l Dept.					U. S. Reg. Area Ages 1 to 74 years
	Persons	White		Colored		
		Males	Females	Males	Females	
1911 to 1920	2.8	4.1	1.9	2.6	1.1	2.7
1916 to 1920	2.9	4.4	1.9	3.0	1.3	2.8
1920	2.3	3.3	1.7	2.4	.8	2.4
1919	2.6	3.8	1.9	1.4	.9	2.5
1918	3.6	5.7	2.1	3.9	1.9	3.1
1917	3.3	4.9	2.1	4.5	1.9	3.2
1916	2.9	4.5	1.8	3.3	1.4	2.9
1911 to 1915	2.6	3.8	1.9	2.0	.8	2.6
1915	2.3	3.6	1.6	1.3	.5	2.3
1914	2.9	4.2	2.1	1.5	1.3	2.7
1913	2.5	3.4	1.9	2.2	1.0	2.5
1912	3.0	4.3	2.2	3.7	.7	2.9
1911	2.3	3.4	1.8	1.5	.7	2.6
Uniform annual decrement, 1911 to 1920.......	+.027	+.061	−.011	+.070	+.058	+.003
Per cent. decline: 1920 Since 1911....	—	− 2.9	− 5.6	+60.0	+14.3	− 7.7
1916-1920 Since 1911-1915	+11.5	+15.8	0.0	+50.0	+62.5	+ 7.7

TRAUMATISM BY FIREARMS

The maximum death rate for this cause was recorded in the
age group 15 to 19 years.   This high death rate in childhood and
early adolescence points to the reckless disposition of firearms in
and about the home, and to the heedless use of these instruments
in the pursuit of outdoor sports.   The high death rates from
accidental gunshot wounds at these ages represent a considerable
part of the total mortality and, if the death rate at this age divi-
sion of life is to be materially reduced, some workable restrictions
upon the sale and use of firearms to and by older children and
adolescents must be put into operation.

TABLE 24.

MORTALITY FROM TRAUMATISM BY FIREARMS,* CLASSIFIED BY COLOR, SEX AND BY AGE PERIOD.

Death Rates per 100,000 Persons Exposed. 1911 to 1920.

Experience of Metropolitan Life Insurance Company. Industrial Department.

Age Period	Persons	White		Colored	
		Males	Females	Males	Females
All ages — one and over......	2.1	3.3	.4	8.5	1.5
1 to 4	1.2	1.3	.8	3.0	3.0
5 to 9	1.4	2.0	.6	5.1	1.3
10 to 14	3.5	5.7	.5	10.3	3.0
15 to 19	4.6	7.2	.8	19.9	.8
20 to 24	2.7	4.0	.3	14.1	3.3
25 to 34	1.8	2.6	.2	9.8	1.5
35 to 44	1.5	2.1	.2	6.8	1.3
45 to 54	.6	1.2	.2	1.5	.3
55 to 64	.7	1.4	.3	1.3	—
65 and over	.6	1.3	.2	1.7	—

*Under this title are classified, also, deaths reported from "gunshot wound," "shot," etc., without qualification as to accidental, suicidal or homicidal character.   Every effort is made to obtain definite information, however, in such cases, and they constitute only a small proportion of the 1,029 deaths classified here.

The death rate from accidental gunshot injuries showed a slight rising tendency throughout the decade.   There was a more decided increase for white males than for the other three color and sex classes.   The following table gives the facts for the individual calendar years of the decade:

TABLE 25.

MORTALITY FROM TRAUMATISM BY FIREARMS, CLASSIFIED BY COLOR AND BY SEX.

Death Rates per 100,000 Persons Exposed. Single Years in Period 1911 to 1920.

Experience of Metropolitan Life Insurance Company, Industrial Department, and U. S. Registration Area (Ages 1 to 74 years).

Year	Metropolitan Ind'l Dept.					U. S. Reg. Area Ages 1 to 74 years
	Persons	White		Colored		
		Males	Females	Males	Females	
1911 to 1920	2.1	3.3	.4	8.5	1.5	2.5
1916 to 1920	2.2	3.5	.5	8.8	1.4	2.5
1920	2.3	3.6	.5	10.1	1.7	2.6
1919	2.2	3.4	.5	10.7	1.3	2.8
1918	2.4	4.2	.5	8.4	1.5	2.5
1917	1.9	3.0	.5	5.8	1.7	2.4
1916	1.9	3.1	.3	8.4	.8	2.3
1911 to 1915	1.9	3.0	.4	8.1	1.7	2.4
1915	1.7	2.7	.4	5.7	1.7	2.3
1914	2.0	2.7	.4	10.2	1.9	2.5
1913	2.2	3.5	.5	9.3	1.5	2.5
1912	2.0	3.1	.3	7.9	2.1	2.3
1911	1.7	2.8	.3	7.3	1.1	2.3
Uniform annual decrement, 1911 to 1920.......	+.047	+.085	+.021	+.181	−.010	+.036
Per cent. decline: 1920 Since 1911....	+35.3	+28.6	+66.7	+38.4	+54.5	+13.0
1916-1920 Since 1911-1915	+15.8	+16.7	+25.0	+ 8.6	−17.6	+ 4.2

ACCIDENT FATALITIES ARISING OUT OF OR IN THE COURSE OF EMPLOYMENT

The statistical records on accident fatalities among insured wage earners were compiled so that it was possible to show the number and proportion of accidental deaths due to occupational causes. The series of data with respect to this disease begins with the year 1912. During the nine year period (1912 to 1920), 29 per cent. of the deaths from all types of accidents were due to occupational causes. The death rate from fatal industrial accidents over the nine year period was 36.0 per 100,000 white males at ages 15 years and over. It should be understood that this death rate represents the number of fatal industrial accidents in relation to the total number of white males at ages 15 and over, and not to the number gainfully employed in industrial pursuits.

This measure of industrial accident mortality is sufficiently sensitive, however, to show the effect of industrial conditions during the war upon the death rate for this cause. Prior to the war, the highest death rate prevailed in the year 1913, (45.7); this was followed by a sharp drop to 27.5 in 1915, the lowest rate in the nine year period. This marked decline in fatal industrial accidents may have been due to the rapid extension of safety work in American industry as a consequence of the development of workmen's compensation legislation. But, the gains were soon offset by the marked increase in industrial activity which followed the outbreak of the Great War. The death rate for fatal industrial accidents among these insured white males, ages 15 years and over, rose from a minimum of 27.5 in 1915 to 40.9 in 1918, an increase of nearly 50 per cent. in three years. In 1919, a lower rate (32.1) was observed and in 1920, a slight rise to 34.9 was recorded. The proportion of deaths due to industrial causes in the total accidents reported for each of the important specific types of injury are shown in the following table:

TABLE 26.

NUMBER OF DEATHS FROM ALL ACCIDENTS; NUMBER AND PROPORTION ARISING FROM INDUSTRIAL CAUSES.

White Males 15 Years of Age and Over.

Metropolitan Life Insurance Company, Industrial Department, 1912-1920.

Type of Accident	Deaths, all form of Accidents	Occupational Accidents	
		Deaths	Percentage of total Accidents
Total Specified Causes.............	27,074	7,835	28.9
Conflagration....................	284	61	21.5
Burns..........................	787	222	28.2
Absorption of deleterious gases.....	1,420	103	7.3
Accidental drowning..............	4,174	308	7.4
Traumatism by fall...............	4,826	1,164	24.1
Traumatism in mines and quarries..	966	899	93.1
Traumatism by machines..........	1,223	976	79.8
Railroad accidents and injuries.....	4,816	1,846	38.3
Street car accidents and injuries....	1,325	238	18.0
Automobile accidents and injuries..	2,546	224	8.8
Other vehicular accidents and injuries........................	1,331	471	35.4
Other crushing accidents and injuries	371	247	66.6
Injuries by animals..............	179	73	40.8
Electricity—lightning excepted.....	642	436	67.9
Fractures—cause not specified......	568	12	2.1
Other external violence............	1,616	555	34.3

Nearly all of the accidents in mines and quarries were occupational in origin. Injuries by animals were sustained in the course of occupational pursuits in 41 per cent., for railroad accidents and injuries in 38 per cent., for burns in 28 per cent., for traumatism by machines in 80 per cent., and for electricity in 68 per cent. of the total accidents recorded on this group of adult white males.

These statistics suggest the compilation of further data to show what number and proportion of accidents are due to other than industrial hazards. As indicated in the preceding portion of this paper, plans are at present under way to show what parts of the total accident experience are contributed by hazards arising in and about the home, from the use of public highways, and of vehicles thereon, and in buildings and other public facilities.

CHART III.

Death Rates per 100,000 from
SPECIFIED FORM OF ACCIDENTAL INJURY 1911 TO 1920

M.L.I.Co. Industrial Dept. ———   U.S.Reg. Area Ages 1 to 74 — — — —

TRAUMATISM BY FALL

ACCIDENTAL DROWNING

BURNS

RAILROAD ACCIDENTS

AUTOMOBILE ACCIDENTS

STREET CAR ACCIDENTS

CHART IV.

Death Rates per 100,000 from
SPECIFIED FORM OF ACCIDENTAL INJURY
and from **SUICIDES & HOMICIDES 1911 TO 1920**
M.L.I.Co. Industrial Dept. ———   U.S. Reg. Area Ages 1 to 74 ———

TRAUMATISM BY MACHINES

INJURIES BY OTHER VEHICLES

ABSORPTION OF DELETERIOUS GASES

TRAUMATISM BY FIREARMS

SUICIDES~TOTAL

HOMICIDES~TOTAL
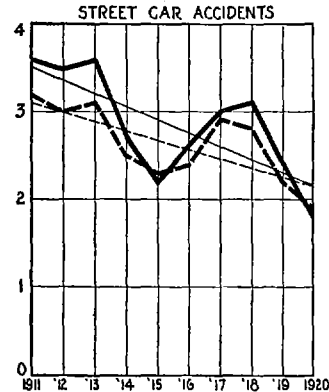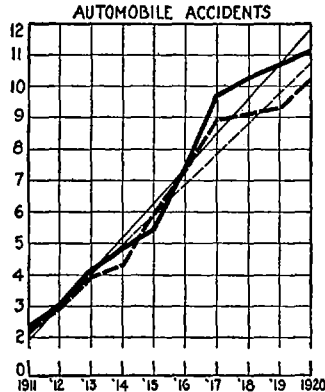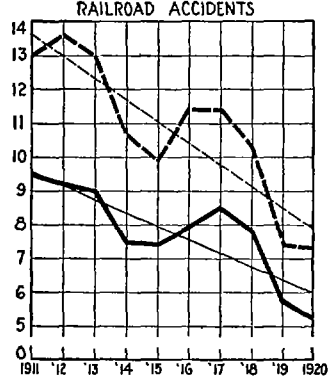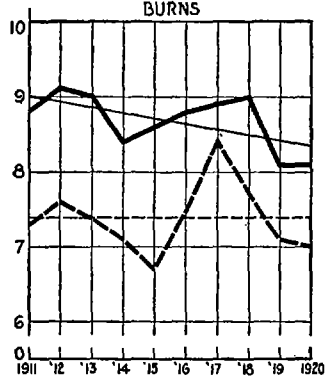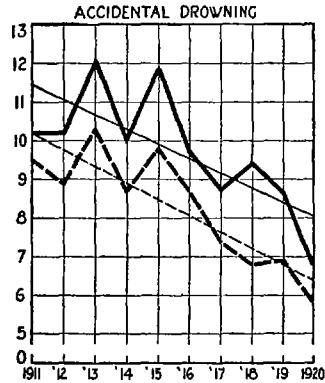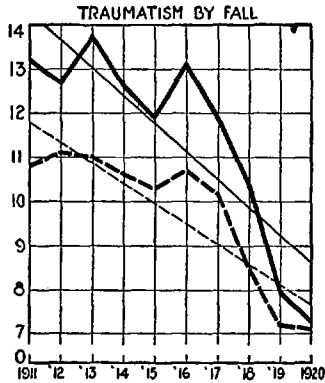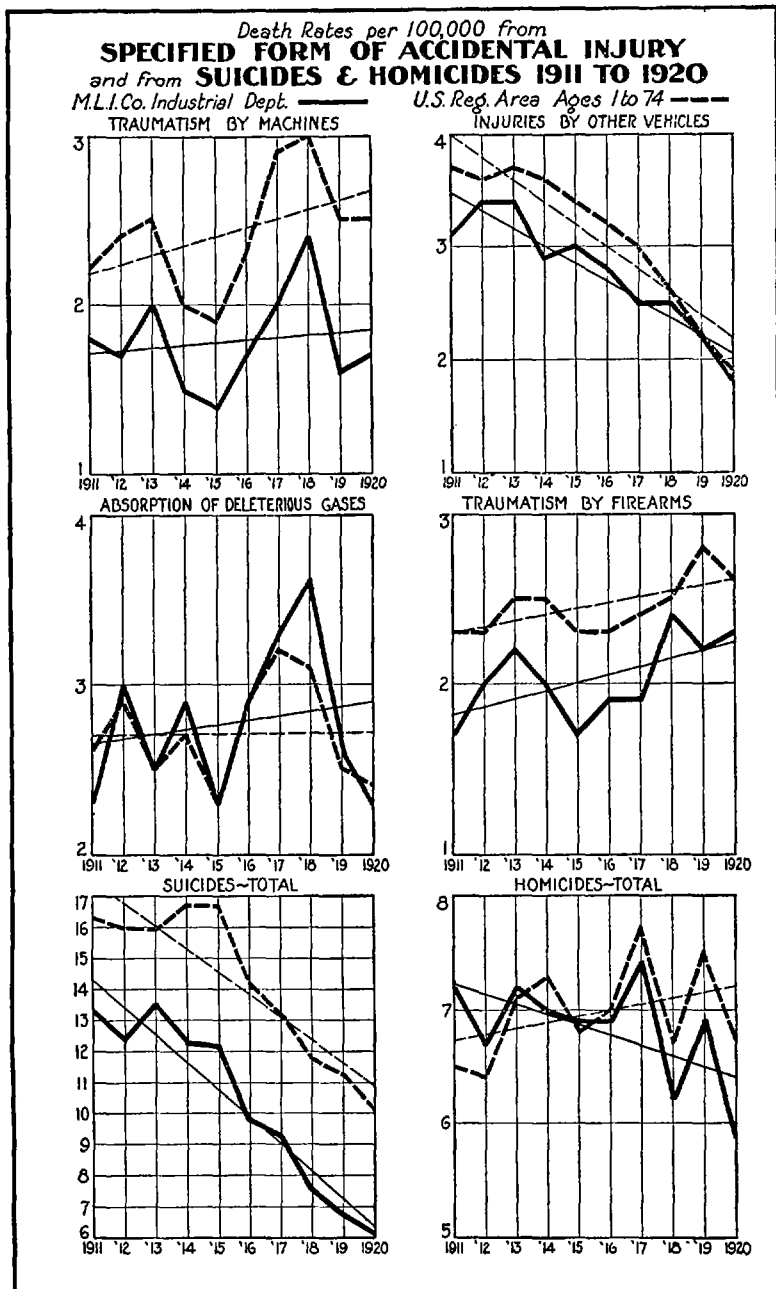
II. SUICIDES

The suicide experience of these insured wage earners has been found to reflect the state of economic well-being of the wage working groups of the American population. Because of the more or less difficult industrial situation of the years preceding the war, the suicide death rate of this group of insured wage workers exceeded decidedly the line of secular trend for the decade. Beginning with the war years, however, there was a sharp drop in suicide mortality. The rate for the year 1920 was 54 per cent. below that for the year 1911. There was a more rapid decline in suicide mortality among insured wage earners than among the general population of the United States Registration Area. This is shown in Table 28 and in Chart IV on page 76.

Each of the color and sex groups in this experience has a decidedly different suicide mortality curve with respect to age. For white males for the decade 1911 to 1920, there is a sharply rising death rate up to the age period 20 to 24 years. A more gradual but uniform increase with advancing age was observed between the age divisions 20 to 24 and 65 to 74 years. After that age, the rate continued to rise somewhat less sharply until the maximum was reached in old age. Among white females, there was a very sharp rise with advancing age in the suicide mortality rate under 25 years. Between 15 and 19 years, and at no other age division, the suicide death rate of white females (5.8 per 100,000) exceeds that for white males (4.4 per 100,000). This excess in the suicide death rate of white females in adolescence has been observed in many other suicide studies. After age 25, the rate for white females continues to the end of life with very little variation from a rate of about 10 per 100,000. This is decidedly in contrast to the uniform advance in the suicide rate with age among white males.

The low suicide death rate among colored persons has always been of interest to students of the comparative mortality of the two races. There is a sharp rise for colored males during childhood and adolescence to a rate of 12.8 per 100,000 in the age group 20 to 24 years. At ages beyond 25, with an unimportant variation at the ages 45 to 54 years, there is practically a stationary death rate up to about age 60. Beyond age 60, the suicide death rate of colored males declines.

CHART V.

MORTALITY FROM SUICIDES ALL FORMS

Death Rates per 100,000 Persons Exposed. Classified by Age Periods.
White and Colored Groups Compared for each Sex Class.
Experience of Metropolitan Life Insurance Co. Industrial Department. 1911 to 1920.

Death Rate per 100,000

White Males - - - - -
Colored Males ———

CENTRAL AGE

Death Rate per 100,000

White Females - - - - -
Colored Females ———

CENTRAL AGE
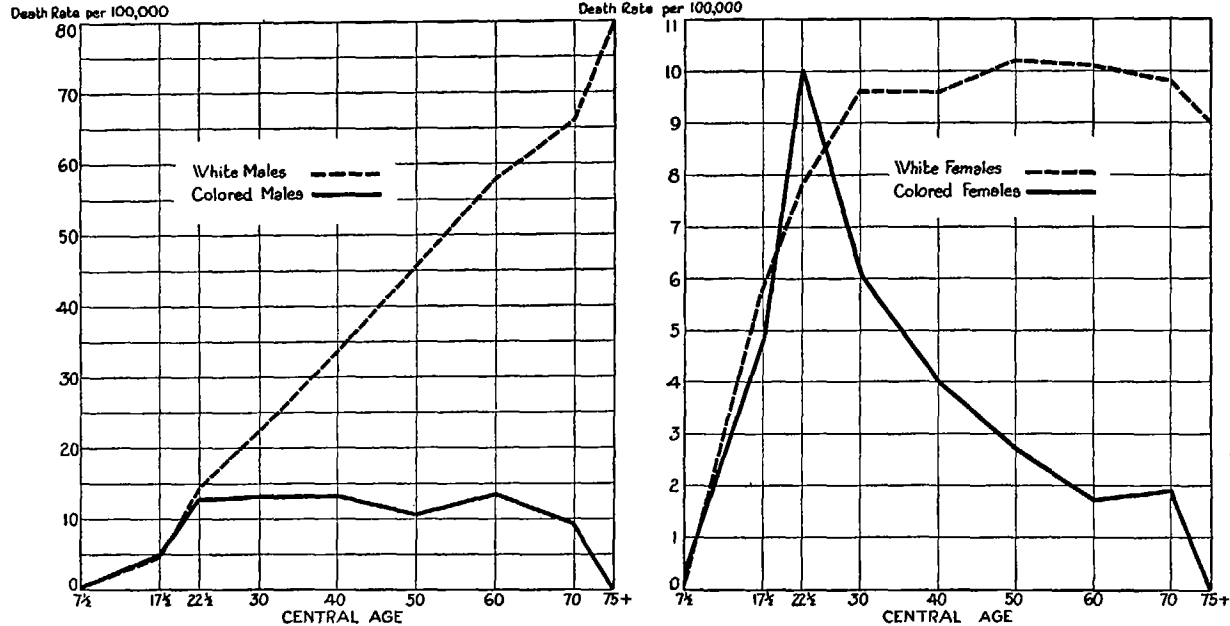
The suicide mortality experience of colored females is radically different with respect to age from that of the other three color and sex groups. The suicide death rate rises to a maximum, 10.0 per 100,000, at the age period 20 to 24 years and then declines very sharply to a second minimum in old age. At the age period 20 to 24 years, the suicide death rate of colored females exceeds that of white females. The following table, and Chart V on page 78, give the suicide death rates by color, sex and age.

TABLE 27.

MORTALITY FROM SUICIDE (ALL FORMS), CLASSIFIED BY COLOR, SEX AND BY AGE PERIOD.

Death Rates per 100,000 Persons Exposed. 1911 to 1920.

Experience of Metropolitan Life Insurance Company. Industrial Department.

Age Period	Persons	White		Colored	
		Males	Females	Males	Females
All ages—one and over..........	9.9	15.8	6.0	8.7	4.0
1 to 14	.1	.2	.1	.2	.3
15 to 19	5.1	4.4	5.8	4.9	4.8
20 to 24	10.8	14.4	7.8	12.8	10.0
25 to 34	14.0	22.4	9.6	13.1	6.1
35 to 44	17.0	33.8	9.6	13.2	4.0
45 to 54	21.0	45.7	10.2	10.6	2.7
55 to 64	25.8	57.9	10.1	13.5	1.7
65 to 74	28.6	66.0	9.8	9.4	1.9
75 and over	31.5	79.4	9.0	—	—

A table showing the trend of suicide mortality according to color, sex and age for the decade 1911 to 1920 is shown below:

TABLE 28.

MORTALITY FROM SUICIDE (ALL FORMS), CLASSIFIED BY COLOR AND BY SEX.

Death Rates per 100,000 Persons Exposed.   Single Years in Period 1911 to 1920.

Experience of Metropolitan Life Insurance Company, Industrial Department, and U. S. Registration Area (Ages 1 to 74 years).

Year	Metropolitan Ind'l Dept.					U. S. Reg. Area Ages 1 to 74 yrs.
	Persons	White		Colored		
		Males	Females	Males	Females	
1911 to 1920	9.9	15.8	6.0	8.7	4.0	13.9
1916 to 1920	7.8	11.6	5.3	7.2	3.1	12.0
1920	6.1	8.7	4.5	4.8	2.8	10.1
1919	6.8	9.7	4.9	7.2	3.4	11.3
1918	7.6	10.9	5.4	8.1	3.0	11.8
1917	9.3	14.6	5.8	8.2	3.2	13.2
1916	9.8	15.3	6.3	8.2	3.4	14.2
1911 to 1915	12.7	21.3	6.9	10.5	5.2	16.3
1915	12.2	19.6	7.5	7.3	6.0	16.7
1914	12.3	20.6	6.4	11.6	5.3	16.7
1913	13.5	23.3	7.0	11.7	4.8	15.9
1912	12.4	20.9	6.5	12.9	3.3	16.0
1911	13.3	22.4	7.2	9.2	6.5	16.3
Uniform annual decrement, 1911 to 1920....	−.878	−1.733	−.282	−.647	−.306	−.741
Per cent. decline: 1920 Since 1911	−54.1	− 61.2	−37.5	−47.8	−56.9	−38.0
1916-1920 Since 1911 -1915.............	−38.6	− 45.5	−23.2	−31.4	−40.4	−26.4

Suicide According to Principal Means of Injury

A few facts on the means of injury employed in accomplishing suicides will be of interest.   For the entire ten year experience, 31 per cent. of the suicides were accomplished by means of poison; 24 per cent. by means of firearms; 17 per cent. by asphyxia and 12 per cent. by hanging.   During the decade, however, there has been a decided change in the choice of means used to accomplish self-destruction.   In the first five years of the decade, suicide by poison led the list (37.3 per cent. of all suicides); in the second five years, suicide by firearms was the chief means of accidental injury (26.1 per cent.).   There was an increase also in the proportion of suicides due to asphyxia (from 15.3 per cent. to 19.8 per cent.).   The most important fact is the sharp

drop in the proportion of suicides due to poisoning. It may be possible that more stringent regulations on the sale of poisonous substances may have been an influence not only in lessening the proportion of suicides accomplished in this manner, but also in lowering the suicide death rate. The following table shows the proportion of all suicide deaths due to each of the principal means of injury:

TABLE 29.

SUICIDES BY INSTRUMENT OR AGENCY OF INJURY.

Metropolitan Life Insurance Company. Industrial Department.
1911 to 1915 and 1916 to 1920 Compared.

Means of Injury	Percentage of total suicide deaths		
	1911 to 1920	1916 to 1920	1911 to 1915
SUICIDES—TOTAL...................	100.0	100.0	100.0
Poison........................	30.7	22.7	37.3
Asphyxia......................	17.3	19.8	15.3
Hanging or strangulation.........	12.0	12.6	11.6
Drowning......................	5.6	6.4	4.9
Firearms......................	24.3	26.1	22.8
Cutting or piercing instruments..	5.9	6.9	5.1
Jumping from high places........	2.0	2.6	1.4
Crushing......................	.4	.4	.5
Other means...................	1.7	2.4	1.1

III. HOMICIDES*

During the decade, 6,899 homicides were recorded among this group of insured wage earners. The rate for the decade was 6.8 per 100,000 lives exposed. The facts for homicide according to mode of injury are shown in the following table:

TABLE 30.

HOMICIDES* BY INSTRUMENT OR AGENCY OF INJURY.

Metropolitan Life Insurance Company. Industrial Department.
1911 to 1915 and 1916 to 1920 Compared.

Means of injury in homicide	Percentage of total homicide deaths		
	1911 to 1920	1916 to 1920	1911 to 1915
HOMICIDES—TOTAL...............	100.0	100.0	100.0
Firearms......................	66.8	68.5	64.6
Cutting or piercing instruments...	14.9	13.5	16.7
Other means...................	18.3	18.0	18.8

*Under "Homicide" are classified only those cases in which the fact of homicide or of attempt at homicide is clearly shown. By careful "editing" of our data relating to causes of death many cases originally reported under such terms as "gunshot wound," "cut," "poisoning," and others have been classed as homicides instead of being placed under the "accidental or unqualified" group.

It will be observed that during the decade about two-thirds of the homicides were accomplished by means of firearms. The last five years of the decade showed a slightly greater proportion of homicides due to firearms than did the first five years. The more significant reduction for a specific means of injury in proportion to total homicides occurred for homicides by cutting or piercing instruments. During the five years 1911 to 1915, 16.7 per cent. of the homicides were accomplished by cutting or piercing instruments, and in the five year period, 1916 to 1920, only 13.5 per cent. were due to homicidal injury from cutting or piercing instruments. This points to fewer stabbing affrays in recent years.

The color, sex and age characteristics of homicide mortality are shown in the following table:

TABLE 31.

MORTALITY FROM HOMICIDE (ALL FORMS), CLASSIFIED BY COLOR, SEX AND BY AGE PERIOD.

Death Rates per 100,000 Persons Exposed. 1911 to 1920.

Experience of Metropolitan Life Insurance Company. Industrial Department.

Age Period	Persons	White		Colored	
		Males	Females	Males	Females
All ages—one and over..........	6.8	5.4	2.0	50.1	14.0
1 to 14	.8	.7	.6	3.9	1.3
15 to 19	5.9	4.4	2.1	43.4	14.6
20 to 24	12.0	8.9	3.6	85.4	30.9
25 to 34	15.1	11.9	3.6	98.3	24.7
35 to 44	11.8	10.8	3.0	66.9	14.7
45 to 54	7.0	9.2	1.7	37.9	7.1
55 to 64	4.1	6.4	1.0	19.7	4.6
65 to 74	2.7	4.0	1.2	10.3	3.2
75 and over	2.9	1.6	1.3	21.7	14.6

For the entire experience of insured wage earners, the maximum death rate is observed in the age period 25 to 34 years. Among colored females, however, the maximum death rate occurred at the age group 20 to 24 years. The outstanding fact in this homicide mortality experience with respect to color is the very high death rate among negro males. This group showed a homicide death rate practically ten times that of white male policyholders; for colored females, the homicide death rate was seven times that of white females. The more serious discrepancies

MORTALITY FROM HOMICIDES *ALL FORMS*

Death Rates per 100,000 Persons Exposed.   Classified by Age Periods
White and Colored Groups Compared for Each Sex Class.
Experience of Metropolitan Life Insurance Co. Industrial Department, 1911 to 1920

Death Rate per 100,000

Death Rate per 100,000

White Males -------
Colored Males ———

White Females -------
Colored Females ———

CENTRAL AGE

CENTRAL AGE
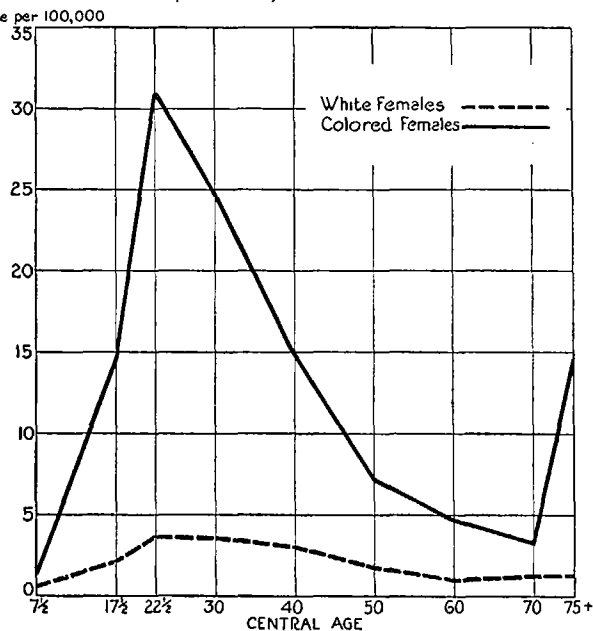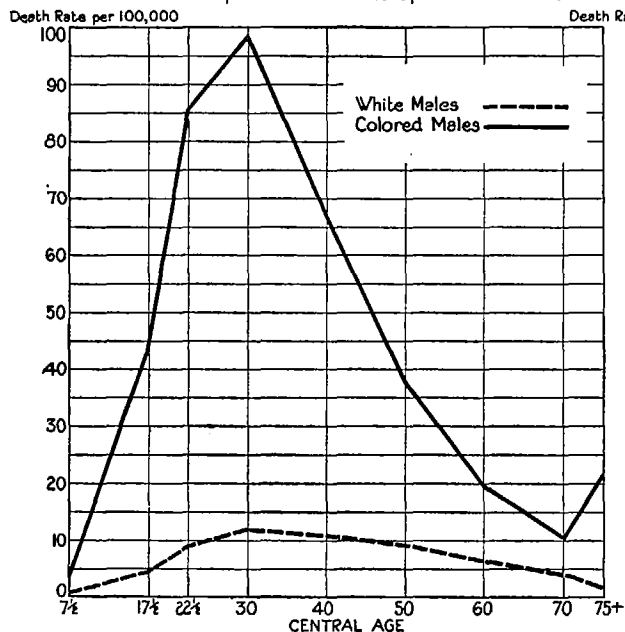
between the homicide death rate of negro and white males occur in the ages under 25 years.

Homicide is one of the leading causes of death among the negro population of the United States. For the mortality experience of the decade 1911 to 1920, homicide ranked next to pneumonia and tuberculosis as a cause of death among young adult colored males. The comparison of the homicide death rates of the two sexes is also of interest. Among white persons, the homicide death rate of males was nearly three times and among negroes nearly four times as great as among females of the respective races. The greatest disparity between the homicide death rates of the two sexes is found between 55 and 64 years for white persons and between 45 and 54 years for colored persons.

The trend of the homicide death rate during the ten year period is shown in the following table:

TABLE 32.

MORTALITY FROM HOMICIDE (ALL FORMS), CLASSIFIED BY COLOR AND BY SEX.

Death Rates per 100,000 Persons Exposed. Single Years in Period 1911 to 1920.

Experience of Metropolitan Life Insurance Company, Industrial Department, and U. S. Registration Area (Ages 1 to 74 years).

Year		Metropolitan Ind'l Dept.				U. S. Reg. Area Ages 1 to 74 years
	Persons	White		Colored		
		Males	Females	Males	Females	
1911 to 1920	6.8	5.4	2.0	50.1	14.0	7.0
1916 to 1920	6.6	5.4	2.0	48.8	14.0	7.1
1920	5.8	5.1	1.8	38.5	13.3	6.7
1919	6.9	5.7	2.0	51.7	14.6	7.5
1918	6.2	5.2	1.8	43.5	14.0	6.7
1917	7.4	5.6	2.4	58.6	14.0	7.7
1916	6.9	5.4	2.0	54.0	14.3	7.0
1911 to 1915	7.0	5.4	1.9	51.8	14.0	6.8
1915	6.9	5.5	2.0	49.9	15.8	6.8
1914	7.0	5.5	1.9	54.0	12.6	7.3
1913	7.2	4.8	2.1	57.8	13.1	7.1
1912	6.7	5.2	1.6	50.4	12.8	6.4
1911	7.2	5.9	2.0	46.2	15.9	6.5
Uniform annual decrement, 1911 to 1920	−.091	−.009	+.006	−.690	−.022	+.054
Per cent. decline: 1920 Since 1911 ...	−19.4	−13.6	−10.0	−16.7	−16.4	+ 3.1
1916-1920 Since 1911-1915	− 5.7	0.0	+ 5.3	− 5.8	0.0	+ 4.4

From Chart IV on page 76, it will be seen that among insured wage earners, the trend of the homicide death rate, was slightly downward, whereas, in the United States Registration Area, the trend for the decade was upward. It should be recalled, however, that in the United States Registration Area, a number of Southern states were added during recent years, and this may serve to impair the comparability of the figures for the two series. These States had heavy proportions of negroes in the population. Considering only the insurance figures, it will be seen that the death rates for the years 1913 to 1917 were each year above the line of secular trend. After a rather low rate in 1918, another high death rate from homicide was experienced in 1919, followed by a drop in 1920. It is hoped that the effect of nationwide Prohibition will be ultimately to decrease the death rate from this cause. Other measures directed at the preservation of public order may in time bring about a marked reduction in fatalities from this cause.

Further details of the experience have been prepared, but not published, for single calendar years of the decade, by color, sex and by age. Certain groupings of the data by age for the first five as compared with second five years in the decade are also available in manuscript form. Quotations from unpublished data will be made gladly.

OBSERVATIONS ON PENSION FUNDS FOR EMPLOYES RENDERED PERMANENTLY DISABLED BY REASON OF A SECOND INJURY

BY

A. H. MOWBRAY.

It is clearly the intent of the compensation laws of all of the states that the employe receiving a permanent injury of a serious character which, however, does not prevent his doing some useful work, shall not be regarded as permanently and totally disabled, but rather that he shall be restored to the working force as soon as his recovery from his physical injuries and suitable retraining will permit. This is shown by the fact that even where injuries resulting in permanent total incapacity are compensated with a life pension, permanent injuries of only partially incapacitating nature are compensated with temporary benefits. In some states* these benefits are based distinctly upon the so-called "rehabilitation theory" and intended to cover a term during which the employe may rehabilitate himself and in other cases this type of benefit appears to have been dictated only by the convenience in settling claims.

The passage of the workmen's compensation laws, however, has tended to handicap the disabled man in getting back into industry. Under liability conditions, when the doctrine of assumption of risk enabled the employer to set up and plead, as a defence against a suit for damages, that the employe had assumed the risk of the industry, there was little likelihood of his having to pay a large claim arising out of the second injury of a workman who was already partially disabled at the time of his employment. But, under the compensation law, when this doctrine is abolished and all cases of injury arising out of the industry are compensable, it is certain the employer or his insurance carrier will have to pay a claim in such cases and because of the previous injury the claim would in most cases, be for permanent total disability with a correspondingly large cost unless some provision to the contrary has been inserted in the law. To this condition is added the fear that a partially

* e. g., California.

disabled employe is more liable to accident.   Consequently a
self-insured employer would be less willing to take on an employe
already partially disabled and a careful underwriter would look
askance at the acceptance of a risk where he knew there were
employed a number of workers who had sustained serious par-
tially disabling injuries óf a permanent nature.

This was the situation under the New York law as originally
passed and is yet the condition in several states.   It came to
the attention of the late John Mitchell, when Chairman of the
Industrial Commission of New York and the difficulties of the
situation were clearly recognized by him.   The smaller cost
under the compensation law for death benefits when an employe
left no dependents than where there were dependents entitled
to compensation was also noted by him as a force which tended
to the discrimination against the employment of men with
families and in favor of single men.   To the extent that the cost
of such cases can be equalized with the cost of cases where
dependents are left, this force would be diminished.   It therefore
occurred to Mr. Mitchell that the situation in both cases might
be helped if the insurance carrier (including, of course, self-
insurers) covering the risk employing the partially incapacitated
man were relieved of liability for compensation beyond that
specified for the second disabling injury in cases of the first type
and a trust fund were created for paying the remainder of the
permanent total benefit, the support of such fund being derived
from small payments by such carriers in respect to each "no
dependency" death case.   Accordingly on his initiative the com-
pensation law of New York was amended in 1916 so as to pro-
vide for such a trust fund, this fund to be maintained by the
payment into the state treasury of $100 for each "no dependency"
death case.

There was some question as to the constitutionality of this
provision.   The theory was advanced that it was a special and
discriminatory tax based upon a false and improper discrimi-
nation, but the matter has been liberally construed and in New
York no constitutional objection has been found.   Objection
has been found in some other jurisdiction on these grounds.

A fund created in this way is distinctly a pension fund and has
all the difficulties of financial administration which characterize
pension funds and certain peculiar ones of its own.   These

latter arise from the facts that (1) its source of income is not in any way closely associated with the cause of its disbursements, but is a fixed amount per occurrence of fatal cases where no dependents are left, (2) the contingencies covered are of rare and infrequent occurrence, but very costly when occurring, making a determination of their probability and expected cost most difficult, and (3) there is no provision either for meeting a deficit or for disposing of a surplus. Hence there is no way, without new legislation, to adjust income and outgo, or meet any contingencies which may arise.

From the technical, actuarial point of view, it would appear that the revenue of such a fund should be in some way more closely associated with the cause of its disbursements, perhaps, for example, being a function of the cost of major permanent disability cases, from among which must arise the cases of second injury which cause the disbursement. However, actuarial refinements must always give place to broad questions of social policy and if social advantages can be gained by deriving the income from the "no dependency" death cases this must be accepted as a basis.

All pension funds, when not critically examined from an actuarial standpoint, have the common characteristics of appearing to accumulate a handsome surplus for a considerable period of years after their inauguration, even though in actual fact their revenues may not be sufficient to meet their ultimate outgo. It is often only after a period of years, and sometimes after it is too late to effect a remedy, that the difficulty is discovered. Funds of the type in question share this peculiarity, since the revenue comes in immediately on the happening of the "no dependency" death cases, but the disbursements for compensation are spread over a long period of time and do not begin, under the New York law, until at least two and one-half years after the injury has taken place.* For some types of cases the interval is much longer. There is further no provision in the New York law, nor, I believe, in the laws of other states, for special notice to the administration of the pension fund that cases are due to come upon the fund until at, or near, the termination of the period during which the insured is paying

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* For other states the periods are somewhat different.

the benefits.   This tendency of the fund will perhaps be made clearer by an illustration.

We may assume, for purposes of illustration, that in New York there occur 150 "no dependency" fatal cases each year, and there also occur annually 2 cases of the loss of an eye to an employe who has already lost the sight of the other eye.   The present value of the future compensation in such cases averages close to $10,000 each.   For purposes of convenience we may also assume that these cases occur exclusively at the middle of the year.   The carrying company will pay compensation for 128 weeks on these cases so that they will not come upon the trust fund until the third year and then only for two weeks.   It will also simplify the problem and not invalidate the principle if we ignore the element of interest.

Under the above conditions the following table will show the progress of such a fund for the first eleven years from its inception:

SIMPLE EXAMPLE OF THE GROWTH OF A FUND ACCUMULATED WITHOUT INTEREST BY THE PAYMENT OF $100 EACH FOR 150 DEATH CASES OCCURRING ANNUALLY TO PROVIDE PENSIONS OF $20 PER WEEK FOR LIFE TO TWO CASES OCCURRING EACH YEAR AT MID-YEAR AND ENTITLED TO RECEIVE THE BENEFIT BEGIN-NING AFTER 128 WEEKS, THE PRESENT VALUE OF EACH CASE BEING ESTIMATED AT $10,000.

Year	Year's income	Cumulative income	Year's inc'd loss	Cumulative inc'd loss	Year's payments	Cumulative payments
1	15,000	15,000	20,000	20,000	....	....
2	15,000	30,000	20,000	40,000	....	....
3	15,000	45,000	20,000	60,000	80*	80
4	15,000	60,000	20,000	80,000	2,160	2,240
5	15,000	75,000	20,000	100,000	4,320	6,560
6	15,000	90,000	20,000	120,000	6,480	13,040
7	15,000	105,000	20,000	140,000	8,640	21,680
8	15,000	120,000	20,000	160,000	10,800	32,480
9	15,000	135,000	20,000	180,000	12,960	45,440
10	15,000	150,000	20,000	200,000	13,120	58,560
11	15,000	165,000	20,000	220,000	15,280	73,840

*Two weeks at $20 on each of two cases.

It will be noted that notwithstanding the fund is piling up a deficit at the rate of $5,000 a year under the $100 contribution, it is not until the eleventh year that the cash outgo exceeds the income and in the meantime the fund, including its interest accumulations, will have reached almost, if not quite, $100,000. During the intervening period the fund will have appeared proportionally even more prosperous.   In the illustration it

has also been assumed that no death takes place among the pensioners for the first eleven years.   One or more deaths would make the fund appear even more prosperous.

My attention was directed to this provision of the law during the time I was connected with the State Industrial Commission through the receipt of a telegram from the authorities of another state asking how this provision was working because they were contemplating the introduction of this provision into their law. I attempted to investigate and found a considerable amount had been collected but no disbursements had yet been made, the amendment having been passed only about two years before. Nor could I ascertain what claims were likely to come upon the fund.   I did find, however, cases in the experience of the State Fund whose present value was alone nearly equal to the amount collected and considering the proportion of business done by other carriers and self-insurers, it seemed to me probable that the revenues of the Fund were insufficient to meet its obligations. This was not found in time to advise against copying the scheme in other states in the same terms.   I took this up with different members of the Commission and an investigation was ordered, but up to the time I severed my connection with the Commission, I was not able to obtain the particulars as to cases likely to come on the fund.   The result of my suggestion that the revenues might not have been sufficient, however, appears to have borne fruit in the amendment of the law passed at the last (1922) session of the Legislature which increased the payment for each "no dependency" death case to go into this fund from $100 to $500.

From such investigation as I was then able to make, it has seemed to me this amount is more than will be necessary to meet the requirements of such a fund and I have, therefore, endeavored to investigate the matter further so far as it is possible.   In this investigation I have had the opportunity to go through the experience records, for New York State, of the National Council on Workmen's Compensation Insurance, covering policy years 1916, 1917 and 1918, and through the courtesy of the New York Insurance Department, have been furnished particulars with respect to policy year 1919.   During policy years 1916 and 1917, individual reports on major permanent partial disability cases were not called for in Schedule Z.   It is, therefore, not entirely

feasible to check out all the cases accurately from the data of the National Council, inasmuch as such pension cases would be reported by the companies not as "permanent total," but, as "major permanent partial" since this is all the liability the individual carriers would incur. The figures for 1916 and 1917, however, tend to confirm the figures for the other years. Policy year 1918 shows 125 "no dependency" death cases and two cases where the loss of an eye to an injured employe who already had lost the sight of his other eye made the case one which would potentially come upon this fund. There are one or two other cases reported under the major permanent partial for which the particulars are not clear whether or not they will come upon this fund. For policy year 1919 the figures are 109 "no dependency" death cases and 1 pension case.

In view of the limited amount of data available from these sources, I have obtained through the courtesy of Mr. S. B. Perkins, the experience in this regard of the Travelers Insurance Company for the States of Connecticut, Illinois, Massachusetts, New Jersey, New York, Pennsylvania and Maine for policy years 1917, 1918 and 1919. In this experience there were 294 "no dependency" death cases and 2 cases of permanent total disability from second injury, the type of cases which would come upon such a pension fund.

If the figures above quoted are typical it would appear that the revenue provided by the law as now amended will be far more than is needed by this fund and instead of having a deficit to deal with the Industrial Commission and the State Treasurer will have accumulated a handsome surplus.

The need for careful scrutiny of this fund is appreciated by the Insurance Department of New York as may be noted from the following observations appearing in the recent annual report of the Superintendent of Insurance:

"In accordance with section 15, subdivision 7, and section 27 of the Workmen's Compensation Law, the State Industrial Commission has created two trust funds. Under section 15 each carrier or employer is required to pay $100 to the State treasurer in every death case where there are no dependents. This money is used to compensate injured employees who have become permanently and totally disabled as a result of a second accident. * * * The statement has been made publicly that the fund created under section 15 is actually insolvent. In

view of these facts, it is suggested that next year a law be passed providing that these funds be placed under the supervision of this Department."

The carrying through of this recommendation will be at least one step in the right direction.

It seems to me, however, that something further is necessary and that the legislation as it now is, is fundamentally faulty in the following respects—it provides a fixed revenue which can only be altered by legislative action, and a fixed benefit which likewise can only be modified by legislative action, yet it provides no means for making up a deficit or disposing of a surplus. Neither does it provide for any advance notice for cases which are likely to become claims upon the fund.

It would seem that a much wiser type of legislation, from the actuarial point of view* would be one which provides:

1.   That until a fixed date, the amount payable into the fund for each "no dependency" death case shall be $100 or some other sum stipulated in the law with the proviso that after that date the amount of such payments shall be periodically revised, either by the Superintendent of Insurance or by the Industrial Commission at least once every five years;

2.   That in order to insure adequate notice of cases liable to become claims upon this fund, the insurance carrier shall only be relieved of its liability for taking care of the case as a life pension case in event that notice is given to the Industrial Commission and State Treasurer within a limited time, say 30 or 60 days after the case has been found by the carrier to be such that it will eventually fall upon this fund;

3.   That periodically, not less often than once in five years, an actuarial investigation of the fund shall be made by the Superintendent of Insurance or the Industrial Commission, or perhaps both in conjunction, including a determination of assets and liabilities as well as income and disbursements, and a study of the probable future relative rates of occurrence of "no dependency" death cases and pension cases be made;

4.   That after each such investigation the amount payable for each "no dependency" death case shall be redetermined as noted in (1) and fixed for the ensuing period of five years, the redetermination to be made in such way as will maintain the fund solvent from an actuarial point of view and yet tend to accumulate

*I have not investigated what, if any, legal objections there might be to it.

no more surplus than is reasonably justified by the probabilities of variation either in the rates of income or claims, or in the value of securities held as assets.

In view of the fact that the principle embodied in the New York Law is being extended and incorporated in the laws of several other states, it becomes increasingly important that we should work for the establishment of these funds on a sound actuarial basis.

CREDIT INSURANCE*

A large percentage of mercantile business transacted is on credit for terms which vary from ten days to six months, or more, according to the class of trade. The amount of credit extended to individual debtors is generally based upon the estimated capital and credit rating of the corporation, firm or individual, indicated by a Mercantile Agency in its published books or reports. The outstanding accounts receivable range in value from 10% to 25% of a merchant's annual business. For such accounts he usually has nothing more than the acknowledged obligation of the debtor for the open account, or his promise to pay in the form of a note, always subject to the honesty and ability of the debtor to pay.

It frequently occurs, however, that the debtor defaults in payment, or becomes insolvent. This may be because of incompetency, inexperience, speculation, neglect of business, personal extravagance, lack of capital, fraud or other cause. The result in any case is a bad debt, or "loss". Merchants rarely escape a certain amount of such losses and so include with overhead cost charges an estimated percentage of their annual sales for bad debts but they often find that this method is neither practical nor profitable; it being impossible to estimate the amount of bad debts likely to occur in the ensuing year with the same degree of accuracy as cost items and therefore they suffer from time to time unexpected and unprovided for losses in excess of their estimates.

From this it will be seen that it is important to be able to estimate the amount of loss that may occur on outstanding accounts during the year, since any excess over estimates dissipates profit and may seriously affect the merchant's financial condition. It would have been difficult, for instance, at the beginning of the year 1920 to estimate the amount of loss caused by insolvencies during that year because of the unusual and unprecedented conditions which created these insolvencies. The same may be said of 1921. It is well known that a great number

*Summary of address delivered by John E. Gregory, Credit Indemnity Executive of the Ocean Accident and Guaranty Corp., on invitation of the Committee on Program, published at the request of the members attending the meeting.

of business enterprises suffered loss on this account far in excess of their estimates, and of what they considered a normal expectancy in their business. Those who carried credit insurance, however, were to a great extent relieved because of having been indemnified by insurance for the excess over the fixed amount of initial loss which they bear under such policies.

The drain on the commercial interests of the country through bad debts and insolvencies will be more fully appreciated if we compare the amount with the amount of fire loss. For instance, in 1921 the amount of insolvent accounts reported was in excess of $750,000,000 as compared with $485,000,000 loss by fire. During the past ten years such losses exceeded fire losses by $400,000,000.

Credit insurance is provided to protect the wholesale merchant or manufacturer against loss in excess of the normal expectancy—"initial loss"—sustained on their accounts. It does not undertake to insure the normal or expected amount which is regarded as inherent in business and which occurs continuously. This is practically a certainty and therefore may be carried without undue burden. For this reason the normal or expected amount of loss is borne by the insured and in the policy is called the INITIAL LOSS, which is a percentage of annual shipments. Thus is determined at the beginning of the year the extent of normal loss and the reserve provision which should be made for bad debts.

The percentage of initial loss is determined by the loss experience of the Applicant as shown by a statement of his annual shipments and losses over a period of years during which he has been in business, his terms of sale, the amount of insurance required on the Mercantile Agency ratings of his various debtors, the line of business and the territory in which principally the Applicant trades as well as the moral hazard of the Applicant which has a bearing on the rates quoted. If, however, the Applicant is new in business, then the Company determines from the experience of new concerns in a similar business an initial or "normal" loss applicable to his business.

The estimated capital and credit rating of the debtor as indicated by the Mercantile Agency to which he subscribes being the basis for credit, it follows that coverage is limited to the amount of insurance obtained on each rating. A schedule of

the Mercantile Agency ratings which the Applicant decides shall govern is provided in the policy, and the limit insured is specific opposite each rating. The policyholder is not limited as to the number of customers to whom he may sell, nor in the amount for which he wishes to extend credit, but he is limited in the amount insured on each debtor at the date of insolvency.

The limits insured on each rating may be determined by the Applicant, provided they do not exceed the maximum limits fixed by the Companies. These limits are sufficiently high to provide a reasonably safe line of credit averaging from 25% to 40% of the debtor's estimated capital where first or highest credit rating is given, and 20% to 30% where the second credit rating is given. Debtors whose ratings indicate an estimated amount of capital and first or second credit are considered preferred over those with other credit ratings, and are covered on a parity of 100%.* Debtors with credit ratings lower than first or second are graded at 66 2/3%. The total amount covered on this class of accounts under a policy insuring all ratings is limited to a nominal amount.

Recovery under the policy on a debtor's account is dependent upon an act of insolvency (as defined in the policy) having been committed by the debtor after the payment of premium for the policy, and prior to its expiration. The policyholder must be a bona fide creditor for the amount of the indebtedness, and the limit of coverage is determined as of the date when insolvency occurs.

The limit of coverage is named in the schedule for the specific rating of the debtor, at the date of shipment, for shipments made during the period covered by the policy.

Under a policy covering the accounts of insolvent debtors, such insolvency is limited and defined in the policy as deemed to occur at the date when,

(a) A petition in bankruptcy or insolvency is filed by or against a debtor.

(b) A debtor makes an assignment or deed of trust for the benefit of creditors, either general or with preferences.

(c) A receiver is appointed for a debtor.

*It is the practice of the Mercantile Agencies to rate each firm noted in their index on the basis of capital in certain classes, including one "uncertain" or "unknown" and of credit standing in its capital class.

(d)   A compromise is made by a debtor for less than the amount of his indebtedness, with a majority (in number and amount involved) of his creditors.

(e)   An attachment or execution is levied on a debtor's stock in trade.

(f)   A debtor's stock in trade is sold under a writ of attachment or execution.

(g)   A writ of execution against a debtor is returned unsatisfied.

(h)   A sole debtor dies or becomes insane.

(j)   Possession of a debtor's stock in trade is taken under a chattel mortgage given to a creditor or creditors, or said chattel mortgage is recorded.

(k)   A debtor absconds.

(l)   A debtor confesses judgment.

(m)   A debtor transfers or sells out his stock in trade in bulk.

(n)   A debtor's business is assigned to or taken over by a committee appointed by a majority in number and amount of his creditors.

There is issued also a form of policy called the "Collection Form." It is for the purpose of serving the policyholder in respect to his past due accounts, and under it the definition of insolvency is extended to include "A debtor's account that has become due under original terms of sale and is filed with the Company within forty-five (45) days thereafter."

In presenting claim thereunder the policyholder files his past due accounts with the company for collection, the company accepting them as insolvencies and charging the policyholder the usual fees based on collections for this service. Very often however it is able to render this service for less, and sometimes without any expense, in which case it can make collection for less than the stipulated legal rates. It often serves materially to reduce the normal loss of the policyholder because of prompt action which is not always taken when the assured attends to the collection of his own accounts.

The policyholder is required to file, on blanks supplied by the company, prompt notice on acquiring knowledge of the debtor's insolvency. Under the Collection Form notice is required after an account is forty-five (45) days past due. Also, in the event of

a claim, a statement of loss, blanks for which are mailed by the company on request, must be filed with the company not later than thirty (30) days after the expiration of the policy, or as often as there may be a claim during the term of the policy, if the policy provides for "interim adjustments."

The premium for each policy is based upon the limits insured on the Mercantile Agency ratings, and the amount of shipments. It averages between $40 and $50 per thousand of the total amount insured, which is limited to twenty-five times the amount of the ascertained premium. This amount, however, may be increased if the applicant so desires to as much as $200,000 at a reduced rate per thousand for the excess.

The loss adjustment is made by first ascertaining the amount covered on each insured debtor's account owing at the date of insolvency, from which is deducted the amount of all dividends or payments and the amount of merchandise returned or re-plevined, the amount of discount on the covered amount of the accounts to which the debtors would have been entitled had the accounts been paid at the date insolvency occurred, also the amount mutually agreed upon as thereafter obtainable on any account. If no amount is mutually agreed upon the account is included for the full amount covered and the amount remaining after making these deductions is the net covered insured loss. From this is deducted the amount provided in the policy—usually ten per cent (10%), as an offset for profits—and the amount of initial loss which is to be borne by the policyholder, the remainder being the amount due and payable to the policyholder upon the assignment to the company of all accounts of debtors included in the adjustment, together with securities, guarantees, etc., held for or by the policyholder on such accounts to the extent of the amount covered on same at the date the debtor's insolvency occurred.

Assignment of the account or securities, etc., is not required, however, if an amount is mutually agreed upon and deducted from the account in the adjustment. The company in the event of realizing on assigned accounts, securities, etc., an amount equivalent to, or in excess of, the total amount paid to the policyholder must re-assign such to the policyholder to the extent not realized on and must refund to the policyholder any excess of the amount paid. In the case of "interim adjustments" having

been made, inasmuch as the agreed amount to be borne by the policyholder—INITIAL LOSS—cannot be calculated until the expiration of the policy, the policyholder agrees to refund to the company the amount thereof deductible, but not deducted in prior adjustments. In no event, however, can the amount to be refunded by the policyholder exceed the amount paid by the company under all adjustments.

There is no cancellation clause in the policy. If, however, the policyholder, during its term, becomes insolvent, or ceases to continue business, or goes into liquidation, or dissolves partnership, then the policy immediately terminate sand a statement of claim, (if there should be a claim at that date) may be filed and an adjustment made as if the policy had expired at the original date of termination. Temporary interruption by fire or strike, or the death or withdrawal or admission of a member of a partnership composed of more than two members, is not deemed discontinuing business, nor dissolution of partnership.

The policies provide that the premium shall be remitted by check with the application therefor. The application requires statements showing how long the applicant has been doing business as manufacturer or jobber, and what portion of his sales are made to manufacturers, jobbers, and dealers; the territory in which sales are principally made and the terms of sale; also whether he has any information detrimental to the credit or financial standing of any customer, or prospective customer and whether he contemplates making any material change in the manner of conducting business, either as to terms of sale or territory; the name of the Mercantile Agency which they have used for checking credits and the one selected to govern if a policy is issued. It also provides as a basis for the terms of the policy a warranty as to the amount of gross sales and shipments for given years, the net amount of insolvent debtor's accounts after deducting actual cash received and the amounts collected from insurance companies on such accounts.

The company is permitted by the policyholder to examine and take extracts from the books, securities and papers bearing upon any matter involved in any adjustment, or bearing upon any representation or warranty made in the application for a policy, or upon any claim made either by the policyholder or the company.

As is usual with insurance policies the policy constitutes the entire agreement between the company and the policyholder, and no change or waiver of any of its terms, conditions or limitations, or no assignment or transfer is valid unless endorsed thereon and signed by the company's manager and countersigned by the authorized executive. The form of policy is not a matter of statutory regulation nor is approval thereof by any state official required.

The policy may be, and often is, upon request from the policyholder, assigned to banks as collateral for credit obtained by the policyholder. It is found under such circumstances, to be a valuable collateral, as in the event of excess loss the interest of the policyholder is a guarantee to the bank and to that extent does not injure the policyholder's credit standing.

LEGAL NOTES
BY
RICHARD FONDILLER.
(OF THE NEW YORK BAR)

ACCIDENT AND HEALTH

Election of Benefit:—(DeLeon *vs.* Pacific Mut. Ins. Co., Supreme Court of California, 199 Pac. Rep. 789.) By reason of an accident, the insured lost the sight of an eye immediately and was totally disabled for several months. His policy provided a specific indemnity for loss of sight in Article 3 and for a monthly indemnity for loss of time in Article 1; these benefits were mutually exclusive, excepting that in addition to the indemnity for loss of sight, monthly indemnity was payable from the date of accident to the date of the specific loss.

Plaintiff brought suit to recover both indemnities. The defense was that plaintiff's loss of sight had not been caused by the accident but by a cataract. The jury found for the plaintiff, that the loss of sight was due entirely to the accident and that there had been no pre-existing cataract. By stipulation, the plaintiff elected the benefit for loss of sight, the trial judge to subsequently decide whether the other benefit was also recoverable. After judgment had been entered, the trial judge decided in the negative as respects the other benefit for loss of time. The benefit for loss of time was much greater than that for loss of sight and thereupon the plaintiff applied to substitute the larger amount. The application was granted by the trial court.

Upon appeal, it was held error to grant the application and the judgment for the lesser amount was reinstated. The plaintiff's election, under which the case had been tried, precluded him from later choosing the more favorable settlement possible under Article 1.

Pro-Rating:—(Stewart *vs.* Massachusetts Acc. Co., Supreme Court of Errors of Conn., 114 Atl. Rep. 657.) The insured gave his occupation as an oyster opener, which is rated as medium. This is a seasonal occupation lasting only six months, and the rest of the year he was employed as a laborer. While at the latter occupation, he was killed. His policy contained the usual

pro-rating clause. He had not given the insurer any notice of his change to a more hazardous occupation. In the court below, a jury trial was had, which resulted in a judgment for the plaintiff for the full amount of the death benefit.

Upon appeal to this court, the judgment was reversed, for the reason that pro-rating should have been applied. There were no disputed questions of fact to be determined by the jury. The beneficiary was entitled only to the indemnity purchased by the premium at the rate for laborer, up to the maximum fixed by the manual.

An extract from the opinion follows:

"The claim of the plaintiff is based upon the theory that, because the deceased never gave up the business of oyster opener, he remained entitled to be considered as such, although he died as the result of an accident received while employed in a more dangerous occupation. The fallacy in the plaintiff's claim lies in not recognizing that a man may have and work at different occupations at different times, without permanently relinquishing any one of them. Upon the statement of fact here, unquestioned as we have seen, it was the duty of the court to have instructed the jury that the facts disclose that the deceased was working at an occupation classified as more dangerous without informing the company. Where the amount of insurance and the rates depend upon the kind of work one is engaged in, the rights of the claimant are based upon the actual facts as to what the person was doing, what his occupation was at the time that he was injured, and not upon whether he, when the season came around, intended to resume some other and more favored occupatino which from its seasonal character he has been forced to relinquish for a part of the year. The policy does not provide for or recognize temporary changes, but calls for the occupation in fact."

It would seem that applicants with seasonal occupations should either be required to pay the rate for the most hazardous occupation in which they are engaged, or be rejected. The adjustment of claims presented by those with seasonal occupations is difficult to the insurer and unsatisfactory to the insured.

Death from Blood Poisoning: — (Rorabaugh *vs.* Great Eastern Casualty Co., Supreme Court of Washington, 200 Pac. Rep. 587.) The insured accidentally cut a finger on a rusty spring, blood poisoning coincidentally occurred and he died several days later therefrom. These were the facts as decided by the jury, which returned a verdict for the plaintiff for the full

amount payable in the event of accidental death. The defendant appealed, claiming it was liable for only one month's disability indemnity.

Upon a consideration of the evidence, the court held that the cause of death was the injury to the finger, within the terms of the policy, being the causative factor for the simultaneous septicemia. A clause in the policy that the insurer would not be liable where the death was caused "wholly or in part, directly or indirectly, by any disease," was construed to apply only in cases where a disease existing prior to an injury, co-operates with it to cause death. Here, however, the disease sprang instantly from the injury, which was the primary cause of death.

Section 1, in addition to providing specified indemnities, reads,

"If any loss specified in this section shall result solely and exclusively from such injury within three months from the date of the accident, the company shall be liable only for such loss and will pay for loss of life $1200."

The principal defense was that there was a limitation of liability expressed in Section 10, which follows:

"In the event of death . . . resulting from the following causes the company's liability shall be one month's indemnity as provided in sections 2 and 5 of this policy. . . . Injuries intentionally inflicted upon the insured by any other person; unnecessary exposure to danger, riot, strike or evading arrest; gas vapor or poison; contact with poisonous substances, blood poisoning, or septicemia, . . . or due partly to injury and partly to disease or bodily infirmity . . ."

In affirming the plaintiff's judgment, the court wrote relative to this section:

"It is our opinion that Section 10 has reference solely to death resulting from the causes therein mentioned, including "blood poisoning or septicemia," and does not apply to an injury caused directly, solely, and independently of all other causes by external, violent, and accidental means . . . Here the death was the direct result of the injury to the insured's finger, and not the direct result of blood poisoning. If the insured's death had been the direct result of blood poisoning, which was not in anywise connected with an injury caused by "external, violent, and accidental means," then the contentions of the appellant would probably be correct. The quoted portion of Section 10 has to do only with indemnity concerning loss of time, and is not consistent with the indemnity to be paid in the event of death directly resulting from external, violent, and accidental means. To give Section 10 the construction desired by the appellant would

be in part to nullify Section 1 of the policy; the construction which we have given it makes it harmonize with all the provisions of the policy."

Death from Disease:—(Rathbun *vs.* Globe Indemnity Co. Supreme Court of Nebraska, 184 N. W. Rep. 903.) The insured, a surgeon, injured his hip while stepping off his automobile. He suffered severe pain for a few days, then for two weeks he had no pain and gave his time to his practice. Thereafter, he gave less and less time to his profession as the pain increased. He was treated by several physicians and operated on twice, and died about six months after the accident. A post mortem examination showed that he died of a cancerous growth of the hip, which all the physicians agreed was the direct result of the injury to the hip. In the trial court, the plaintiff recovered a judgment of $8243 comprising $7500 for loss of life, six months' disability $618, and hospital expense $125.

The defendant appealed from the judgment, claiming that it was not liable for both death and disability, under special provision A:

A. "This policy does not cover . . . loss resulting from bodily injury caused or contributed to, directly or indirectly, by disease, or vice versa."

Restating this provision from the "vice versa" aspect, it could be read:

B. "This policy does not cover . . . loss resulting from disease caused or contributed to, directly or indirectly, by bodily injury."

The court agreed with the defendant that the insured died of a disease, which was the direct result of a bodily injury; apparently, under the terms of the last provision quoted above, when read literally this would deprive the beneficiary of a recovery. But the court makes the observation that the construction of a contract should not be unreasonable or defeat the manifest intention of the parties to the contract. From the way the defendant construed clause B, it would only be liable where the insured met instant death, which is a comparatively rare happening. In the great majority of cases, where disease follows the accident, the defendant could claim no liability either as to death or disability benefits, as to which the court wrote:

"It seems to us that a theory which inevitably leads to such damaging results to the insured as would this, is so unreasonable, absurd and destructive to the very object and purpose of the contract, as well as the manifest intention, or at least the supposed manifest intention and understanding of the parties who entered into it, that such a construction cannot be allowed; and, if the language of the provision is susceptible of no other construction, then that of the provision itself cannot stand. We are of the opinion that in this instance there is no alternative, and that the clause in the defendant's policy known as the "vice versa" clause B is inoperative and of no effect. But, taking another view of it, we think it must be conceded that all the authorities hold that a loss resulting from disease which is the direct and immediate result of a bodily injury sustained through accident is precisely the same as a loss resulting from the bodily injury itself. So, then, this provision will be precisely the same as though it read:

'This policy does not cover . . . loss resulting from bodily injury caused or contributed to, directly or indirectly, by bodily injury'—which of course is a palpable absurdity.

If this disposition of the provision in question is the inevitable result of a just consideration of the same, the defendant company has less reason to complain from the fact that it did not express in words in its policy the interpretation it expected to place upon the words "vice versa." This much at least the company should have done in fairness to the assured, so that he might at least have had the opportunity to read its interpretations as expressed in exact words, and thus act with knowledge in that regard. This the company did not do, but at best left it to conjecture, so far as the assured is concerned, as to what interpretation should be given to this phrase. So that, even in this view, the insured would be justified in believing that no interpretation would be given this phrase that would, except by a rare chance, wholly defeat the sole purpose and object of the contract.

But, as before stated, eliminating the provision in question does not necessarily affect the validity and operation of the contract as a whole, but the whole instrument may be examined to determine, if possible, the real intention of the parties to the contract and the object and purpose they had in entering into it. Such an examination of the policy introduced in evidence readily discloses ample provisions whereby the defendant company undertakes to indemnify the insured against loss caused by bodily injury sustained through accidental means, including loss of life, and inasmuch as the defendant frankly admits that the evidence conclusively shows that the insured died from sarcoma, a malignant disease, which disease was the direct and immediate result of a bodily injury sustained by the insured through the

accident alleged, this is all that is necessary to establish the
defendant's liability."

Another ground upon which the defendant appealed was that
death occurred more than ninety days after the accident; it
claimed the following provision applied:

"Section 1 (a). If such injury, within 90 days from date of
accident, irrespective of disability, causes the insured to sustain
a loss enumerated in this section, the company will pay the sum
specified for such loss as follows: For loss of life, $7,500."

The plaintiff claims a recovery under subdivision (d) of the
same section, reading:

"(d)   If such injury, from date of accident, causes the insured
to be totally and continuously unable to transact all business
duties and, during the period of such disability and within 208
weeks, results in a loss enumerated in this section, the company
will pay the sum specified for such loss and in addition, until the
loss occurs, indemnity at the rate per week of $25."

relative to which the court wrote:

"We are of the opinion that if claimant shows himself entitled
to recover under subdivision (d), if that subdivision stood alone,
then he may recover under said subdivision, notwithstanding
more than 90 days had elapsed from the date of accident to the
date of death, the limitation in subdivision (a), for the reason
that subdivision (d) imposes new and additional conditions pre-
cedent to a recovery not contained in subdivision (a)."

The court reviews the evidence to determine whether, as a
matter of law, the insured was "totally and continuously unable
to transact all business duties." As a matter of fact, he had been
performing operations during the first few weeks after the acci-
dent, and later on with much personal inconvenience. The
court does not believe the defendant is entitled to a literal con-
struction of "totally and continuously unable." This for the
reason that the insured was in ignorance of the serious injury
he had received and which led him to attend to some of his pro-
fessional duties. Had he reasonably not made any attempt to
work, he could unquestionably have made the insurer liable.
With respect to the first few weeks when the insured was attend-
ing to his practice, the court wrote:

"We think it may be said to be a matter of common knowledge
that in a great many, perhaps in a large majority of, instances
in which bodily injuries are received, the real nature and extent
of said injuries do not reveal themselves until a greater or less

time in the future and after the first pains from the hurt shall have passed away. The injured part often lies dormant for an indefinite period, with but little or no consciousness of its existence by the person injured, although from the very moment of the accident, perhaps, the processes of nature may be busily engaged in developing what may have seemed to be but a slight hurt into a most serious and perhaps fatal injury. In such a case it cannot be said that the injury is not continuous and from the date of the accident, nor can it fairly or justly be said that the disability is not continuous and from the date of the accident, because the injured party enjoys a brief respite from pain and suffering, only to be endured to a greater degree when perverted nature again asserts itself. Occurring then under the circumstances stated, to hold that a brief respite from the conscious ill effects of an injury during which respite the insured was able to transact the most, if not all, of his ordinary business should bar recovery, seems to us neither reasonable nor just. It is the undisputed evidence that at the end of two weeks the injury to the insured grew worse and worse until it culminated in his death five months later."

The court thereupon affirmed the judgment obtained by the beneficiary in the trial court.

Sunstroke:—(Richards *vs.* Standard Accident Ins. Co., Supreme Court of Utah, 200 Pac. Rep. 1017.) This was a suit upon an accident policy insuring against "the loss resulting from bodily injuries effected directly, exclusively and independently of all other causes, through accidental means except when intentionally self-inflicted while sane or insane." The insured was a mining engineer, and, in company with three men, went to inspect a mining claim which was represented by one of them as being only six miles from the Colorado River. This man also represented that there would be horses at the river, to take the party to the claim. The horses not having appeared, each man took enough water for a six mile trip and they walked, as subsequent events showed, ten miles to reach the claim. Upon the return trip, their water became exhausted and the insured died from sunstroke.

The insurer claimed that sunstroke is a disease, and since diseases were specifically excluded from coverage, that it was not liable. Further, that sunstroke does not constitute a bodily injury within the meaning of the policy, and that the insured voluntarily subjected himself to intense heat rendering him

liable to sunstroke, so that his death was the natural result of his own acts.

The court found difficulty in deciding the issue, whether sunstroke was an accident or a disease. It wrote a long opinion discussing the leading cases in this country and abroad. It pointed out that medical authorities and witnesses called sunstroke a disease. Many courts of last resort also hold that sunstroke is a disease, although the weight of authority is contra. However, even though scientifically a disease, sunstroke is popularly understood to be an accident, as much so as a stroke of lightning. The popular meaning will be applied to hold the insurer liable.

The court also discusses with approval a number of workmen's compensation cases, in each of which sunstroke was held to be an accident entitling the claimant to compensation. In these cases, however, the claimant had the benefit of a liberal statutory definition of "accident." (See *Proceedings*, Vol. VII, pg. 114, City of Joliet *vs*. Industrial Commission.) Applying the rule of liberal interpretation so as not to defeat the purpose of the insurance, the court finds in these cases additional reason to affirm the judgment.

The unexpected event which led up to the sunstroke was the misrepresentation as to the distance to be travelled, which caused each man to take insufficient water. It was held that the evidence was not sufficient to show that the insured's death was the result of his negligence in exposing himself to great heat. Under this policy, in any event, negligence is not a defense.

Neither is the "voluntary exposure to danger," as urged by the insurer, a defense, since it is not contained in the policy. Sunstroke is held to be a bodily injury and therefore covered; the miscalculation of the distance from the river to the mining claim was the accidental means. Sunstroke was not specifically excluded from coverage nor was it defined as a disease, which led the average man to assume that this word would be interpreted in the popular sense. The judgment in the beneficiary's favor was affirmed.

Suicide:—(Seiler *vs*. Commercial Accident Ins. Co., Supreme Court of Minnesota, 185 N. W. Rep. 383.) This was a suit brought by the beneficiary of an accident policy, where the

insured committed suicide. The policy insured against "the effects resulting . . . from bodily injury sustained during the life of the policy solely through violent or accidental means (including suicide, sane or insane)." Judgment was rendered in the beneficiary's favor in the court below and the insurer appealed.

The use of the words "violent or accidental means" is so broad as to include the results of violence that are not accidental, such as suicide. The insurer also alleged that through a printer's error, the word "including" was used instead of "excluding." The defense is not now available, the contract having been prepared by the insurer and accepted by the insured.

Finally, the insurer urged that a policy which insures against death by suicide is against public policy and void. This would be true, if the policy were simply a contract of insurance against suicide. But here the policy insured generally against death by violence and included insurance against suicide. The judgment was affirmed.

WORKMEN'S COMPENSATION

Lump Sum Settlement:—(Integrity Mutual Casualty Co. *vs.* Nelson Supreme Court of Minnesota, 183 N. W. Rep. 837.) One Nelson signed a lump sum settlement for seven hundred fifty dollars, which was agreed upon as full compensation for his injuries. The settlement was approved by the court judgment entered and the amount paid to him. A year thereafter, he applied to the court to vacate the settlement and to make further inquiry into the extent of his injuries, on the ground of newly discovered evidence and that the settlement was inadequate compensation for his injuries.

The Compensation Act provides that lump sum settlements shall be approved by the court, and that such an award is final. Here the agreement had been entered into by the claimant, Nelson, his employer and the insurer, had been ratified and paid; it is deemed to be not open to readjustment in the absence of fraud. It was within the power of the Legislature to declare such settlements final and the courts are without authority to disregard the plain legislative intent. Nelson's application was consequently denied.

Violation of Law:—(Union Colliery Co. *vs.* Industrial Commission, Supreme Court of Illinois, 132 N. E. Rep. 200.) The deceased was employed to dump cars of coal into a dumper, when the cars reached the surface of the mine. He also helped to lay rails at the bottom of the mine. When going to the bottom of the mine, he descended a flight of stairs which he should also have used when ascending. Instead, he frequently rode on the top of the elevator cage when the cage carried a car of coal which it was his duty to dump at the surface of the mine. The State Mining Law provides that no one shall ride on a cage containing either a loaded or empty car. On the day of his death, he rode on the cage, presumably in order to be at his place in time to dump the car, and was instantly killed on the trip up to the surface.

There was ample evidence that the deceased employee rode several times daily on the cage, including the date of the accident. The moot question was, whether his death arose out of and in the course of his employment. He was performing his work, but his employer claimed that the deceased's violation of the State Mining Law barred a recovery for compensation. The court held that this defense was not valid, since at most the violation amounted to contributory negligence and not to a departure from the scope of the employment. Had the violation of the Law (or of a rule of the employer which was enforced) taken the employee out of sphere of his employment, then it would be held that the accident did not arise out of the employment. The court directed an award of compensation to the dependents.

Death from Disease:—(Anderson *vs.* Industrial Insurance Commission, Supreme Court of Washington, 199 Pac. Rep. 747.) One Anderson received a cut on his foot from an axe causing a great deal of bleeding. An automobile was called to take him home but he was compelled to walk a mile through the forest in cold and inclement weather in order to reach the automobile. He developed pneumonia and died therefrom in a few weeks. It was admitted by the widow that the injury to his foot would not have resulted fatally, neither would the injury have caused pneumonia. The wound and weakened condition of the deceased rendered him much more susceptible to the disease than if he had been well.

The Industrial Insurance Commission denied compensation to the widow, on the ground that the injury was not the direct cause of death. The widow appealed to the court, which found in her favor. The court calls attention to the unwisdom of Anderson's exposing himself to the weather in such a weakened condition, but this element of contributory negligence has no bearing in a workmen's compensation claim. Compensation is allowed under the Compensation Law regardless of fault. It is not necessary for the wound to be the cause of death; it is sufficient that the wound was the proximate cause in the train of events which developed the fatal disease.

Extraterritorial Effect:—(Pickering *vs.* Industrial Commission, Supreme Court of Utah, 201 Pac. Rep. 1029.) The claimant, a resident of Utah, was hired in Utah by a Utah contracting firm, as an engineer. He had always been employed within the state, until his employers sent him to Colorado to supervise a construction contract. While in the latter state, he was injured by an accident arising out of and in the course of his employment. He claimed compensation under the Utah Compensation Act but the Industrial Commission denied his claim. The firm carried compensation insurance in both states.

The claimant appealed to the court which held in his favor and directed the Industrial Commission to grant compensation. The Utah Act provides:

"If a workman who has been hired in this state receives personal injury by accident arising out of and in the course of such employment, he shall be entitled to compensation according to the law of this state..............even though such injury was received outside of this state."

The law clearly shows that the Legislature intended to include such cases as the one under discussion, without regard as to whether there existed a compensation act in the state where the injury occurred. The constitutionality of such a provision is not now seriously disputed.

Partner not an Employee:—(Employers Liability Assurance Corporation *vs.* Industrial Accident Commission, Supreme Court of California, 203 Pac. Rep. 95.) The claimant (Williams) was an equal partner with another man, neither receiving any wages and both receiving an income only out of the firm profits.

The firm was in the rockcrushing business, claimant working with the employees in the gravel pit while his partner was the salesman of the firm.   In the compensation policy, the claimant's name was included among the list of employees covered, upon which the insurer received a premium at the classification rate for drivers and chauffeurs.   The claimant was injured while working in the gravel pit and the Industrial Accident Commission made him a large award of a life annuity payable weekly.

The case came before the court, upon the appeal of the insurer, who urged that the claimant was not an employee of the co-partnership of which he was a member.   With this contention, the court agreed unanimously.   The award of the Commission was unauthorized, because there was no relation of master and servant between the firm and the claimant.

Further, it was held that the insurance carrier was not estopped from its defense that the claimant was not an employee, by the fact that the claimant's name was listed in the policy.   Even a valid estoppel between individuals could not confer jurisdiction upon a public body like the Commission whose powers are limited by statute.

During the course of its opinion, the court wrote:

"The claimant showed that in the policy of insurance issued to the firm of Green & Williams, said W. L. Williams was expressly mentioned and listed among the employees of said firm, and it is his contention that the name of W. L. Williams, having been thus inserted in said policy among the employees of the firm even though he was not in fact such employee, and that said insurance carrier having received benefits in the way of added premium by virtue of the insertion of the name of said Williams in said policy as such an employee, were sufficient to give the Industrial Accident Commission jurisdiction to determine the fact as to whether said Williams was or was not an employee of his own firm.   This contention is based upon the showing that the Workmen's Compensation Act embraces certain sections which provide that working members of partnerships receiving wages, irrespective of profit from said partnership, shall be deemed employees thereof, and which also undertake to give the Commission jurisdiction to determine controversies arising out of insurance policies issued to self-employing persons   .   .   .
Even if it were to be conceded that such a stipulation between the insured and the insurance carrier could suffice to confer jurisdiction upon the Industrial Accident Commission to hear and determine the question as to whether the person named as an

employee therein is or is not such an employee as would be entitled to the benefits of the act, it would avail the applicant in this proceeding nothing since the undisputed evidence shows that he was not in fact an employee of the partnership of which he was a member. His own testimony before the Commission is conclusive upon this subject, and brings the case squarely within the above authorities so as to compel an annulment of this award."

Casual Employment:—(Callihan *vs.* Montgomery, Supreme Court of Pennsylvania, 115 Atl. Rep. 889.) One Callihan was a skilled mechanic engaged in business for himself. The defendant, who operated an oil well, employed Callihan to repair an engine used to run a pump, at $1.25 per hour. Callihan removed the cylinder of the engine to take it to his shop and waited several minutes to be transported by defendant's machine. During the interval of waiting, he stepped into the pump house, where he was caught in the machinery and killed. The widow was awarded compensation by the Compensation Board, which was affirmed by the Court of Common Pleas. The defendant appealed, contending: (1) that the deceased was not engaged in the furtherance of defendant's business; (2) that deceased's employment was merely casual; (3) that he was not employed in the regular course of the business of the defendant.

The Compensation Act expressly excludes those whose employment is "casual in character and not in the regular course of the business of the employer." Attention is directed to the exceptional provision of the Pennsylvania Act that,

"In order to come within the act, an injury to an employee need not arise out of his employment; all that is necessary is that it occur in the course of that employment, and this includes all such injuries, except those caused by the intentional acts of third persons, done for reasons personal to the employee and not directed against the employer, and self-inflicted injuries. The fact that claimant may have been guilty of contributory negligence is immaterial."

Callihan's employment had not ceased when the accident happened, since he was to return to replace the cylinder in the engine. The engine on which he was working was required to operate the pump in the pumphouse and his temporary digression did not constitute a break in the employment. The court overruled the defendant's first contention, quoting the definition of the Act,

"An injury occurring in the course of employment includes 'all injuries caused by the condition of the premises or by the operation of the employer's business or affairs thereon, sustained by the employee, who, though not so engaged (in the furtherance of the business or affairs of the employer), is injured upon the premises occupied by or under the control of the employer, or upon which the employer's business or affairs are being carried on, the employee's presence thereon being required by the nature of his employment.' "

and then writing,

"The provision just quoted is broad enough to include every injury received on the premises of the employer, during the hours of employment, so long as the nature of the employment demands the employee's presence there regardless of whether his presence at the particular place where the injury occurred is actually required if there is nothing to prove a virtual abandonment of the course of his employment by the injured person, or that, at the time of the accident, he was engaged in something wholly foreign thereto."

A review of the evidence clearly showed that Callihan was a casual employee, one merely employed incidentally for a limited and temporary purpose. The court upheld the defendant's second and third contentions and concluded its opinion as follows:

"The casual employment of one, for the performance of an odd job, may occur in conducting a business and still not be within its regular course. For instance, emergency repair work on a machine used in the operation of a business can always be said to take place in the course of that business, as all machinery, at some time or other, is bound to need repair; but such work, if not of a kind usually performed by or under the control of the person conducting the business, would be outside the regular course thereof. The Legislature evidently intended, by the use of the words "regular course," to give them some definite significance, and the most natural meaning is that they refer to the normal operations which regularly constitute the business in question, excluding incidental or occasional operations arising out of the transaction of that business, such as now and again repairing the premises, appliances or machinery used therein. While repair work may be considered an important incident to any business using machinery, and, in some cases, may enter into the customary operations of such a business (for example, when men are engaged as regular employees for the purpose of keeping the machinery in order), yet the repairs we are here considering were no part of the regular course of the business conducted by

defendant which is producing oil; they represent merely an odd job, incidental to that business, but not part of the work ordinarily done by or under the control of the employer in this particular case. On the other hand, such repairs might well be classed as within the regular course of the business of plaintiff's deceased husband.

As the employment of deceased to repair the machine in question was casual and not in the regular course of the business of defendant, his widow is not protected by the Pennsylvania Act."

MISCELLANEOUS

Insurer Refuses to Defend:—(Mannheimer Bros. *vs.* Kansas Casualty & Surety Co., Supreme Court of Minnesota, 184 N. W. Rep. 189.) The casualty company issued an automobile indemnity policy, with $5,000/10,000 limits, to Mannheimer Bros. Two men were injured in an automobile collision with a Mannheimer truck and they brought separate suits for damages. Although the insurance policy required the company to defend the suits, it refused; the Mannheimer firm defended them and paid $2,000 for the attorney's fee and court costs. One Hillstrom secured a judgment for $12,000 and Hanscom's judgment amounted to $2,600.

Mannheimer paid the Hanscom judgment and then sued the casualty company for reimbursement. The court, in that action, held that the insurer's claim of non-liability was without merit.

Mannheimer then paid the Hillstrom judgment and demanded in this suit that the insurer reimburse him for the full amount of the judgment and costs. The casualty company now admitted liability, that issue having been judicially decided in the other suit; but claimed that its liability was limited to $5,000 as to the judgment and only pro rata (*i. e.*, five-twelfths) of the total costs of $2,000.

The court held that the refusal of the casualty company to defend the two original suits did not make it liable for an amount greater than the $5,000 for each suit, with a $10,000 limitation, as stipulated in the contract. The repudiation of liability by the casualty company did not change the terms of the policy as to its liability and only made it liable for the entire and increased expenses of defending the two original suits. The liability is

limited to $5,000 for each person injured and although that amount was not used in paying the Hanscom judgment, Mannheimer cannot claim the balance up to the full $10,000 towards paying the Hillstrom judgment.

The court further held that the casualty company was liable for the entire amount of costs. These were incurred in defending the suits, which was an obligation of the company under its contract. That duty was to conduct the entire defense, which is an indivisible one.

Joint and Several Liability for Premiums:—(In re: John B. Rose Co.; In re: Rose Brick Co., U. S. Circuit Court of Appeals, Second Circuit, 275 Fed. Rep. 409.) Two corporations were insured under various policies for workmen's compensation, public liability and marine liability, each policy being issued in the form of "A and/or B". The applications were signed in the same manner. Both corporations became bankrupt, A owing the insurance company about $5000 and B the sum of $3,000 for earned premiums. The insurance company filed claim with the trustees of each bankrupt for the total amount of $8,000, upon the theory that the insurance contract created a joint liability against each corporation, and therefore each bankrupt is severally liable for the total claim. The same man was president of both corporations, but neither corporation owned any stock in the other. A and B had close business dealings and A often transported B's products.

The insurer rendered one genera bill for the total amount of earned premium, which A's bookkeeper would analyze by payrolls and charge each corporation with its share. A check for one thousand dollars would be remitted by either corporation on account. The insurance broker testified that the check was made out to his order, that the checks were received on the general bill and that he never received any instructions from either corporation to the contrary.

The court decided against the contention of the insurer. A joint liability would have been created had the policy been issued in the form of "A and B". The significance of "or" was to make both corporations liable in respect of employees jointly employed of whom there were none. The claim was allowed only for $5,000 as against A and $3,000 against B.

An extract from the opinion follows:

"The contract seems to us to indicate a plain intent to create a several liability upon the part of the insurance company to the two companies assured. It also indicated a like intent to create a several liability with regard to the obligation of the two companies assured for the payment of the premiums. The liability of each company for premiums is commensurate with the benefits received by each company under the policy. But while the contract signifies the intention stated it indicates something more. The words "and/or" cannot be ignored. They have a meaning. It seems to us that in writing the policies it was had in mind that in view of the fact that the John B. Rose Company's barges and their crews were employed to transport the brick manufactured by the Rose Brick Company a situation might arise in which there would be joint employees and that special provision should be made for the protection of the two companies in that class of cases.

The policies were drawn to insure three employers:

1. The Rose Brick Company against injuries to its employees.

2. The John B. Rose Company against injuries to its employees.

3. The two companies together against injuries to their joint employees.

As the resulting liability of each company for the premiums is based upon its payroll, there is a several liability of the Rose Brick Company for the number of employees carried on its payroll. A like several liability of the John B. Rose Company exists for the number of employees carried on its payroll. In addition there would exist a joint liability of the two companies for the aggregate number of employees carried on their payrolls if the companies engaged in any joint undertaking. The fact, however, is not disclosed by the evidence that the two companies did engage in any joint undertaking or that they had any joint employees."

Insurer Liable to Passenger:—(Arizona Mutual Auto. Ins. Co. *vs.* Bernal, Supreme Court of Arizona, 203 Pac. Rep. 338.) The insurer issued an indemnity policy to one Mirando, as the owner and user of an automobile carrying passengers for hire. The policy included provisions requiring the assured to give immediate written notice of an accident or of any claims or suits. The policy also contained the following indorsement:

"In consideration of the premium at which this policy is written and in further consideration of the acceptance by the Arizona Corporation Commission of this policy as a compliance with orders No.   , it is understood and agreed that,

regardless of any of the conditions of this policy, same shall cover passengers as well as other coverage, and shall inure to the benefit of any or all persons suffering loss or damage, and suit may be brought thereon in any court of competent jurisdiction within the state, by any person, firm, association or corporation suffering any such loss or damage. If final judgment is rendered against the assured by reason of any loss or claim covered by this policy, the company shall pay said judgment up to the limits expressed in the policy direct to the plaintiff securing said judgment, or the legal holder thereof, upon the demand of said plaintiff, or holder thereof, whether the assured be or be not financially responsible in the amount of said judgment and that this policy may not be canceled by either party except that written notice of the same shall have been previously given for at least ten days prior to the cancellation of such policy . . .

In all other respects, the terms, limits and conditions of this policy remain unchanged."

A passenger, Bernal, secured a justment for $3,000 against Mirando for injuries sustained through the negligent operation of the car. The judgment having been unsatisfied, Bernal brought suit against the insurer to pay the amount of the judgment. No notice to the insurer had been given by anyone as to the accident, claim or suit against Mirando, prior to the date of filing the suit against the insurer on the Bernal judgment. The insurer claimed that it was not liable by reason of the failure to give such notice, which should have been given either by the assured or by Bernal. The court ruled against the insurer.

During the course of its opinion, the court wrote:

"The language of the indorsement is that 'regardless of any of the conditions of this policy' the company shall upon demand pay a final judgment rendered against the assured 'up to the limits of the policy to the plaintiff securing said judgment,' i. e., a judgment secured in a suit against the assured by a person suffering a loss or damage which the company undertakes to indemnify. It does not appear possible to conceive a doubt as to the meaning of this language, or to add anything to its clearness by exposition. The only terms of the indorsement which might be supposed to qualify its effect are in the concluding sentence, 'In all other respects, the terms, limits and conditions of this policy remain unchanged.' This sentence merely evidences the intention that every obligation and right created by the contract and existing between the assured and the indemnity company should, except as modified by the indorsement, remain unaffected, and is but the expression by way of emphasis of a rule

for the interpretation of the policy which would be applicable
even were the sentence omitted . . .

As neither the terms of the indorsement nor the policy in any
other of its provisions requires the giving of any notice to the
company of an accident, by a person injured, nor requires in
terms such person to see to the performance of any such act by the
assured himself, it cannot therefore be said that the giving of such
notice is a condition precedent to recovery by any such person;
it being sufficient that such person has complied with the terms
and conditions of the indorsement which sets forth the sole
requirements to be fulfilled antecedent to the liability of the
company to such person. By the provisions of the indorsement
the only notice required to be given by such person is a demand
on the company to pay a final judgment already obtained against
the assured."

ABSTRACT OF THE DISCUSSION OF PAPERS READ AT THE PREVIOUS MEETING

INDUSTRIAL RETIREMENT SYSTEMS BASED ON THE MONEY-
PURCHASE PRINCIPLE—J. H. WOODWARD

VOL. VIII, PAGE 13.

WRITTEN DISCUSSION

MR. W. R. WILLIAMSON:

The manner of treatment followed in Mr. Woodward's paper recognizing the correlation of annuities, death benefits, disability protection and benefits to employees upon withdrawal, is one which will commend itself to actuaries familiar with the subject. There is a practical difficulty, however, involved in handling pensions in this fashion.

Mr. Woodward recognizes the widespread failure to provide for a competence in old age and correctly states the principle that income during the earning years shall be adequate for the entire lifetime.

Where, however, the employer assumes that he may properly withhold a portion of the wages from the employees in order to compel savings for old age, a rather dubious paternalism enters into the plan. It seems very doubtful that an employer can establish a pension system of this sort through the compulsory deduction of wages, while if the industry is one which can bear a heavy increase in real wages the withholding of the increase by the employer is equally open to criticism.

The admission that pensions are earned by the individual year by year makes Mr. Woodward's method of treatment rather imperative and definitely requires the setting aside of funds on an interest basis only, so that the wages held out of the employee's income to provide pensions may in event of termination of employment be given to him as a withdrawal allowance, or in event of his death may be given the family as a death benefit.

As a practical matter the proportion of entrants in any staff of employees who remain with the employer during a lifetime is very small. If the pensions are considered as a gratuity on the part of the employer he can with relative ease grant pensions to

such employees as may qualify by some rather rigid standard with a much smaller outlay than is required to install a so-called pension plan as outlined by Mr. Woodward. As Mr. Morris in his recent paper before the Life Actuarial Society suggested, the corporation which buys life annuities on a small number of pensioners actually cares for these life annuities on all individuals who qualify for them so long as the corporation desires to continue this method of special grants.

Moreover, among employees there may well be choice, individual initiative and special necessities calling for variation in the types of investment to be made and a plan which makes investment entirely a matter of acquiesence on the part of the employee may be undesirable in stimulating thrift on his part, while leaving the employer responsibilities for investment as a trustee, which will not be fully met.

Mr. Woodward's discussion is particularly timely at a period of retrenchment, for economies in individual expenditure are most carefully considered at such a time.

I should be interested to know whether Mr. Woodward's paper arises from an actual plan of this nature established under his supervision and if so what the experience of the employer has been in selling the general idea to the employees to be benefited thereby.

Although all the parts of the program have been considered by Mr. Woodward, I am inclined to believe that employers as a whole should adopt Group Life Insurance and Group Disability protection before extending the plan to Pensions, which is more expensive and much more difficult to present to employees. Probably the rapid growth of Group Life Insurance and subsequently Group Disability Insurance, while Pension plans have shown but little development over the same period, is due to a recognition among employers that the two insurance company plans will be of greater value to employers in improving mòrale among the employees than would pensions on the money-purchase plan.

When pensions cease to be merely pensions to employees retiring at old age after a life's service and become a new wholesale budget system for individuals, there is entailed a very heavy sales cost in presenting the case to the employees, and a very difficult sales proposal to carry out.

MR. M. M. DAWSON:

This paper is admirably worked out on sound actuarial principles and with very careful attention to details. It cannot fail to be of great service to all students of the subject, and particularly to those who accept the fundamental proposition that *for all purposes* retirement pensions on account of incapacity due to age may be considered deferred wages.

The moment that position is definitely accepted, with all that it implies, the various steps which Mr. Woodward has taken in his paper are logically called for.

In any case whether or not this principle be accepted, I should regard it unquestionable that if the employer of a small number of employees or even though there were a large number, yet in case his business were insecure and his ability to respond by no means assured, the plan and principle would be fairly applicable in case he wished to attempt granting such service pensions at all.

There would also be more reason for applying it to staff pensions, that is, the pensions of office and sales employees, than to pensions for all employees, because there is greater probability of permanency of employment. In such cases the employer might not perhaps object to setting up a fund toward providing pensions as regards each of his employees, not taking into account turn over, because the excess of the amount so provided would not be so very great.

On the contrary, however, as applied to the general list of employees of a manufacturing employer, for instance, the system as suggested would undoubtedly increase the cost to the employer from 300% to 400% at least above what would be the cost to provide pensions only for those who continued in his service until reaching the retirement age.

The fact that employers would certainly shy at this very greatly enlarged burden and would in practically all cases refuse to submit to it, strongly emphasizes the further fact that the employer does not think of these pensions as deferred wages for each bit of work that his employee has done for him and therefore as being fairly equivalent to an increase of each pay check.

That mode of thinking of it entirely omits what is the real thing in the employer's mind, to wit: that he is paying special compensation for the completion of a special job, which is service to him during all the working days of the employee after he has been admitted to his service. It is more like the price which is paid for a job, such as making a suit of clothes, than it is like an employment by the hour, day, week or month at fixed wages or salary.

Its origin gives emphasis to this. There are few men who are so constituted that they would turn out an old family servant, who had become infirm because of a lifetime of service, if it were at all possible to support such servant, and employers-even on a very large scale, are impelled by the same general motive when they grant service pensions. They think of it primarily as a special reward for long continued, faithful service in their employment and not in any sense as a mere equivalent of an increased wage throughout the entire employment, to which accordingly the employee was fairly entitled, even though he had retired from the service earlier.

It is to be borne in mind, also, that if the fundamental thesis, that for all purposes retirement pensions may be regarded as deferred wages, should be accepted, one of two things would follow, viz., either virtually all employers would refuse to grant such pensions or, per contra, virtually all employers would be compelled to provide them.

The former is the more probable of these, but if the latter should come into effect the result would either be a smart increase, averaging nearly or quite 10% in the average wage, or else a decrease of nearly the same percentage in the wage paid in cash which the employees would otherwise have received.

The most unpopular form of social insurance has been a compulsory contributory plan of old age provision. This has been true even when the employer contributes as much as the employee and the state adds its contribution, and every attempt to compel the employee to contribute the whole of it out of wages he would otherwise receive in cash has been most offensive to workmen.

This would, as regards wage and salary earners, were such a system of contributions, whether made openly by the employees or only in effect by the employees, being deferred wages, to get a

firm hold, amount to a system of compulsory old age provision, applied only to these, which would go far beyond anything that has ever been deemed wise or practicable.   These pensions are usually in proportion to wages and not merely such as to provide a bare subsistence (unless the wage were very small or the term of service before retiring very short) and the new compulsion would really be that one must, by this means, provide a reasonably liberal income for himself in old age, in this way.

The theory which underlies compulsory old age pension plans is instead merely that provision should be made for the support, in an honorable manner, but for a bare support on a minimum scale, of those who become infirm by reason of age without having such a provision for their support.   The theory upon which the compulsion is based is that it is the duty of those of us who are at producing ages to feed and clothe those who have done like duty in the past generation and who, through misfortune or self-sacrifice, as for instance in the support and education of children or grandchildren who may have died or become disabled, find themselves without the means of support.

We are already supporting them, but in our poor houses and private alms houses and in a manner which dishonors them. You would all be surprised, I know, to visit a poor house in any part of the country and to see how many .of the inmates are there through no other cause whatever.

Other civilized countries have made this provision, Great Britain, Australia, New Zealand, Denmark, France, Germany, Austria and several others, and it would be a poor substitute for such provision in the United States that the service pensions granted by employers for long and faithful service with them should be so extended as to give this relief only for wage and salary earners and in amounts much larger than are requisite for support, by means of what would, on the deferred wage theory, be compulsory deductions from their pay, instead of drawing upon the entire wealth of the nation to provide bare, honorable support for those who reach old age without this provision. The true principle is to make the provision for the latter by proper public means and to encourage men and women to make better provision for themselves by systems of saving and of intelligent management of their own affairs.

At least that is the way it seems to me and I cannot believe that from a social insurance and social welfare standpoint the system of dealing with service retirement pensions as in all respects equivalent to deferred wages, would be a good one.

In practice it will also certainly work out as follows: that there will be a constant and insistent demand, as the amount of the individual's contributions increases, for some system of recognizing his rights on a cash basis, and the thing will inevitably prove, when attempted on a large scale, so great an annoyance and of so little benefit to an employer, that I think, so long as it is not compulsory or practically rendered so by general adoption—both of which things I deem most improbable—it is a system which would, after a few years, be abandoned.

The things which I have said have not the least bearing against the paper as a careful analysis of the subject from that standpoint and as embracing most thoroughgoing and valuable suggestions for the utilization of the plan, if that standpoint is taken, but while I recognize that all such service pension systems may, for actuarial purposes, be thought of and worked with as mathematically constituting deferred wages, I am of the opinion that there is a fundamental mistake involved in thinking of these plans as amounting in all respects to deferred wages.

MR. G. B. BUCK:

The purpose of this paper is stated to be that of stimulating a discussion of the principles to be followed in formulating an industrial retirement system and of emphasizing the advantages of systems based on the so-called "money-purchase principle." The lack of adequate and reliable information on the subject of the principles to be observed in the establishment of industrial pensions makes the paper very valuable not only to the actuary but to the employer and employee who is contemplating the establishment of a plan. The majority of our industrial pension plans have been founded upon principles which in the main are unsound, and employers in establishing pension plans are prone to lean upon precedents rather than to analyze the basic principles involved. If they can be influenced to think along the lines outlined by Mr. Woodward a great step forward will be taken in the settlement of the problem of industrial pensions.

The method of providing pensions on the "money-purchase principle" is one which lends itself kindly to the establishment of a retirement system that can be either underwritten by an insurance carrier or operated by the company itself. Its general adoption throughout industrial and governmental employment would mean an appreciable step forward in the settlement of the problem of old age dependency because it would permit an employee to begin work with one employer, leave and enter the service of another, and thus progress through his years of activity without losing his years of credit toward an old age or disability pension. This could be effected by permitting him to transfer the reserve on his benefit between the systems, a practice which has already been adopted by the State of New York in respect to the employees of various cities and the state service.

The active entrance of the insurance companies into the field of pensions would have a very salutary effect on the pension funds of this country, both industrial and municipal. The fact that pensions do cost money and that they cannot be treated lightly may thus be brought home to both employer and employee. When a pension policy can be readily purchased from the insurance companies its value will be more generally known. When the premiums which an insurance company will be compelled to charge are compared with the relatively small amounts which some employers think their funds are costing, many employers will make inquiry into the true financial condition of these funds.

The average employer fails to realize the liabilities involved in the establishment of a pension plan. He assumes that he is protected by a statement to the employee that no legal obligation is assumed by the company and that the plan can be changed or discontinued at will. For this reason he feels safe in drifting along and paying the maturing pension claims without taking into account the accruing liabilities. It would seem that he is being misled by the illusive character of his liabilities because we cannot believe on the one hand, that he knows of these liabilities but does not care to put them on his books, or, on the other hand, that he intends to repudiate them and fool the employees who are not in a position to ascertain the facts and who come to rely on the expected pensions for their old age.

Mr. Woodward's comments on the use of the rate of labor turnover and the use of the salary scale are appropriate when applied to any system underwritten by an insurance company and to the self-insurer, unless the annual rate of payment to the fund by the self-insurer as determined by the use of a conservative withdrawal rate and rate of salary change is checked and adjusted by means of periodic investigations and valuations. I would hesitate to subscribe to the statement that the use of a conservative lapse rate or that the proper use of a salary scale is not compatible with the operation of a sound retirement system in accordance with actuarial principles. I believe that a company can operate a sound fund which will work successfully and in which both the lapse rate and the salary scale may be used if the proper periodic actuarial valuations and adjustments such as an insurance company would make are employed. I have had occasion to demonstrate in dollars and cents the manner in which a fund of this kind would weather some of the most unfavorable changes in the lapse rate and the salary trend which could be expected. The organizations which have met with difficulties on account of their pension funds are the organizations which make no actuarial valuations or checks to test the solvency of their plans, and funds of this kind should be regarded with suspicion regardless of whether the benefits are based upon salary.

If a set of the mortality and service tables employed are available together with a comparison of the actual and expected experience, a valuation balance sheet and a tabulation of the number and salaries of the active members classified by age and length of service, i. e., data similar to that which an insurance company is required to have each year in respect to its policyholders, I think that the financial condition of the fund may be definitely determined and that the solvency of any properly constructed funds should not be questioned simply because they used a salary scale, a withdrawal rate, or both. Without these data being available there may be cause for distrust in connection with any pension or retirement fund.

The obstacle in connection with the establishment of any sound industrial plan is that of pension costs especially as it relates to making adequate provision for present employees. The main problem that overshadows ordinarily all other questions is that of taking care of the accrued liability. Under any

plan of liquidating the accrued liability, the immediate outlay is
so great that employers are usually inclined to cut the benefits
as far as possible to keep the costs down.   For this reason
employers may hesitate to adopt the provision for return of
contributions made on behalf of any employee when the em-
ployee leaves the service.   Mr. Woodward touches very lightly
on the question of providing for the accrued liability but it should
receive very careful consideration.   In establishing a retirement
plan, calculations of the liability on account of the present mem-
bers should be made with the same precision as is followed in
calculating the liability to be assumed after the plan is established,
otherwise this liability may be underestimated by employers and
cause embarrassment later.

The accrued liability is a practical obstacle which every pension
fund established in an industrial or municipal organization has
to face, if the members are to be credited with service prior to
the establishment of the plan.   Even in the plans in which the
employees are asked to contribute, the major part of the accrued
liability generally has to be assumed by the employer if the
system is to be of real value to the employer.   Therefore,
despite the fact that it may be argued that the employer must
contribute on account of the employees who quit the service as well
as on account of those who remain, the average employer will
probably be slow to assume this extra cost, which benefits
only employees, until the accrued liability has been safely taken
care of on account of the employees who remain in service to
draw pensions.

I have limited my discussion principally to the points of dis-
agreement with Mr. Woodward.   There are so many points in
the paper with which I am in accord and so many phases of the
subject in which I am interested, that had I attempted to dis-
cuss these points I fear my discussion would have been unduly
lengthy.

THE DEVELOPMENT OF PUBLIC LIABILITY INSURANCE RATES
FOR AUTOMOBILES—A. L. KIRKPATRICK.

VOL. VIII, PAGE 35.

WRITTEN DISCUSSION

MR. F. R. MULLANEY:

Up to the present time there has been a great deal of study
and attention given to the statistical and underwriting methods
used in Workmen's Compensation Insurance, but another line
in the casualty field has been making rapid strides in the last
few years which demands attention and that is Automobile
Insurance. Mr. Kirkpatrick's article on the Development of
Public Liability Insurance Rates for such form of coverage is
therefore a very timely one and calls our attention to the need
of devoting more time and study to the proper methods to be
pursued in computing rates for such insurance. As is known to
all of us who are interested in this branch of the casualty field,
there is a tendency to place the control of rates for Automobile
Insurance with the Insurance Departments, as is indicated in
the recent action of the New York State Legislature, but the
possibility or probability of rate control for this form of insurance
should not be the only incentive for the members of the insurance
fraternity to urge them to devise better statistical methods and
underwriting practises so that adequate and equitable rates may
be determined.

As has been pointed out in this article, the problems of the
actuaries and statisticians have been made considerably more
difficult by reason of the number of changes that have been made
in the underwriting practises and bases of rates, and I believe
that we will all agree with Mr. Kirkpatrick when he says "It
is certain that until there is some stability in the underwriting
practise no company can furnish statistical data of great value
for rate making purposes. It is hoped that the time will come
when a satisfactory method of underwriting may be permanently
maintained without radical modifications. When that point is
reached it will be possible to conduct extensive statistical studies
and to make use of methods which will solve many of the present
day difficulties in Automobile Rate Making." I do not believe
that this point can be emphasized too much, especially so when

we find that the experience of not more than two, or at the most, three policy years can be used for rate making purposes.

We all probably realize the fact that conditions in the automobile industry have changed very rapidly and undoubtedly have necessitated changes in the handling of Automobile Insurance also. It is very interesting, therefore, to note how the experience that was available was adapted to the needs of the business by the use of certain assumptions which seem to be borne out by tests that were illustrated in the article.

The use of the projection factor method for determining the increase in cost of claims from year to year has evidently served its purpose very well for this form of insurance. It would seem that the results obtained from such a method would probably be more consistent and dependable for the calculation of automobile rates than when a similar method was used in Compensation rates where some difficulty has been experienced with the application of that method. In Compensation there are a number of factors which tend to produce inconsistent results such as changes in wages and industrial activity which condition would not affect, to such a great extent, the results when used for auto-. mobile rate computations.

In conclusion, permit me to quote from President Mowbray's address at the November meeting in which I think he sums up the entire situation: "It is for us to work out such standards and establish their soundness. And we must soon, I think, do this, not alone for Workmen's Compensation Insurance, but for all casualty lines. For when we observe the efforts (attended with some success) to make carrying of Automobile Liability Insurance compulsory, we may anticipate regulations of rates in the not distant future for this line also."

MR. S. B. PERKINS:

Mr. Kirkpatrick's paper on "The Development of Public Liability Insurance Rates for Automobiles" is the first that has appeared to my knowledge containing such a complete exposition of automobile rate-making methods and should prove of great interest to such of its readers as are interested in this particular subject, as well as academically to all who are interested in casualty insurance rate-making methods. Automobile rate-

making is in its infancy and it is a matter of personal satisfaction to me that the importance of the line is being recognized and that some serious attention is being given toward the establishment of rates on something which approaches a scientific basis.   There are so many phases of this problem that a complete discussion of the paper would practically amount to another paper.   I will, therefore, confine my remarks to two particular points.

The first of these is the matter of development of losses.   In Workmen's Compensation Insurance the benefits payable, in the event of an accident, are prescribed by law, and the method and time of payment also follow the act.   It is obvious, therefore, that with a constant exposure to the accident hazard, and if there be no material change in the accident rate or the severity of accidents, there would be a very definite relationship between the amount of compensation paid at the end of a given period and the total amount incurred on the same accidents. In the Automobile Insurance business, however, the relation should not be as definite, because of the fact that automobile losses are determined either by agreement between the insurance carrier and the injured or his estate or, failing to arrive at such an agreement, by judgment of the court.   Either of these is subject to violent fluctuations, depending upon many conditions. The public's appreciation of the fact that the insurance carriers, not being desirous of allowing claims to go to suit, will make reasonable settlements, regardless of their liability, is one of the most effective of these conditions.   The public is prone to take advantage of this situation and presents claims for which liability is known not to exist.   This situation obtains until the carriers realize the extent of the moral hazard and change their policy to one which adheres more strictly to the contractual obligations.

Such a change produces two results—more claims develop into suits, legitimate ones being accompanied by judgments which many times are higher than settlements under agreements might have been but which, in the ultimate, might produce exactly the same amount of losses as under the original situation, with the exception that the money is now paid to those to whom it is due and denied those to whom it should not be paid. This is as it should be but, in bringing the claims to suit, naturally, initial payments are deferred sometimes materially, and this destroys the relationship which previously existed between

amounts paid at the end of any given period, such as twelve months, and the ultimate incurred cost. It is quite possible, also, that the courts, feeling that the public is becoming careless in operating in traffic, in attempting to curb this evil, increase their verdicts. This can easily be done because there has been no legislation stipulating what the benefits to an injured should be, as there has been in the case of Compensation. So it is that, in the development of automobile losses, these factors have to be considered in addition to those factors which enter the compensation problem, although it is equally true that some factors affecting the compensation losses, such as the change in wage scales, do not as materially affect automobile losses. Unfortunately, the factors which do not affect automobile losses are more easily measurable than the additional factors which have been considered. I do not pretend at this time to offer any remedy to the situation but merely wish to point out its existence.

The other point which I desire to comment on is the matter of proper allocation of responsibility for accidents. This is a matter which might well be incorporated in the rating problem. Certain communities establish excellent traffic rules and take many precautions to prevent accidents. Energy and money spent along these lines should receive their reward. The question is, · how shall this be effected? The converse is more readily visualized. The traffic conditions in some localities may be very unsafe; at the same time, owing to the full knowledge of these conditions car owners operating continuously in these locations may suffer no more than the normal number of accidents, while the cars owned and operated from points more distant may continually find themselves in difficulties while driving through these districts. Under the present system all losses are assigned to owners and to the locations in which the cars are owned. Therefore, under the present system, the conditions which have been thus outlined would merely tend to penalize the car owners of the surrounding districts by virtue of a reaction of the subsequent rates, whereas, the real fault existed in the locations where the accidents took place. All this merely points toward the possibility of territorial charges or credits, depending upon the actual operating conditions but, as in the case of the development of losses, I am not prepared to offer a solution but I merely wish to suggest the possibility.

MR. R. H. BLANCHARD:

The general impression which I got from this excellent paper is that automobile rate making is still far from an exact science. The system described is probably more efficacious in producing an adequate premium income for insurers than in measuring the hazard involved in insuring the individual car owner. In fact it seems doubtful to me whether this hazard is even approximately measured. I am not intimately acquainted with the details of automobile rate making and I shall therefore not attempt extended discussion of the paper. However, in reading it certain questions occurred to me which I should like to have further discussed by the author in his review. They are as follows:

1. What is the exact basis of assignment of cars of various makes to the symbol groups? To what extent is this method justified by experience?

2. Is there any relationship between losses and the type of car within a given symbol group? We find, for example, within each group, cars of relatively cheap construction; cars which depend for their sales on a sporty appearance and other cars which are built primarily to be sold as conservative and reliable instruments of transportation. Does the public liability hazard correspond to any degree to the types of buyers to whom cars of these various classes appeal?

3. To what extent do the characteristics of the individual owner deserve consideration? For example, are the extent to which he uses his car, his skill as a driver, care used in maintenance and driving given consideration? Is the past record of the driver worthy of attention as an indication of relative hazard? What are the practical limitations on the measurement of individual hazard?

4. In the construction of rates for 1921 certain assumptions were made concerning the development of premiums and losses under policies issued in 1920. These policies have now all been terminated. To what extent has experience to date justified these assumptions?

I have submitted these questions with the idea of indicating the features of automobile rate making which appear to one somewhat detached from the practical conduct of the business to require critical analysis. It seems to me that a full discussion of them would be of considerable value to the Society.

AUTHOR'S REVIEW OF DISCUSSIONS.

MR. A. L. KIRKPATRICK:

While this paper was primarily an exposition of the methods used in making automobile rates, some questions have been raised which involve further explanation and an opinion as to the accuracy and value of those methods.

When private passenger cars were rated upon the basis of a list price, it was a simple matter to determine the group in which each kind of car fell, merely by the price of that car. This involved the use of a rule of thumb. But in eliminating the inequities produced by this method no definite rule can be said to have applied. In general, the object to be attained by the assignment of cars to symbol groups rather than list price groups was the elimination of the inequities produced by cars of similar type and hazard which happened to have a different list price, and consequently took a different rate. In making the assignment to symbol groups, each type and make of car had to be considered separately and the assignment to a symbol group determined in each case, in the most equitable manner possible. This can be readily understood by referring to the manual and studying the symbols of almost any make of car. It will be noted that although different models may have list prices which fall in different groups, yet the same symbol has been applied to all models of similar construction and which involve the same Public Liability hazard.

Experience has shown that there is a certain definite relationship between the list price of the car and the losses which that type of car produces. It is a pretty difficult thing to explain to the layman and the purchaser of insurance why a Packard car is any more dangerous to drive than a Dort. There have been various explanations given for this relationship, but the discussion of these causes is not within the scope of this paper.

In developing the 1920 policy year experience to determine the ultimate cost of that business, a certain amount of judgment was exercised in determining the development factors. Later experience is not yet available to show how close the actual cost came to that arrived at by the methods described. It is reasonably certain, however, that the results will not be wide of the

mark as respects the business as a whole. But where only a limited volume of experience was available in certain territories the method could not be strictly adhered to.

Mr. Blanchard has raised a question as to the extent to which consideration should be given to the characteristics of individual owners. The matter of measuring the hazard in the case of each driver is one which has puzzled automobile underwriters for a considerable period. Many suggestions have been made as to methods of securing information which will distinguish a risk involving a careless driver from one involving a careful driver. There is no doubt but what the personnel hazard is by far the greatest hazard to be considered in automobile underwriting, but so far there has been no satisfactory solution presented for getting the information which will enable the underwriter to determine which drivers are good risks and which are bad. Some companies have adopted the policy of an inspection report which covers the owner of the car himself. The chief difficulty involved is to get this inspection at a reasonable cost. The remedy which has been generally adopted by companies is to review very carefully the experience of each owner and when that experience appears to indicate a bad moral hazard, the policy is cancelled. This method appears to be the most generally used, although it is admittedly not entirely satisfactory and does not permit of a careful selection of risks in advance.

DISTRIBUTION OF SURPLUS BY CASUALTY COMPANIES WRITING PARTICIPATING INSURANCE—WILLIAM LESLIE.

VOL. VIII, PAGE 54.

WRITTEN DISCUSSION.

MR. H. R. BASSFORD:*

Mr. Leslie's paper "Distribution of Surplus by Casualty Companies" should be of particular interest to those Life Companies who do a Group Insurance business. Our Company has paid dividends on the "Individual Risk Experience Method" for the last two years and this method has apparently been satisfactory to most employers. The exact formula used is a slight

*For James D. Craig.

modification of formula number 25 in Professor Whitney's paper on "Theory of Experience Rating." Instead of applying the formula to loss ratio, as Mr. Leslie does, it is applied to the surplus. This application of the formula produces results somewhat similar to Mr. Leslie's formula shown on page 70 of his paper. So modified, it is as follows:

$$\text{Dividend} = a \left[P' + Z \left(P - P' \right) \right]$$

P': At the end of each calendar year, the divisible surplus is determined as a percentage of the premium on all policies in one line, say, all Group Life Policies. This percentage applied to the premiums earned on the particular group under consideration, represents the class experience, in the formula, P'.

P: The individual risk surplus P is determined for each Group on its renewal date. The Group is credited with the premiums earned up to the renewal date and charged with expenses (graded on large groups) and with claims incurred. The net balance represents the individual risk surplus, P.

Z: Professor Whitney, in his above mentioned paper, suggested that the credibility factor Z is a matter of individual judgment. We wished to make it as simple as possible and to have it depend on the size of the group only, being any independent value for any one group. In the above formula, the factor represents the probability that the actual experience will come within a reasonable percentage of the expected experience. In Group Life Insurance, the probability of the contingencies insured against is rather simple, inasmuch as the face of the policy is paid in case of death or total and permanent disability. The Z factor, therefore, is practically a factor of the number of years of life exposed.

a: As pointed out in Mr. Leslie's paper, there will be a number of cases where a formula of this type will produce negative dividends. As it is impossible, practically, to "collect this dividend," the total of the dividend quoted will probably exceed the amount of surplus to be distributed and accordingly, the factor "a" which is a fraction, has been inserted to reduce the dividend and so provide for negative dividends as well as for a contingency reserve.

The class experience used with such a formula should be strictly homogeneous and should therefore include the experience

of one industry only. Usually, however, the experience of any one industry is not of sufficient size to produce the true average experience. It is therefore more practicable to use the entire experience in one line of insurance, if the law does not forbid it. Little injustice will result, provided the original premium charged is in proportion to the risk insured. If experience proves that any one industry has been charged an incorrect premium, it is possible to correct this in the calculation of the dividend, by assuming that the particular group was charged the correct premium and determining the dividend on this basis. The dividend can then be corrected by the difference between the premium charged and the correct premium.

Under Group Life Insurance, the most reasonable time for paying the dividend seems to be at the annual renewal date. At this time, the employer decides whether he wishes to renew or not, and it seems, therefore, the proper time for making the financial adjustment to which he is entitled. It is for this reason that the individual risk experience is carried to the renewal date of the policy. Again, if the general experience has changed since the end of the calendar year when the class experience factor was determined, the change will be reflected in the calculation of the individual dividend.

One of the objections which Mr. Leslie has cited for this type of formula is that "It is not in consonance with the idea of a fixed dividend policy which has the effect of enabling an employer to forecast with considerable certainty his final insurance costs." In order to prevent the net cost from fluctuating widely, for any one employer, from year to year, the credibility factor should be made rather small. It runs as low as five per cent. on small groups in the above formula.

In the application of the formula, a total dividend is calculated for the full exposure of the Group and then the dividend is determined for the particular year in question by subtracting previous dividends paid. Of course, in determining the surplus for all years of experience, the Group is not charged with the dividends already apportioned. As the experience is accumulated on any Group, the credibility factor increases and the general tendency is to have dividends increasing with duration. Employers who are familiar with the Life Insurance business

naturally expect increasing dividends and such a method, therefore, gives general satisfaction.

In the practical application of a formula of this type, the following points must be considered:

1. Wide fluctuations in individual dividends should be avoided. This can be done best by limiting the value of the credibility factor.

2. The avoidance of an over-payment caused by negative dividends. This can be accomplished by fixing maximum and minimum dividends or by limiting all dividends. Usually, the investment income is negligible on any one group as the insurance is issued on the One Year Term Plan and no reserves accumulate and can be used for this purpose.

3. Where the loss ratio runs high, it is necessary to be particularly careful in the underwriting of large risks. One or two poor risks of considerable size may require all surplus and vitiate any dividend formula.

We agree with Mr. Leslie in that under the test of actual use, the formula has proved satisfactory to most employers. It is equitable and does not discriminate unfairly between risks.

CLASSIFICATION OF RISKS AS THE BASIS OF INSURANCE RATE MAKING, WITH SPECIAL REFERENCE TO WORKMEN'S COMPENSATION—A. H. MOWBRAY

VOL. VIII, PAGE 77.

WRITTEN DISCUSSION

MR. R. A. WHEELER:

Although the classification of risks as a basis of insurance rate making is fundamental to the making of insurance rates, the evolution of this phase of rate making as affecting Workmen's Compensation insurance has been slow and without the guidance of recognized principles or consistent theories. This may be due, not to the absence of principles or theories, but to the conflict of different principles and theories. Mr. Mowbray states that rates should provide an equitable distribution of

insurance cost by being closely adjusted to the inherent hazard of individual risks. This would appear to be self-evident were it not for the fact that there are those who believe that it is not especially important that every commodity should bear a specific cost or that every consumer should pay his exact quota. From an insurance carrier's point of view, however, it would be unsafe to accept other than the above fundamental principle. How far we can go towards making rates that are closely adjusted to the inherent hazard of individual risks is another matter. We are then confronted with the problem of determining the inherent hazard of an individual risk, the solution of which presents many practical difficulties.

Mr. Mowbray has offered the following fundamentals as a basis for a solution:

1. Bringing together into classifications, risks which have inherent in their operation the same causes, the variation in strength of which may be further subdivided by schedule and experience rating plans.

2. The resulting classification system and its extension through schedule and experience rating should be harmonious.

3. Such a classification system must be consistent with the practical conduct of the business.

In applying these principles to Workmen's Compensation Insurance, the theory produces a process manual, although as he states, in addition to process, recognition must also be given to other factors, such as general level of wages, character of workmen and extent of indemnity.

Finally a program is presented for the study and review of the present manual in the light of the foregoing theory. This calls for an examination of individual risks as to exposure to accidents and the occurrence and cost of accidents as to causes, and I would add, an examination into the bases of payroll accounting.

Whatever theory underlies a system of classification, care should be taken to see that it is susceptible to statistical analysis and control.

While I am in entire accord with Mr. Mowbray's theory and principles, I am constrained to point out some of the practical

difficulties in applying them at the present stage of statistical development.

1. Our statistics have been accumulated under a classification system comprising nearly 1000 classifications of which scarcely 20% have sufficient nationwide exposure to indicate either accident frequency or loss cost per unit of payroll. That such a situation might arise was predicted by Mr. Magoun, in the February, 1915, *Proceedings*, when he said: "It goes without saying that such a refinement in classifications is impossible for statistical purposes in general."

2. Statistics as to cause of accident have been so finely divided for each of these 1000 classifications that they are, to a large extent, vitiated by lack of exposure. This of course can be partly remedied by the grouping of classifications and causes.

3. Statistics as to physical conditions causing accidents have not been kept currently to go hand in hand with the loss costs attributed to physical conditions making difficult desired correllation. Although this has not been done in the past some data is available on current conditions.

4. The lack of state regulation of rates and the enforcement of manual rules, has brought about improper assignments of payroll and losses to the existing classifications. For instance, the payroll on high rated classifications has been assigned to low rated classifications until the vicious cycle has finally produced in New York State a rate of $28.99 for "Iron and Steel Erection."

Progress is now being made by the committees of the National Council along the lines indicated in this paper, although it is not certain what principles will emerge as underlying a revision of the classification or the accompanying schedule and experience rating plans.

MR. W. W. GREENE:

The erection of a satisfactory system of classification is no slight task in any form of insurance. In workmen's compensation insurance it is perhaps the biggest and most fundamental of our difficulties. Mr. Mowbray's paper is admirable as an expression of the philosophy which should govern our approach to this problem.

His discussion of abstract principles leads him to certain criteria which are so worthy of emphasis that I take the liberty of reiterating them, in essence.

(1)   The classification should embrace risks which display the same causes of loss.

(2)   Within the classification, the variation from risk to risk in the strength of each such cause should not be greater than can be handled by the (schedule and/or experience) rating plan.

(3)   The classification should not cover important hazards which are not common to all its risks.   (The foregoing, I believe, expresses what Mr. Mowbray had in mind).

(4)   The classification system and the supplementary rating plan should be in harmony.

(5)   "The basis throughout should be the outward, recognizable indicia of the presence and potency of the several inherent causes of loss including extent as well as occurrence of loss." This last, though well put, seems to be quite definitely implied by (1), (2) and (3).

The value of a clear statement of the essentials of classification building is very substantial, though probably all along the makers of classifications have been carrying these standards in the back of their heads.   The author of this paper has performed a very necessary and helpful analysis of the phychology of manual making.

Mr. Mowbray goes on to outline a program for the study and review of the manual.

In outlining the work of manual revision he refers to the study of descriptions of individual risks in the particular classifications under consideration, to reviewing "complete accident records for these risks covering a considerable period of time and including an analysis by cause and cost," to what we understand to be a weighting of the potential causes of accident in each risk on the basis of the actual experience, to comparison of the several risks within the classification to determine if any "include as important elements of their hazard causes which are not common to all," and to review the present grouping of classifications in the light of the information developed by the foregoing steps.

In the writer's opinion Mr. Mowbray's program falls below the promise of the earlier part of the paper.

It seems to us that what the classification system particularly needs is more of the panoramic view taking in all industry, and less of the view which is restricted to a particular industry. The most serious difficulties of our present set of classifications are due more to failure to look at the manual as one problem, than to anything else. This failure has not been the fault of the individuals who have done the work, but rather of the general plan (if it may be called a plan) of manual revision, which has precluded consideration of more than one particular group of classifications at a time.

There is no doubt that the complete descriptions of individual risks referred to by Mr. Mowbray are necessary to the panoramic view. We would point out that for practical purposes these descriptions are now available in connection with manufacturing risks. We refer to the inspection reports now on file in the offices of the rating bureaus of the principal industrial States.

As a means of "breaking into" the problem, these reports should be sorted into groups which are, in a general way, homogeneous from the standpoint of material, process and product. Preponderance will have to be given in most cases to one of these three aspects of the risk, and the procedure which is suggested in one industry is certainly not the one which can be profitably followed with respect to all. The natural "lines of cleavage" between well-defined subdivisions of an industry can be recognized by any one with common sense and with the necessary detailed information at hand.

Assuming that the sorting of inspection reports will furnish a first approximation to a set of classifications for a given industry, this hypothetical set of classifications can be tested by an intensive field investigation. The revisions in classification plan indicated by the field investigation can be made.

When tentative classification plans have been worked out for all industries, they should be examined from a general point of view and made to be as consistent as possible. The tentative classification scheme as a whole should, of course, be compared with the existing set of classifications, and then it should be submitted for criticism to groups of employers, and for final review to a selected group of underwriters.

Until the system is in practically complete form, subject, of course, to revision, the work, to secure adequate results, should be under the immediate direction of a single mind. Committees can criticize, they can seldom create.

The classification problem is quite as much a business problem as it is one of insurance theory. The business cannot satisfactorily proceed unless the dividing lines between classifications are satisfactory to the great majority of employers.

We believe that highly satisfactory results can be obtained in the manner we have indicated, without resort to as rigid an application of theory as possibly Mr. Mowbray has in mind when he referred to the analysis of individual risk experience. Such experience, in the detail mentioned by Mr. Mowbray, would be difficult to secure, and we fear that a great deal of it would not be indicative because of lack of necessary breadth of exposure.

AUTHOR'S REVIEW OF DISCUSSIONS.

MR. A. H. MOWBRAY:

It is very gratifying to find my critics do not differ with the theory of classification I endeavored to formulate. It is with the practical application that difficulty is found. This is to be expected and it may well be that the program I have outlined for working out the theory will require radical revision. Agreement on the underlying theory of classification must, if it becomes general, tend to clear away some points of disagreement and difficulty.

The difficulties Mr. Wheeler points out are real and important and will certainly slow up progress. Yet, as I noted in outlining the theory, we cannot hope to get a perfect scheme of classification which will precisely analyze the entire industry of the country in narrowly defined classifications. After all, can we not make some progress even with the faulty material we have and get a better start for the next step?

Mr. Greene suggests a different approach to the practical problem on the basis of what he calls a panoramic view in place of study of individual risks. In other words, as I understand him, he would proceed by analysis rather than synthesis. Since risks are the things to be classified it seems to me self-evident

that a proper system of classification cannot be worked out without a study of risks, their likenesses and differences. It may well be, however, that the problem can be attacked from both points carrying the analysis through the major divisions of industry which will give groups of classifications, and then building up individual classifications within these groups by study and association of risks.

It may also be possible to shortcut this work somewhat through the use of independent expert advisers on different lines of industry. I have recently found that a brief interview with a well-known consulting engineer in oil production furnished the basis for an apparently satisfactory solution of the classification problem in this field. This was so, however, because of his intimate knowledge of conditions in large numbers of individual enterprises of the type we must classify, the equivalent of the study I have suggested. However, we have to deal with many lines in which such independent experts cannot be found, and here we will have to find our own means for developing and a scheme of classifications consistent with the general theory.

ACTUARIAL AND STATISTICAL NOTES

UNEARNED PREMIUM RESERVES FOR FIDELITY AND
SURETY INSURANCE

The computation of Unearned Premium Reserves for Fidelity and Surety Insurance has presented a difficult problem to some students of the subject, especially those not in direct contact with the business. For the purpose of adding to the general information, the following is offered.

There are three kinds of Surety Bonds representing extreme types.

(a) Court Bonds : Judicial Bonds which in the main terminate only upon the release of liability by the court. The premium for these bonds is on an annual basis and the unearned premium reserve is computed, therefore, in the same manner as any other premium reserve, the annual premiums being disclosed each year, and possibly for a fractional portion of the year, at the date of cancellation.

(b) Indemnity Bonds for lost securities, or Refunding Bonds. The termination of liability in these forms of bonds is indefinite, and of course, as only one premium is charged, it has been necessary to arrive at some understanding with regard to a term for the purpose of computing the unearned premium reserve. The Insurance Department of New York has assigned seven years as a term for such bonds, and I believe that this method is being generally followed in computing the unearned premium reserve.

(c) Surety Contract Bonds. A construction bond written together with a maintenance bond, guaranteeing the wearing qualities or efficiency of the thing constructed or supplied, furnishes a peculiar example of the difficulties of setting up a correct premium reserve in this line of business. Should it happen that it is impossible to determine in advance the date of the completion of the work, it is customary to set up the premium on a two year basis for the contract portion until the construction is complete. The maintenance portion, however, must be handled in a somewhat different manner, since liability as a rule, does not begin to operate until the contract has been completed. It is necessary

to maintain the whole of the maintenance premium in the reserve until such time as the contract is finished, and at such time the term of maintenance governs, of course, the period for which the unearned premium reserve shall be computed. Should the contract stipulate the period in which the construction work must be completed, it is customary to set up the maintenance premium of the contract bond which of course, is paid at the same time as the construction premium, as an advance premium to be carried at 100% until the date of the completion of the construction work, as stipulated by contract, and whose term shall be that coincident with the period of maintenance. The inspection of an annual statement of any carrier writing this form of insurance will disclose considerable volume of advance premium for the surety line.

Bonds written on the Fidelity form do not as a rule, present such difficulties as Surety Bonds. Those written to guarantee the honesty of men in elective offices, of course, must provide coverage for the term of office. But it should be noted that the premium is charged upon an annual basis, and for purposes of the Unearned Premium Reserve, each annual premium is set up for a term of one year, or, less of course, if the period of office happens to terminate before the end of the year.

All premiums and cancellations under Schedule Bonds covering groups of employees listed in an attached schedule, should be handled by giving them the term of the bond and not the term of each item under the constantly changing schedule, these bonds being written on an annual basis.

An Automobile Embezzlement Bond is still another variation. The bond is issued in connection with certificates, each certificate covering the security furnished in connection with the payments due on cars sold. These certificates, of course, having each a different commencement and expiration date, and the premiums being charged annually, are considered individually on an annual basis for purposes of computing the Premium Reserve.

Premiums on renewable bonds which have not been paid or in cases where the bond has not been cancelled either by reason of the fact that it is a noncancellable bond, or that authorization to cancel has not been received, are usually charged to a

premium suspense account and are not entered in the premium writings until their status is determined, *i. e.*, paid or cancelled.

The Premium Reserve, however, must be maintained to cover the liability which is assumed by these premiums and the usual procedure is to carry a separate reserve calculated in the usual way and based on the individual terms of the premiums entered in the suspense account, a new "in force" being determined and a new reserve calculated thereon each time.

GEORGE D. MOORE.

REVIEWS OF PUBLICATIONS

Insurance Principles and Practices.   Riegel and Loman.   Prentice-Hall, Inc., New York, 1921.   Pp. xv, 514.

This volume represents an attempt to cover the entire field of insurance.   It contains 350 pages of text, 6 pages of bibliography, and an appendix covering 143 pages.

The text is divided into six parts as follows:

Part I.   INSURANCE IN GENERAL

Part II.   PERSONAL INSURANCE

Part III.   LIABILITY AND COMPENSATION INSURANCE

Part IV.   FIRE INSURANCE

Part V.   MARINE INSURANCE

Part VI.   OTHER FORMS OF CASUALTY INSURANCE

Part I takes up the uses of insurance, the fundamental principles of insurance, the types of insurance organizations, and the organization of the business.   Under "Personal Insurance," life, health, and accident insurance are discussed.   In Part VI the principles of automobile insurance, title insurance, credit insurance, and corporate bonding are considered.

The desirability of a general text of this kind will perhaps be best appreciated by those who are attempting to give a general course in insurance in universities or colleges.   To the person specializing in a particular line of insurance, the treatment of the subject in which he is interested will probably not be found sufficient for his purposes because of its necessary brevity.   It is gratifying to find, however, that, in the main, the condensation of the whole field of insurance into one volume has been accomplished through the omission of unnecessary repetition and padding.

The arrangement of the book deserves commendation.   It follows a logical order, giving in Part I a brief statement of the general features of insurance and insurance carriers and then proceeding to present the details and special features of the more important lines of insurance.

In a work of this kind it is almost impossible not to find many things which do not suit the particular reviewer's taste. That is true in the present instance. For example in Chapter III, which discusses the types of insurance organizations, the following statement appears:

In all forms of insurance the insured is offered his choice of a number of different organizations for the purpose of insuring his risk. These organizations may be broadly classified into six groups: (1) self-insurance; (2) stock companies; (3) mutual associations; (4) reciprocal underwriters or inter-insurers; (5) Lloyds; (6) government or state agencies. To consider the advantages and disadvantages of each type of organization separately for every form of insurance would be a tremendous as well as an uninteresting task, inasmuch as the same ground would have to be covered many times. Each of these types has certain characteristics, whether it be writing life, casualty or property insurance, and from these characteristics its advantages and disadvantages naturally follow. We shall therefore devote this chapter to a general discussion of these various organizations, irrespective of the type of insurance business in which they are engaged, merely pointing out important qualifications relating to particular businesses.

The authors then proceed to describe mutual companies in terms of their principal features, enumerating the advantages claimed for such companies. One would conclude, from the reading, that all mutual life companies were organized under assessment laws and that policyholders were liable to assessments if premiums collected were insufficient to meet losses: For here is the way some of the statements about mutual companies are presented:

The advantages are:

a. Where no commissions or very small ones are paid to agents, mutuals claim to be able to do business at a smaller cost than other organizations. (This does not apply to life insurance.)

d. The mutual can exercise a more careful selection of risks. (Inapplicable to life insurance.)

f. Many mutuals have operated without finding it necessary to call for assessments.

The disadvantages which the mutual is said to be under are as follows:

d. The contract is indefinite, since the policyholder may be called upon to pay further premiums.

In life insurance mutual companies have gradually attained a position of preeminence; at the present time their number and the amount of business written exceeds that of the stock companies. With the exception

of the fact that policy-holders in a mutual company receive a participating policy, there is little difference between the mutual and the stock life insurance company. Even this difference almost disappears when the dividends of the life insurance company stockholders are limited to a definite figure, such as 6 per cent., and the stock company issues only participating policies.

The last portion of this may be intended to take life insurance companies completely out of the class of mutuals for which the arguments "for and against" are presented, but if so, why are they referred to in "a" and "d"?

In fact the entire chapter on "Types of Insurance Organizations" seems unsatisfactory. The advantages and disadvantages of the various types of companies which are put down have the appearance of being claims which the proponent or opponent of some particular type of company has advanced and do not seem to have been carefully digested or analysed. For instance an advantage which is set forth for reciprocal exchanges is "Assessments are usually limited. Whether such limitation is legal or not is hard to say." But in looking through the advantages claimed for mutual companies no reference is made to limitation in the amount of assessments that may be levied. Again the reduction in acquisition cost through the elimination of agents or brokers is treated very differently in the description of mutuals and reciprocals, and might lead a student to the wrong conclusion or at least confuse him. Look back for a moment at argument "a" in favor of a mutual company and then consider the two following advantages presented for reciprocals:

a. The elimination of expense through the conduct of the business at cost, with the exception of any amount which may be paid the attorney for his services. The amount which the attorney is to receive and the expenses are usually limited in some manner.

e. Elimination of the cost of the constant struggle to obtain new business in the form of commissions to agents.

Under advantages of reciprocals is found this statement:

d. Some provisions usually exist for preventing large losses through conflagration, such as a re-insurance arrangement with another insurance organization.

The criticism to be made of such statements is mainly that a student unacquainted with the business and reading about insurance for the first time cannot help the conclusion that each

is a feature peculiar to reciprocal exchanges and not found else-
where, for otherwise why is it an "advantage" and why is it not
mentioned in connection with any other carrier.

Another statement:

Reciprocals are quite common in the fields of fire insurance and auto-
mobile insurance. The method has been very little applied in life, acci-
dent, health, compensation or marine insurance.

Compensation ought not to be tied up with life, accident, health
or marine insurance in such a statement.

Under the sixth division of insurance organizations referred to
in a previous quotation, appears this statement:

By State insurance we understand an insurance enterprise operated by
the State or nation, the government assuming liabilities for the payment
of the losses. The most successful form of State insurance in the United
States has been the "State Fund" organized for the insurance of the
compensation risk.

One of the biggest and most successful arguments used by
competitors against State funds in the early days of their opera-
tion was the fact that the STATE DOES NOT ASSUME LIABILITY
FOR THE PAYMENT OF THE LOSSES.

The close of the chapter goes into some detail concerning War
Risk Insurance and describes the conditions under which such
insurance was granted, the nature of the policies, the basis of
the rates, the amount of premiums collected, privileges upon
conversion, etc.; practically all of them being matters foreign
to the chapter.

If the whole book were as poor as this chapter it would require
rewriting before being used as a text in any institution.

In view of the interest which our members naturally take in
compensation insurance, attention should be directed to a very
unfortunate passage describing the processes of compensation
rate making. The book would have been much better if no
attempt at all had been made to describe rating processes,
because they change almost with the seasons, but it is doubly
bad to describe as the process in use, a combination of two pro-
cesses which do not tie together at all and, as a result, to present
a hopeless confusion of incorrect statements.

The quotation follows and no further comment is necessary
for members of this Society.

A rate to be adequate must be sufficient to cover three items of cost: (1) the pure premium which covers the amount expected to be paid in benefits, (2) the loading for expenses sufficient to cover the cost of management and obtaining business and (3) the profit of a stock company. In computing the pure premium it is necessary to obtain an amount which will be sufficient to cover not merely the initial benefits paid under policies but the ultimate benefits, which may extend over a long period of years. This involves an estimate of the outstanding liabilities of a compensation insurance company and renders the problem more difficult than it otherwise would be. Likewise, we find that many industries are so inadequately represented in some States that the experience of such industries classified by States is too meagre for rate-making purposes. To avoid the latter condition a statistical assumption must be employed. This latter point must be immediately disposed of as it is a fundamental part of the compensation rate-making system.

Since, for example, we cannot depend upon the past experience on coal mining in Michigan to fix a rate for coal mines in that State, nor upon the experience on clothing manufacturing in Arizona to determine a premium on this industry in the particular State, and since, in fact, there are many industries which are not adequately represented in all States, the difference between the pure premiums on various industries must be determined primarily on the basis of the experience on each industry in the country as a whole or at least in several States. This means a comparison of the losses per $100 of payroll on contracting work, for example, as compared with the losses per $100 of payroll on bakeries. But the various States have different compensation laws and the losses will be influenced by the provisions of the acts. In other words, as the losses stand, they are not comparable, and before being added together to arrive at the general experience, must be reduced to a common level. For this purpose a reduction factor must be computed which will approximately measure, for instance, the difference between the liberality of the New York law and the liberality of the Pennsylvania law. This reduction factor is dependent upon two processes. For death and permanent total disability losses, the average cost per case is determined from past experience in each State, and by multiplication there can be found what New York accidents would have cost in Pennsylvania or what Pennsylvania accidents would have cost in New York. As regards minor injuries and other benefits, the two States are reduced to a parity by the comparison of payrolls and losses, thus finding what the cost of the benefits paid in Pennsylvania would have been if the payroll of Pennsylvania were the same as the payroll of New York. These two types of calculations are necessary because the proportion of serious injuries to the total number varies between States, due to the character of the industries.

When by this method one or more reduction factors have been found for each State, the losses for the country as a whole can be grouped together for individual industries and compared with the payrolls of individual industries. This comparison shows the loss which is to be expected upon each $100 of payroll, on the average, in each industry. This might be

$1 for a gas works or $2 for manufacturing cast iron pipe, to assume figures for illustration. These are the initial pure premiums. But such a premium would only cover the initial loss as shown to date, whereas the company's liability upon many claims will not expire for years. Some allowance must be made therefore to bring this initial loss up to the ultimate loss, and the initial pure premium is therefore multiplied by a factor based upon experience and designed to accomplish this result. Another factor is introduced to allow for a period of industrial activity or industrial depression, because during the former the accident rate increases under the stress of overwork while during the latter the accident rate tends to decrease. It has happened in the past that the companies' estimates of outstanding liabilities have been insufficient, being under-estimates rather than overestimates, and another factor is introduced to take care of that.

It is also necessary to take into account the difference in the various State laws. Some are much more severe upon the employer than others, and from past experience it may be ascertained that a given number of accidents are to a certain degree more expensive in one State than they are in the State which is being used as a basis for rate-making. For this State, therefore, the rates must be increased by a percentage sufficient to take care of this difference. The rates of other States may have to be reduced by reason of their leniency towards the employer and his insurer. This is merely reversing the process used in finding the reduction factors and a factor in the computation takes care of this element. Finally, the calculations based on past results are "projected" so as to more nearly approximate the conditions of the future and a flat sum may be added to allow for contingencies, such as catastrophes. Although this should be covered by the preceding factors it is good underwriting practice to allow some margin for unexpected events of this character.

Summing up, the computation of the pure premium takes the following form:

Initial Pure Premium

$\times$ Factor for outstanding liabilities
$\times$ Factor for industrial activity
$\times$ Factor for underestimate of outstanding losses
$\times$ Law differential
$+$ Allowance for catastrophe
$=$ Pure premium

Assuming figures for the various factors, the computation of the premium is as follows; $.20 (1.20 \times 1.15 \times 1.02 \times 1.33) + .01 = .37. To this must be added an allowance for expenses and profit, and the result will be the manual rate.

In the rate manual this information is presented in the following way. Opposite the name of each risk classification appears a figure, as, for example, 2,214, 2,837, etc. On a separate sheet is given the meaning of these symbols in manual rates for individual States. Other systems of presenting results have also been used.

It must not be concluded that these criticisms of the book are offered as types of errors into which the authors have fallen. On the contrary they represent what is perhaps an overcritical attitude on the part of the reviewer in those fields in which he feels best qualified to speak.

WILLIAM LESLIE

Mathematics of Accounting and Finance. Seymour Walton and H. A. Finney. Ronald Press Co., New York, 1921. Pp. ix, 274.

This book is not an arithmetic though the majority of the subjects dealt with are contained in modern commercial arithmetic texts, nor is it primarily a treatise on accounting though many accountancy matters are touched upon, but rather it partakes of the nature of both, and, in the words of the publishers, aims to provide "a clear explanation of all the mathematics required in accounting and financial work." No effort is made to review the rudimentary principles of arithmetic and space is saved by the omission of practice problems. Sufficient problems are given however to illustrate each subject and many of these problems were originally contained in C. P. A. examinations. The clear and detailed explanation of each step in the solution of problems will be particularly appreciated by the student.

The text is very readable. The incidental discussion of accounting practice involved in many of the subjects will be found particularly interesting to the accountant.

The book begins with a description of various short methods of calculation and the use of proof figures, and proceeds to an explanation of the mathematical basis underlying the solution of business problems involving progression, average, percentage, equation and discount.

Chapters IX and XIV include: a discussion of turn-over and the solution of problems illustrative thereof; a study of the established rules governing partnerships and the distribution of their assets; a description of the clearing house and of the various forms of building and loan associations; a definition of good will and the calculation by several methods of the value thereof; and problems arising from the conversion of different currencies in foreign exchange.

The importance of compound interest in modern financial calculation is recognized by the space given to annuities, compound discount and premium, leaseholds and depreciation. A very clear explanation of the nature and use of logarithms, particularly illustrating their use in constructing compound interest tables is given. This section of the book should prove of particular value to those desiring a simple exposition of logarithms and to attain facility in their use. Thirty-seven pages of logarithmic and compound interest tables are given in the Appendix.

The preface written by Mr. H. A. Finney, contains this closing statement, "During the last months of his life, Mr. Walton devoted most of his strength to this book, and it is a source of profound personal regret that he did not live to see its publication. Few men were his equal as an accountant, a teacher, and a writer. None surpassed him as a friend."

H. O. VAN TUYL

Insurance Against Unemployment. Joseph L. Cohen. P. S. King & Son, Ltd., London, 1921. Pp. 536.

This latest and most timely treatise on Unemployment Insurance was written "with special reference to British and American conditions." It is a valuable contribution to the discussion of a subject which is naturally at present much in the minds of students of social science. While the book shows some lack of care in planning and while the author's methods of expression often leave much to be desired, it is packed with information which no one interested in social insurance should neglect.

The author first addresses himself to the problem of unemployment, basing his treatment on the following definition of an unemployed workman: "A workman is unemployed when he is able bodied, efficient, and, though willing to work in his own trade at the current rates of pay, is unable to find employment because of lack of work." After a brief discussion of the causes and effects of unemployment, methods of "prevention" and of "mitigation" are considered. Under the first are treated reduction of hours of labor, development of public works in periods of depression and regularization of industry through employment

exchanges. Under the second, savings and insurance. It is pointed out that general reduction in the hours of labor would not prevent unemployment since the unemployment problem arises not from a general over supply of labor but from maladjustment of industry. Something is to be hoped from the use of public works to supply employment and much more from the regularization of industry. Voluntary or compulsory savings as a resource for mitigating the effects of unemployment offers a wasteful means of preparing for periods of unemployment since excessive individual reserve funds would be required.

With this introduction the author addresses himself to the problem of Unemployment Insurance, raising three questions:

(a) Is unemployment a contingency against which it is possible to insure?

(b) And if it is, is it a contingency against which it is advisable to insure?

(c) And even if it is advisable to insure against unemployment, is it a rightful function of the modern State, by encouraging this activity, to make itself responsible for evils which are in the main the result of the relationship between employer and employees?[1]

All of these questions are answered in the affirmative.

Unemployment Insurance as treated in this book is defined as follows:

Unemployment insurance may therefore be defined as an agreement, which is legally enforceable, to pay a certain sum of money as compensation against the loss of wages resulting from involuntary unemployment due to lack of work.[2]

Such insurance has been provided "(1), through trade unions, (2) through associations recognized and subsidized by public bodies, (3) through establishment funds, and (4) through national compulsory schemes."

There follows an historical and descriptive treatment of the Ghent System as it has been developed in various foreign countries. It is pointed out that the application of this system has met with varying degrees of success, but that it has nowhere proved satisfactory nor has it reached even a majority of the workmen subject to the risk of unemployment. ·

1. Page 62.
2. Page 67.

Before the passage of the Labor Exchanges Act in 1909 much attention had been given to the problem of unemployment as is indicated by the large number of reports and books devoted to the subject. Out of all this discussion the author states that five principal propositions were developed:

First: That a different policy must be adopted in treating unemployment amongst employables and "unemployables."

Second: The measures must be taken to train the inefficient labourer and to raise the standard of wages in seasonal occupations, so that the average wage will be high enough to enable adequate provision to be made against periods of unemployment.

Third: That steps should be taken to regularize industry and to eliminate blind alley occupations.

Fourth: That certain specified occupations such as hauling, towing, and carting should be so organized as to concentrate all the labour to be done, at any given moment on the most efficient workmen, and thus to make possible the decasualizing of labour.

Fifth: That the percentage of unemployment, which with our present knowledge and administrative machinery cannot be wholly abolished, should be provided for either by:

(a) Arranging that all workmen should work short time in preference to some working full time, whilst others are dismissed;

(b) Organizing a scheme of unemployment insurance to carry workmen over periods of unemployment; or by a combination of these two methods.[3]

The establishment of unemployment exchanges was a logical method of attacking the problem of unemployment since it was directly along lines of prevention. Its three main functions were:

First: It would help to place the unemployed workman in the vacant job with the greatest speed.

Second: It could be so managed as to help in the decasualization of labour.

Third: It was the necessary substructure for a plan of unemployment insurance.[4]

It was found that prevention and the earlier restricted experiments in unemployment insurance were inadequate since they

3. Page 167-168.
4. Page 199.

were only a partial solution of the problem.   Accordingly in 1920 a compulsory act was passed applying almost universally to British workers.   Cohen describes the system as follows:

> The British scheme of unemployment insurance is a device for making provision against the economic loss to wage-earners resulting from involuntary unemployment due to lack of work in the district where they were last ordinarily employed, and where work was not obtainable otherwise than at a rate lower or on conditions less favorable than those habitually obtained in their usual employment in the district, by means of funds made up of regular compulsory contributions from the insured workmen, their employers, and the State, out of which indemnities for such losses are paid.[5]

The idea lying back of the British Act that unemployment insurance should be universal and compulsory was a radical departure from the Ghent System, which up to that time had been advocated by most of the investigators of the problem.   The advantages of the compulsory scheme, as given by Cohen, are that adverse selection is eliminated, that administrative costs should be kept lower and that the State could easily keep in touch with conditions in industry as reported by unemployment statistics.   Two objections to the compulsory principle, are noticed, the first practical, the second theoretical.   It was urged that statistics of unemployment were insufficient as a basis for actuarial calculation of the hazard involved in this new form of insurance.   The author points out that this argument is one part of a vicious circle.   "Since we have no satisfactory statistics, they say it is impossible to attempt any scheme.   But until we have some such scheme it is safe to say that we shall not have satisfactory statistics."   The validity of this answer will be apparent to insurance men.   The theoretical objection urged is that compulsion is an infringement of individual liberty.

Two quotations from the conclusions stated by the author will serve to indicate his attitude toward the British scheme.

> We may conclude that the British scheme of unemployment insurance introduces factors which tend to increase the amount of unemployment and others which tend to diminish it.   The latter are more important than the former.   The most important effects such a scheme can be made to have on the problem of reducing unemployment are fourfold.   The unemployables may be weeded out and their problem thus made more easy of handling.   All parties to the wage contract are given an interest

5.   Page 248.

in reducing unemployment. Expenditure will be regularized. We shall experiment with and ultimately gain more ability to deal with the problem of regularizing whole industries as well as the output of individual factories. In consequence, the efficiency of the individual plant will be increased, and the national wealth will be increased.[6]

Four main conclusions emerge from this discussion of the scheme of unemployment insurance in Great Britain. First, it is established that the costs of the scheme are more than justified by the suffering which it alleviates.

Second, there is general gratification that the workhouses are falling into disuse, and other antiquated means of caring for the unemployed and needy are practically disappearing.

Third, unemployment insurance acts as an incentive to employers to eliminate every removable cause of unemployment as far as in them lies the power to do so.

Fourth, the Unemployment Insurance Fund may be regarded as a wages equalization fund. The variation in income between periods of active employment and of unemployment is considerably lessened. It has been compared with a dividends equalization fund, which in a similar manner lessens the variations in the earning capacity of a firm, and which has proven to be a sound financial device. With an increase in the scale of benefits this aspect will grow more important. No body of any consequence is to be found in Great Britain desiring the abolition of the scheme as a whole. Indeed, whilst on the one hand it has been the greatest bulwark against revolution, its withdrawal could not be attempted without precipitating a great crisis.[7]

Brief comment is made on other compulsory European schemes and on establishment funds.

The author next turns to the United States. He shows that such Unemployment Insurance as we have had has been furnished by a few trade unions. Our lack of any real solution of the problem is analyzed in the following quotation:

The inadequate statistics, the lack of a national centralized system of public employment exchanges, the abuses of private employment exchanges, the still persisting naive faith in the efficacy of relief works, the theoretical nature of most discussions of unemployment in the States, are due to these two fundamental needs, a national programme and one governmental body whose function it is to deal with the evil.[8]

6. Page 311.
7. Page 345-346.
8. Page 430.

Throughout the book it is made quite clear that Unemployment Insurance is impossible without a complete efficient system of employment exchanges. In discussing the situation in the United States the author says:

The backbone of a national scheme for treating unemployment must be a national centralized system of employment exchanges working in co-operation with State, municipal, and regional groups of employment exchanges. Without such a system, information dealing with unemployment must necessarily be inadequate, vocational guidance, if attempted, largely a matter of chance, the direction and distribution of public works fraught with the danger of aggravating the evils they are meant to diminish, the decasualization of labour an unrealized hope, and the separation of employable from unemployable workmen impossible. Nor will it be able to control effectively private employment agencies until public employment exchanges set them an example of higher standards of efficiency.[9]

The employment exchange must have the following principles and objects:

1. The systematic organization of public employment exchanges according to territorial divisions (local bureaus, State and national), and they must take account of the interests of different trades and professional groups.

2. The unification of administrative technique, with the employment of modern means of communication, telephones, telegraphs, posts, railways.

3. The maintenance of absolute neutrality between contending claims of employers and workmen.

4. The provision of free service to those who seek employment at the public exchanges.

5. The methodical organization of the labour market, *i. e.*, by the placement and movement of workers according to uniform principles and under the direction of a central office supplying continuous statistics of the labour market.

6. The expenses should be provided at communal charge (for local exchanges), by the State (for the State exchanges), and by the nation for the central office.

7. Private employment offices ought to be licensed and controlled.

8. Employment exchange authorities should endeavor to decasualize labour.

9. Page 432-433.

9. Employment exchanges should be organized to be able to administer schemes of unemployment insurance.[10]

The treatise closes with a discussion of the Massachusetts Bill for Unemployment Insurance with which the author was intimately concerned. His recommendations can be boiled down to the statement that he believes in a compulsory universal scheme with contributions from employers and employees in the State based in general upon the British System. He would probably advocate, however, contributions and benefits bearing some relation to wages.

Whether or not one agrees with the philosophy lying behind this book its informative value is such that it should not be neglected.

RALPH H. BLANCHARD

10. Page 438-439.

CURRENT NOTES

A. L. KIRKPATRICK, CURRENT NOTES EDITOR

ELECTRICAL MACHINERY INSURANCE

Contracts.   The electrical machinery insurance contract covers losses caused by the breakdown of electrical machines.   Like the steam boiler contract it is primarily designed to indemnify for loss resulting from damage to the insured object or other property of the insured and for damage to the property of others for which the insured may be liable.   Under the standard form there is also included, the insured's liability for personal injury to employees and/or non-employees.   It should be understood in this connection that workmen's compensation coverage is not included in this policy.   A limit as respects damage, is stated in each policy beyond which losses will not be paid.   This limit applies to each accident.   If liability for personal injury is covered, there is also a limit per person injured.   In some cases policies are endorsed to provide for deductible liability, for suspension while a plant is shut down, or for part time operation. There may also be covered under special form, use and occupancy and consequential loss.

The following typical provisions of the policy contract, apply peculiarly to this type of insurance.   Other provisions are much the same as those found in policy contracts in general.

The Company shall not be liable under this policy:

For loss or damage, if the breakdown is caused by the burning of any part of the structure in which the machine is located, or for any damage by fire resulting from breakdown.

For the value of, or the replacement or renewal of, fuses or brushes.

For loss or damage resulting from breakdown while the machine is undergoing insulation breakdown tests, experimentation, repair or drying out.

For any loss due to the stoppage of work or to any indirect result of breakdown.

For the value of, or the renewal or repair of, any part of a machine which has broken or failed because of the deterioration or weakness produced by wear of such part.

For breakdown or loss occasioned by or in consequence of inundation, invasion of foreign enemy, rebellion, insurrection, riot, strike, civil commotion, or any military or usurped power whatsoever.

For loss or damage except to machines described in the Schedule, when such loss or damage is caused by the transmission or interruption of electrical energy on wires or conductors.

For more than the actual and immediate damage insured against, estimated according to the true cash value of the property at time of breakdown, proper deduction having been made for previous deterioration.

The terms "machine" and "breakdown" shall, when used in this policy, mean respectively as follows:

The word "Machine" shall mean any piece of electrical apparatus described in the Schedule, including the wheels and gears, if any, mounted on the shaft of the machine. It shall not include any mechanism or appliance driving or driven by the machine or connected to it by any coupling, belt, gear or other means, whether mounted with it on a common shaft or bed or otherwise, nor any wiring beyond the machine terminals, nor shall it include any shaft with its bearings which is common to the machine and to an engine or other prime mover with which it forms a direct connected unit, nor any wheels or gears on such shaft.

"Breakdown" shall mean the sudden, substantial and accidental breaking or burning out of the machine or any part thereof, while in use or installed and connected ready for use, which immediately stops the functions of the machine and which necessitates repair or replacement before its functions can be restored, but the concurrent or resultant breakdown of more than one machine, as the direct or indirect result of one cause shall, for the purposes of this policy, be considered as one breakdown only.

Rates. Rates for Property Damage are of three kinds; (1) a location charge applicable to each location where machinery is insured, (2) an object charge applicable to each machine and (3) an insurance charge determined by multiplying the limit per accident by the object charge and dividing by 100,000. The addition of these three charges gives the premium for the risk.

Location charges vary according to the geographical district

in which the risk is located and according to the limit per accident expressed in the contract.

The lowest location charge made in district number one which comprises the more thickly settled manufacturing territories, is $13.50 for a thousand dollar or lower limit.

The less thickly settled districts have higher charges as follows: District No. 2—$18.50; No. 3—$23.50; No. 4—$28.50. These charges become for a limit of $150,000—$133.00, $138.00, $143.00 and $148.00 respectively. For each additional $5,000 in any district, there is an additional charge of $3.75.

Object charges for rotating objects are determined by consulting a classification schedule which refers to appropriate tables showing rates for each capacity and speed, divided as to voltage and type, the rates having been calculated upon capacity, speed, type and voltage.

The charge for transformers is based upon voltage, phase and capacity and in the case of all other non-rotating objects, etc., the charge is based upon the limit per accident only, without respect to capacity or type. For instance, if insurance is desired upon a panel board, the three year premium is 10% of the limit per accident on such board. All manual premiums cover for a period of three years, but a single year policy may be written at 40% of the three year premium.

Rates for personal injury liability insurance, are quoted for four classes of machine capacity, for various limits per person, and for public and employees, separately or combined. The lowest rate for this coverage is $1.50 per machine of a capacity of 100 or less for public liability only.

Use and occupancy premiums are based on a waiting period of seven days and on the limit per accident expressed in the policy. The rate for a limit 100 times the daily indemnity is 100% of the daily indemnity; for a limit 400 times the daily indemnity 170% of the daily; for intermediate limits the rates are appropriately graded. These rates are to be increased by specific percentages if the waiting period is reduced.

Consequential loss is written at a rate of 2% of the amount of the insurance specifically applicable thereto.

CREDIT INSURANCE.

Following the talk on the subject of credit insurance given at the last meeting of the Society, it will be of interest to review the recent experience of companies writing this kind of business. The years 1920 and 1921 have given a real test to the necessity for such coverage and the soundness of the principles on which it is based. It is expected that 1922 will show a still larger volume of losses than were paid in 1921. Failures for the first four months of this year were 42% greater than for the same period last year.

EXPERIENCE 1919-1921

Year	Premiums	Losses	Loss Ratio
1917	$1,665,015.00	$96,676.00	.06
1918	1,856,704.00	194,183.00	.10
1919	2,219,679.00	72,552.00	.03
1920	3,695,954.00	1,677,396.00	.45
1921	3,498,163.00	3,100,782.00	.89
Total	$12,935,515.00	$5,141,589.00	.40

Although business conditions are generally improving, the number of failures continues large and it has been found that the proportion of failures has been increasing among small manufacturers. This is attributed to two facts; first, many small manufacturing companies have the entire resources of the owners and they can do nothing else but hold on to the end, hoping that conditions will improve. In the second place, larger interests are generally better able to foresee the trend of conditions. They take their loss early and retire rather than wait until they are forced out.

Companies writing credit insurance are seeking closer cooperation on the part of bankers. They are endeavoring to show the banks that insurance against credit losses is equally as important a factor to be considered as is fire insurance upon the property of the applicant and life insurance upon the active manager. In order to protect the bank which makes a loan to the purchaser of a Credit policy, the proceeds of the policy are made payable to the bank. With this exception, the policy is non-negotiable.

Following the heavy losses of the last two years, it is interesting to note the strong position of the American Credit Indemnity Company as disclosed by the recent examination of the New York Insurance Department. This Company writes approximately 50% of the credit business of the country, with a premium income of over one and three quarter million dollars last year. Admitted assets amounted to over three million dollars and surplus to slightly over a million.

In its report the Department complimented the Company on the excellent service rendered in its collection service in assuring prompt recovery to the assured and keeping down the loss ratio of the Company.

PLATE GLASS INSURANCE

In line with the decreased cost of glass, the rates on plate glass insurance were reduced as of May 1st. This is the second reduction to be made since the beginning of 1922, the earlier cut having been made on February 1st. The amount of reduction differs in various sections of the country, but that in New York City ranges from eight to fourteen per cent., making a total decrease this year of about twenty-seven per cent. This rate change follows the established rating system of the Plate Glass Bureau, which is based upon the cost of glass, modified by the loss experience of each rate territory.

It is probable that there will be no further reduction in rates in the near future. Considering the price of glass and the cost of replacement and repairs, they are now on a basis which appears to be equitable to all parties. Although the price of glass has had a very severe decline in the past year, it is still materially above the price level which prevailed prior to the war.

NON-CANCELLABLE ACCIDENT AND HEALTH INSURANCE

Following the investigation conducted in 1921 by the Bureau of Personal Accident and Health Underwriters with regard to a revised policy form and proper rates for non-cancellable accident and health insurance, it is interesting to note the manner in which the sale of this particular form of insurance is being pushed by the various companies which are at present underwriting it.

Some companies are enthusiastic concerning this form of accident and health insurance and firmly believe that it fulfills a long felt need of the public. Others, however, seem to feel that the time is not yet ripe for a vigorous campaign in this direction and although perfectly willing to issue a non-cancellable policy, if an applicant desires one, they are not pushing its sale with any degree of enthusiasm. Some companies have found their experience on non-cancellable accident and health insurance rather disastrous and one company at least has definitely withdrawn from this field.

Two reasons why the sale of non-cancellable accident and health insurance has not progressed as rapidly as some of its more ardent supporters expected are (1) the medical examination which the applicant must undergo is even more rigid in its requirements than that for life insurance and (2) the rates for non-cancellable insurance differ from those quoted for commercial accident and health insurance in that they increase by ages. It will be recalled that prior to the investigation of the Bureau several of the companies writing non-cancellable insurance quoted rates which were uniform for all ages. Thus when the more adequate rates were adopted and a differentiation was made between the various ages, it was not surprising that there should have been a falling off in the rate of the sales.

An important feature of this form of insurance is that in many cases it results in the subsequent placing of life insurance. If the applicant can pass the medical examination required for non-cancellable accident and health insurance, he is likewise eligible for life insurance and furthermore the application form usually furnishes the agent with information as to the amount of life insurance already carried. These two factors assist the agent materially in selling a life insurance policy to the applicant along with the non-cancellable accident and health policy.

Whatever may be the fate of the non-cancellable policy as regards its popularity, the Bureau of Personal Accident and Health Underwriters is preparing to compile statistics on the experience on this line of insurance in America. A statistical plan has been proposed by the Bureau and has been submitted to the various member companies for criticism or approval. The plan will apply to all policies written on or after January 1, 1918. Whereas the present volume of non-cancellable business is too

small to warrant the immediate application of the plan, it is felt desirable to have the plan ready to be put into effect at such time in the future as the volume does become sufficiently great. This forehanded action of the Bureau is to be commended especially since it has too often been the experience in the past that a method for compiling the statistics on a particular line of business was developed long after the need for the actual experience presented itself.

THE ALLOCATION FOR CASUALTY COMPANIES OF ADMINISTRATIVE EXPENSE BY LINES OF INSURANCE

The question of the proper allocation of administrative expense by lines of insurance is one which heretofore has received too little attention in casualty insurance. Cost accounting for factories has become a commonplace necessity, but for insurance companies keeping costs "on a lot of paper" is generally assumed to be out of the question. The usual method of allocating expense seems to be to throw expenses into a pool and apportion them among lines in ratio to premium volume. There are two outstanding objections to this method. One is that there is considerable variation between lines in the amount of work required in connection with the issuance of a policy. The second is that there is a wide variation between lines in the average premiums. So that when we find a line in which the premium is small and the amount of detail large, the amount of expense charged is altogether too low. On the other hand, the line which produces a large premium may be comparatively easy to handle and is, consequently, much overcharged. When the difference between profit and loss in a given line may be represented by one or two per cent. of the premiums, this matter is too important to be trusted to the application of a rule of thumb. Moreover the lack of any reliable data on administrative cost by lines leaves the ratemakers in the dark, so that the provision in the premiums for this element must almost of necessity be a percentage of the premiums, based on the experience of all casualty lines. If a company is writing all lines of insurance in about the average proportion, such a method may be all right, but if it should specialize in lines where the actual administrative expense is higher than the average, the expense provision is insufficient.

As a matter of fact the securing of a fairly accurate allocation of expense between lines of insurance is not so difficult as it seems, but is a matter of applied common sense rather than of set rules. No single method will apply to every department. There is a variety of means available, and each unit of the work must be considered in the light of its own conditions. The basic problem is the allocation of salaries, as many of the heavier expenses will follow these directly.

Home Office Salaries. The first step, then, is to divide the entire office force into groups, each one homogeneous as to the kind of work done,—the next to find the annual payroll for each group. Some of these groups will be working on only one kind of insurance and can be assigned at once. In other groups many of the clerks can be assigned individually, and the remainder can be divided by a percentage split representing the best judgment of the supervisor, causing at most a small percentage of error. Other units can be allocated according to the volume of work handled for each line of insurance, modified in some cases by weights, which may be the result of judgment or of time study tests. Service departments which cannot be charged directly to lines of insurance, may be charged to the departments served and allocated according to the percentages used in such departments. The remaining groups, which cannot be disposed of by any of these methods, will represent the general overhead, which must be assigned by some more or less arbitrary percentage. Treating this as a percentage loading on the direct charges is as logical a method as any, but may not be applicable in all cases. However, departmental supervision and overhead should unquestionably follow the directly charged salaries.

The only real difficulty in any of these methods, aside from making a reasonable division for general overhead, is in finding measureable units of work for the departments which are to be allocated on volume of work done. The number of policies written in all the lines handled by a given group will apply in many cases, such as proposal checking, registration, and policy writing, though it will be worth while to consider whether certain forms of policies should have greater weight than others. In some divisions, as premium accounting and statistical, the number of premium entries will be the unit of measurement. If for example

punched cards are used for premium reserves, the relative number of cards punched by lines may give a convenient percentage split applicable to all groups handling premium records. In short, study the group; determine the unit of work, and whether this unit must be weighted to give reasonable results; then find the most convenient means of measuring the quantities for each kind of insurance.

Rent. The floor space occupied by each department should be determined as a basis for the rental charge. This charge can then be allocated by lines in the same proportion as the salaries.

Furniture and Fixtures. Since furniture and fixtures cannot be treated as an asset in the annual statement, it is convenient to charge off each year's purchases as an expense. If this is charged directly to departments ordering the equipment, the result is an unusually heavy charge against a new or rapidly growing department, for the equipment which will be in use for years to come. If furniture were carried as an asset, depreciation would be charged against departments in proportion to the value of furniture in use. Therefore it would seem that the furniture purchases should be charged in the same way. The result will be an equitable and fairly even assignment over a term of years, without the uneven distribution inevitable under a system of direct charges.

Other Administrative Expenses. Home Office traveling expense will follow the salary division of the person traveling. Office supplies for general use can take the same division as salaries. Express and Freight, Telegraph and Telephone, stationery forms and blanks and other minor expenses should be directly charged whenever possible. The balance will take the general expense division.

Payroll Audit. The most convenient way to handle payroll audit costs, as well as Inspection and Loss Expense, is to charge to that account all expenses which relate to it both in the field and the home office, including salaries, travel expense, rent, stationery, printing, etc. An average cost per audit may be easily obtained, but the relative weight to be given audits of different kinds is a matter of judgment, to be settled by those closely in touch with the work. Single audits covering concurrent policies on the same risk may be divided in proportion to the

average premium of the lines affected. Thus if compensation is producing an average premium of $200 and public liability an average of $100, a concurrent audit affecting both lines could be charged two-thirds to compensation, and one-third to liability.

Inspections. There is such a wide variation in the cost of different kinds of inspections that it is necessary, in order to secure anything like correct costs, to use some unit other than an average cost of all inspections. A method, which has given satisfactory results at small expense, is to take from the inspectors' daily reports the number of inspections by kind and the total inspection hours by kind, including the time used in writing reports. The total inspection department cost for a given period is divided by the total inspection hours to find a total cost per hour, including direct and indirect charges. This figure multiplied by the total inspection hours for each kind of inspection will give the total charge for the period to each line of business.

Adjusting Expense. The number of claims handled by lines offers a convenient unit of division for unallocated adjusting expense. However, it is a question for the adjusters to determine what relative weights should be assigned to each class of claims.

Conclusion. It will be noted that the above sketch does not attempt to outline a "cost system" in the usual understanding of the term. But an investigation along the lines suggested should give a basis for establishing percentage splits which can be applied to the salaries and expenses of the various departments with substantially correct results. A re-survey from time to time will keep the percentages up to date, and a few necessary readjustments at the year end will take care of irregularities which may have developed during the year, due to an unusual distribution of business by lines or to other unforseeable causes. However, these are matters of detail for the Chief Accountant to settle in the light of conditions in his own office. The essential point is that a great improvement in present methods of expense allocation is easily possible as soon as insurance companies will give the matter the attention that it deserves.

BAIL BONDS

It has been quite apparent to the general public and even more so to casualty companies doing a burglary and robbery business, that a crime wave of considerable proportion has been sweeping the country for some time past. Accompanying this wave has been an increased demand for bail bonds. Recent investigation in New York State has disclosed certain abuses of this form of bond which led the Legislature to pass two bills providing for the remedy of this situation.

Originally bail bonds were given by individuals and it was to be supposed that when an individual gave bail for a friend, he would make it his personal business to see that the friend fulfilled the requirements of the court. If he did not see to it, he was liable to suffer a financial loss.

It is the practice of surety companies doing a bail bond business to require full collateral either in the form of cash or readily marketable property before issuing a bond. Under these circumstances the companies had nothing to lose if the bailee did not fulfill the requirements of the court. This lack of interest on the part of companies furnishing the bond led criminals to jump their bail.

Such circumstances were contrary to good public policy and resulted in the legislative investigation. It was found that in some cases bonds were given by men who were already out on bail for an earlier offense. In many cases the collateral which was furnished the surety company was stolen property. Circumstances were even found where the same company paid a burglary loss for the property, which was turned over to its surety department by the criminal as collateral for the bond.

The New York Legislature added Section 554-B to the Code of Criminal Procedure and also amended Section 142 of the Insurance Law. These two bills provided for the licensing of surety companies as a prerequisite to the issuance of bail bonds. They also provided for the licensing of agents, brokers, employees and officers of surety companies who were participating in the bail bond business.

Before the Insurance Department will issue a license for the transaction of this business, it requires the company or agent to submit evidence of good faith and character. It further requires

an agent or broker to carry his license with him at all times in order that he may satisfy the magistrate that he has been duly licensed by the Insurance Department.

The law provides that the premium charged on this kind of bond shall not exceed 3% of the amount of the bond. From this 3% is to be deducted the commission which is paid to the broker as well as that which is paid to the local or general agent.

The Superintendent of Insurance has issued an opinion upon these bills for the guidance of companies and for the protection of the public at large. He has requested persons having complaints of abuse in the issuance of bonds to submit their grievances either to the District Attorney, the Bar Association or the Insurance Department.

EXPERIENCE RATING

Prior to the 1920 National Revision of the Workmen's Compensation rates it was felt by many companies that the Experience Rating Plan then in use was not sufficiently flexible and that the swing of debits and credits was too much restricted. Accordingly the plan was amended in certain particulars during the course of the 1920 Revision to meet these criticisms. The amended plan has been in effect for some little time and it has developed that the plan tends to produce much too large debits in many cases of small risks having a single very serious accident of such a nature that it must be placed in the "all other" portion of the data for experience rating. The matter has accordingly again been taken up with the National Council on Workmen's Compensation Insurance and the Actuarial Committee of the Council under instructions from the General Rating Committee is making a fundamental study of the plan with a view to eliminating these difficulties. In the meantime, an amendment of an admittedly temporary nature has been made in the plan to take care of these cases of small risks where an excessive charge is produced by a single accident.

CROP INSURANCE

In view of Mr. Valgren's discussion which appears in the current number of *Proceedings*, the members of the Society will be interested in a joint resolution recently adopted by Federal

Congress which provides for the creation of a commission composed of three members of the Senate and a similar number of members of the House of Representatives to study the subject of Crop Insurance. The scope of the Commission's work as defined in the joint resolution, is as follows:

> "The Commission is authorized to sit during the sessions and recesses of the present Congress, to employ such stenographic, clerical and actuarial, and other expert assistance, to meet at such times and places, to have such printing and binding done, to make such expenditures for traveling, and to make such other expenditures as it deems necessary. The Commission is further authorized to send for persons and papers, to administer oaths, and to take testimony. The expenses of the commission shall be paid one-half from the contingent fund of the House and one-half from the contingent fund of the Senate upon vouchers authorized by the commission and signed by the chairman thereof."

INVESTIGATION OF WAGE TREND AND EMPLOYMENT CONDITIONS

The Plan of the National Council on Workmen's Compensation Insurance formulated in the fall of 1921 to secure, through summary reports from company auditors, data showing the trend of wages and of employment conditions, has been put into effect and the companies are co-operating with the Council in securing this material. At the present moment a sufficient volume of data to warrant tabulation has not yet been received, but the material is coming in rapidly and undoubtedly by the time the next issue of the Proceedings goes to press there will be actual results available from this investigation.

SCHEDULE Z

The officially required compilation of Workmen's Compensation experience known as Schedule Z is, of course, familiar to all our members. Prior to the organization of the National Council on Workmen's Compensation Insurance the only compilation of such experience data, except under official call or in individual offices for private use, was that by the National Workmen's Compensation Service Bureau now the National Bureau of Casualty and Surety Underwriters, and some of these data was used by the National Council in its 1920 Revision. More recently the National Association of Mutual Casualty

Companies has been securing and compiling for its companies Schedule Z material in the same form, but there has been growing recently a general feeling that all such work should be concentrated in the National Council which is the ratemaking body using these statistical data. Accordingly, beginning with the 1922 Schedule, the National Bureau has voted not to issue its call but to transfer this work to the National Council and there has, therefore, recently come to the members of that Bureau notice from them announcing this change, and the National Council by General Notice No. 256 has announced its taking over of this work of compiling the experience.

SCHEDULE RATING FOR WORKMEN'S COMPENSATION INSURANCE

About a year ago the National Council on Workmen's Compensation Insurance began a study of the theory underlying a plan of schedule rating for the purpose first, of improving upon the fundamental structure of the plan, and second, of providing a statistical basis for the charges and credits granted. The first part of the task has been fully covered in an earlier number of the Proceedings. The formula was there developed, upon the basis of which, the plan is to be built. The second step is at the present time in the process of construction.

The schedule rating formula consists of a comparison of the physical hazards of the individual plant which is being rated with the average hazard of all plants of like kind. It is necessary, therefore, to determine values for the formula which represent the average condition of a plant and values which represent the pure premium cost of accidents due to a given cause. The values representing the average hazard consist of the number of employees and the number of danger points to which these employees are exposed in the average or normal plant. These values will be obtained from the inspection reports of risks furnished by the various rating boards and bureaus. Following a study of these reports, the proper values will be determined upon for use in the formula.

The data used in determining the pure premium cost of accidents due to a given cause was furnished by some eight companies, which have an analysis of their compensation accidents on a punch card system in accordance with the statistical plan

of the National Bureau of Casualty and Surety Underwriters. This analysis shows the cost and number of accidents by classifications, by causes of accidents and by nature of injury. From a study of the costs of accidents by causes and classifications, it is possible to determine how much credit can be allowed for the elimination of a certain cause in any classification.

The tabulation of this data has been under way for several months and it is expected that within the next few months the work will have reached such a stage that it will be possible to determine values for the formula and put out a set of rules and standards for the completion of the schedule.

AUTOMOBILE FIRE AND THEFT INSURANCE

Although the fire and theft business is not generally classed as a casualty line, it is nevertheless very closely allied to the automobile lines written by casualty companies. During the past year or two the companies transacting this business have met with a very unfavorable experience. This is almost universally true of fire and marine companies alike.

There are three principal causes which have been assigned as being responsible for this bad experience. All are indirectly due to the business depression which has been in effect for the past year or more. Chief among the causes of bad experience was the falling of list prices of automobiles, coupled with the fact that many owners were covered by what is known as a valued policy. Under this form of policy it was agreed between the company and the assured that the value of the car at the time of writing the policy was equal to the amount of insurance granted. In adjusting the loss this value was taken as a base from which was deducted a reasonable amount for depreciation. When automobile owners found that their cars were worth considerably less than the amount for which they were insured, many yielded to the temptation of disposing of their car either by means of a fire or through an alleged theft. Even owners who did not have the valued form of policy were influenced by the fact that the amount of insurance which they carried was greater than the value of the car and they managed to dispose of their cars under the impression that the insurance company would pay the full amount of the policy.

The falling of list prices and the accompanying temptation to automobile owners was further aided by the financial stringency in which many people found themselves. Owners who found their income decreased or stopped altogether, were forced to find some means of raising money. About that time the market for second-hand cars became flooded and it was practically impossible to dispose of a second-hand car at anything like a reasonable price. Rather than make the sacrifice necessary to dispose of the car in a legitimate manner, the assured managed to have his car burned or stolen. It has even been found that gangs of men made a business of disposing of second-hand cars in order that the owner might recover the insurance.

In order to combat the moral hazard which was created by the circumstances previously outlined, the companies adopted a number of remedies. The most drastic which was adopted by some companies was that of discontinuing the automobile fire and theft line altogether. Some companies stopped writing this business in order to conserve their capital and others did so involuntarily. The manager of one newly organized company was heard to say the company was discontinuing the line merely because it felt it had gone into the business at the wrong time.

In order to prevent losses due to the absence of a lock, a penalty was levied on policies written in certain territories for the absence of a lock. It further became necessary to exclude spare parts and accessories carried upon the car, except in the case of a total loss. Such action was taken to prevent numerous small losses by sneak thieves—losses which it is practically impossible to prevent.

All companies scaled down the amount of insurance which they were willing to accept on any car. They adopted very rigid rules limiting the amounts to figures much less than had been granted during the period of high and rising prices of automobiles.

One remedy which has been adopted by some companies and which is being considered as a compulsory rule for all members of the National Automobile Underwriters' Conference, is the 75% loss clause. Under this provision the company would pay only 75% of the loss sustained and the assured would be co-insurer to the extent of 25%. It is generally believed that this action would impose enough of a burden upon the assured so that he would not be so easily influenced in disposing of his car, knowing

that he could not make a full recovery. The remedies which have been proposed and those which have been adopted, have produced considerable dissatisfaction among the agency forces.

It is always true that frequent changes in rules and rates tend to confuse both the agents and the automobile owners, but under the existing circumstances in the business, it has been deemed advisable by most companies to make these changes in spite of the opposition.

PERSONAL NOTES

Benedict D. Flynn has advanced from his position as Assistant Secretary of the Travelers Insurance Company to Secretary of the Company. He has been Assistant Secretary since January, 1913.

T. F. Tarbell is now with the Aetna Life Insurance Company at Hartford.

R. V. Carpenter and James D. Craig have been made Actuaries of the Metropolitan Life Insurance Company.

R. J. Sullivan was recently elected Vice-President of the Travelers Indemnity Company in addition to his duties as Secretary of the Compensation and Liability Department of the Travelers Insurance Company.

C. H. Remington has become Vice-President of the Aetna Life Insurance Company.

E. E. Cammack is now Actuary of the Aetna Life Insurance Company, of which Company he was formerly Associate Actuary.

Winfield W. Greene has opened an office as Consulting Actuary and Underwriter.

B. A. Hunt who has been Actuary of the Aetna Life Insurance Company, has recently been elected Assistant Secretary of the Accident and Liability Department.

R. A. Wheeler has been made Actuary of the Liberty Mutual Insurance Company.

Arthur E. Thompson has left the Royal Indemnity Company to become Chief Statistician of the Globe Indemnity Company.

O. M. Sullivan is now Director of Re-education of Injured Persons in the Minnesota Department of Education with headquarters in St. Paul.

OBITUARY

JAMES MCINTOSH CRAIG
Born, April 5, 1848   Died, January 20, 1922,

In the death of James McIntosh Craig, on January 20, 1922. the actuarial profession lost one of its outstanding figures.

Mr. Craig was born in Philadelphia, Pa., of Scotch parents, April 5, 1848, and was educated in New York City. In 1866 he entered the service of the National Life Insurance Company of New York, a successor to the National Life and Travelers Insurance Company, which latter was also the parent company of the Metropolitan Life. Mr. Craig quickly took up the study of insurance mathematics, and on June 1, 1872, became connected with the Metropolitan. He soon became its Actuary and held this office until his death. Thus Mr. Craig served the Metropolitan itself for practically fifty years, and for six years previously was with a company closely identified with it.

In Mr. Craig's career in the business of insurance, he brought honor and distinction to his company and to the actuarial profession. He piloted his company safely through the troublous days of its early career, and watched it become the largest in the world. He did notable pioneer work. Under his supervision were constructed the Standard and Sub-Standard Industrial Mortality Tables, which have been adopted as standards for Industrial valuation by the law of the State of New York. He also supervised the construction of tables showing the mortality under $500 "Intermediate" policies and under sub-standard "Ordinary" policies, both tables being recognized as standards by the New York Insurance Department. He established an actuarial class for the education of clerks in his department, and its graduates are to be found not only on the official staff of the Metropolitan Life, but scattered throughout the country in positions of responsibility.

Mr. Craig was one of the founders of the Actuarial Society of America in 1889 and was its President for two years. He presented several papers, and took an active part in the discussions of the Society. He was a Charter Member of the Casualty Actuarial Society.

Mr. Craig was a keen student of the business of life insurance, both theoretical and practical. In his skillful analysis of legislative bills he rendered marked service to life insurance. He possessed a rare gift of eloquence, and was a popular figure at meetings of actuaries, insurance commissioners, and field men. His marked ability, his gift of common sense, the strength of his character, and the charm of his personality make him a man long to be remembered.

CASUALTY ACTUARIAL SOCIETY

THE COUNCIL.

Officers: ALBERT H. MOWBRAY.......................*President*
LEON S. SENIOR......................*Vice-President*
HARWOOD E. RYAN...................*Vice-President*
RICHARD FONDILLER..............*Secretary-Treasurer*
G. F. MICHELBACHER........................*Editor*
LOUIS I. DUBLIN........................*Librarian*

Ex-Presidents: I M. RUBINOW (1914-1916)
JAMES D. CRAIG (1916-1918)
JOSEPH H. WOODWARD (1918-1919)
BENEDICT D. FLYNN (1919-1920)

Ex-Vice-Presidents: GEORGE D. MOORE (1918-1920)
WILLIAM LESLIE (1919-1921)

Term Expire
Elected: EDMUND E. CAMMACK.................November, 1922
EDMUND S. COGSWELL...............November, 1922
ALBERT W. WHITNEY................November, 1923
MERVYN DAVIS.....................November, 1923

COMMITTEE ON ADMISSIONS
JAMES D. CRAIG *(Chairman)*

B. D. FLYNN   J. H. WOODWARD

AUDITING COMMITTEE
W. H. GOULD *(Chairman)*

JAMES MORRISON   E. S. COGSWELL

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ABSTRACT FROM THE MINUTES OF THE MEETING MAY 17, 1922.

The semi-annual (eighteenth regular) meeting of the Casualty Actuarial Society was held at the Hotel Pennsylvania, New York, on Wednesday, May 17, 1922.

President Mowbray called the meeting to order at 10:30 A. M.   The roll was called, showing the following thirty-nine Fellows and fifteen Associates present:

FELLOWS

BLANCHARD	GOULD	MOORE
BREIBY	GRAHAM, G.	MORRIS
BUDLONG	GREENE	MOWBRAY
CAMMACK	HARDY	MULLANEY
CRAIG, J. D.	KEARNEY	MURPHY
DAWSON, M. M.	KIRKPATRICK	NICHOLAS
DEARTH	KOPF	OUTWATER
DUBLIN	LAIRD	PERKINS
DUNLAP	LITTLE	RYAN
FALLOW	McMANUS	SENIOR
FARRER	MADDRILL	SMITH, C. G.
FLYNN	MAYCRINCK	WAITE, A. W.
FONDILLER	MELTZER	WOLFE, L. J.

ASSOCIATES

ACKERMAN	NEWELL	WARREN
BARBER	PIKE	WHEELER
CONSTABLE	SMITH, A. G.	WILKINSON
ELSTON	THOMPSON, A. E.	WILLIAMSON
HULL	VAN TUYL	WILSON

The President's address was presented.

The minutes of the meeting held November 18, 1921, were approved as printed in the *Proceedings*.

The Secretary read the report of the Council and upon motion, it was adopted by the Society.   The first year book issued, the 1922 Year Book, had been mailed to members and will be bound into Volume VIII of the *Proceedings*.   The memorial notice of James M. Craig, 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:

> DAVID HERON, Secretary and Chief Statistician, London Guarantee & Accident Co., Ltd., London, England.

After ballot, this nominee was declared a duly elected Fellow. The papers printed in this Number were read or presented. Recess was taken until 2:00 P. M.

By invitation of the President, Mr. V. N. Valgren, Agricultural Economist, U. S. Department of Agriculture, addressed the Society upon "Agricultural Insurance"; and Mr. J. E. Gregory, Executive Head, Credit Insurance Department, Ocean Accident & Guarantee Corporation, spoke upon "Credit Insurance." The publication of both papers in the *Proceedings* was recommended to the Council by a vote of the Society.

Mr. George Graham, President, American Institute of Actuaries and a Fellow of the Society, extended the greetings of the Institute to the Society.

The papers read at the last meeting of the Society were discussed.

Upon motion, the meeting adjourned at 4:30 P. M.

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CASUALTY

ACTUARIAL SOCIETY

1922 YEAR BOOK

Officers, Council and Committees

List of Fellows and Associates, November 18, 1921

List of Students

Constitution and By-Laws

Examination Requirements

(Corrected to February 1, 1922)

No. 1

CASUALTY ACTUARIAL SOCIETY

THE COUNCIL.

Officers: ALBERT H. MOWBRAY............................*President*
LEON S. SENIOR............................*Vice-President*
HARWOOD E. RYAN........................*Vice-President*
RICHARD FONDILLER....................*Secretary-Treasurer*
G. F. MICHELBACHER.............................*Editor*
LOUIS I. DUBLIN..............................*Librarian*

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WILLIAM LESLIE (1919-1921)

Elected: EDMUND E. CAMMACK..................... November, 1922
EDMUND S. COGSWELL..................... November, 1922
ALBERT W. WHITNEY..................... November, 1923
MERVYN DAVIS......................... November, 1923

Term Expires

COMMITTEE ON ADMISSIONS
JAMES D. CRAIG (*Chairman*)
B. D. FLYNN   J. H. WOODWARD

AUDITING COMMITTEE
W. H. GOULD (*Chairman*)
JAMES MORRISON   E. S. COGSWELL

MEMBERSHIP OF THE SOCIETY, NOVEMBER 18, 1921.

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, Treasurer, 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 24, 1921	Bond, E. J., First Vice-President, Maryland Casualty Co., Baltimore, Md.
May 19, 1915	Bradshaw, Thomas, General Manager, 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., Consulting Actuary for Pension Funds, 25 Frankfort St, 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., Associate 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.

FELLOWS.

Date Admitted	
Oct. 27, 1916	Cogswell, Edmund S., General Manager, National Association of Mutual Casualty Companies, 25 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.
†	Copeland, John A., Consulting Actuary, Hurt Building, Atlanta, Ga.
†	Cowles, Walter G., Vice-President, Travelers Ins. Co., Hartford, Conn.
†	Craig, Arthur H., Fredk. C. Smith Co., Insurance Brokers, 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.
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, Pennsylvania 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.

FELLOWS.

Date Admitted	
†	Flynn, Benedict D., 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., Manager, Casualty Dept., Northwestern Casualty & Surety Co., Brumder Bldg., Milwaukee, Wis.
Feb. 25, 1916	Froggatt, Joseph, President, Joseph Froggatt & Co., Insurance Accountants, 25 Church St., New York.
†	Furze, Harry, Treasurer, Globe Indemnity Co., Washington Park, 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, 75 Fulton St., 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., Consulting Actuary and Underwriter, 35 Nassau St., 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., 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, Herbert Hess & Co., Public Insurance Accountants, 120 Broadway, New York.
†	Hillas, Robert J., President, Fidelity & Casualty Co., 92 Liberty St., New York.

FELLOWS.

Date Admitted	
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., 325 Riverside Drive, 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.
Nov. 18, 1921	Hutcheson, William A., Second Vice-President and Actuary, Mutual Life Ins. Co., 32 Nassau St., 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 Proctective Assn., Worcester, Mass.
*Nov. 18, 1921	Kearney, Thomas P., Manager, State Compensation Insurance Fund, Denver, Colo.
†	King, Walter I., Secretary, Group Insurance Dept., Connecticut General Life Ins. Co., Hartford, Conn.
*Nov. 21, 1919	Kirkpatrick, A. L., Actuary, Michigan Mutual Liability Co., Detroit, Mich.
†	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., Secretary & Actuary, Interstate Life and Accident Co., Chattanooga, Tenn.
†	Leslie, William, Consulting Actuary, 525 Market St., San Francisco, Cal.
Nov. 18, 1921	Little, James F., Assistant Actuary, Prudential Insurance Co., Newark, N. J.
†	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.

FELLOWS.

Date Admitted	
†	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 Bureau of Casualty & Surety Underwriters, 15 Park Row, New York.
†	Michelbacher, G. F., Secretary-Treasurer, National Bureau of Casualty & Surety Underwriters, 15 Park Row, New York.
†	Miller, David W., Assistant Treasurer, S. W. Straus & Co., Investment Bonds, 565 Fifth Ave., 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.
*Nov. 18, 1921	Montgomery, Victor, Actuary, California Ins. Dept., San Francisco, Cal.
†	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, Secretary, Royal Indemnity Co., 84 William St., New York.
†	Mowbray, Albert H., 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, Consulting Actuary, Andrades 64, P. O. Box 1817, Rua dos Rio-de-Janeiro, Brazil.
†	Orr, Robert K., President, Michigan Employers Casualty Co., Lansing, Mich.
†	Otis, Stanley L., Director, Bureau of Workmen's Compensation, New York Labor Dept., 124 E. 28th St., New York.
*Nov. 21, 1919	Outwater, Olive E., Assistant Actuary, National Bureau of Casualty & Surety Underwriters, 15 Park Row, New York.

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FELLOWS.

FELLOWS

Date Admitted	
†	Whitney, Albert W., Associate General Manager, National Bureau of Casualty & Surety Underwriters, 15 Park Row, New York.
*Nov. 18, 1921	Wilson, W. Norbert, Travelers Ins. Co., Hartford, Conn.
†	Wolfe, Lee J., Consulting Actuary, 165 Broadway, New York.
†	Wolfe, S. Herbert, Consulting Actuary, 165 Broadway, New York.
May 24, 1921	Wood, Arthur B., Actuary, Sun Life Assurance Company, Montreal, Canada.
†	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.

ASSOCIATES

Those marked (*) have been enrolled as Associates upon examination by the Society.

Those marked (^{1}) have passed Part I of the Fellowship Examination.

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, Continental Life Ins. Co., District Natl. Bank Bldg., Washington, D. C.
*Nov. 17, 1920	Barber, Harmon T., Travelers Insurance Co., Hartford, Conn.
Nov. 17, 1920	Black, Nellas 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	Buffler, 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. 18, 1921	Coates, Clarence S., 2107 Hearst Ave., Berkeley, Cal.
*Nov. 17, 1920	Comstock, W. Phillips, Statistician, Continental Casualty Co., 910 Michigan Ave., Chicago, Ill.
*Nov. 18, 1921	Constable, William J., Assistant Secretary, National Council on Workmen's Compensation Insurance, 16 E. 40th St., New York.
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. 18, 1921	Haggard, Robert E., Supt. Perm. Dis. Rating Dept. Industrial Accident Commission, 525 Market St., San Francisco, Cal.
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.
Nov. 18, 1921	Hull, Robert S., Travelers Ins. Co., Hartford, Conn.
*Oct. 31, 1917	Jackson, Edward T., Statistician, General Accident, Fire & Life Assur. Corp., 421 Walnut St., Philadelphia, Penn.

ASSOCIATES.

Date Enrolled	
*Nov. 18, 1921	Jensen, Edward S., Travelers Ins. Co., Hartford, Conn.
*Nov. 21, 1919	Jones, Loring D., Claim Auditor, State Ins. Fund, 124 E. 28th St., New York.
(¹)*Oct.27,1916	McClure, Laurence H., Colt's Patent Fire Arms Mfg. Co., Hartford, Conn.
*Oct. 22, 1915	McGuire, Vincent G., Asst. Actuary-Auditor, Pension Division, Dept. of Finance, Municipal Bldg., New York.
*Nov. 21, 1919	Mothersill, R. V., Secy. & Actuary, Compensation Insurance Board, State Capitol, St. Paul, Minn.
*Oct. 22, 1915	Müller, Fritz, Friedrich Wilhelm Life Ins. Co., Behren St., Berlin, Germany.
(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, Michigan Mutual Liability Co., Detroit, Mich.
*Nov. 17, 1920	Pike, Morris, Examiner, New York Ins. Dept., 165 Broadway, New York.
*Nov. 18, 1921	Pinney, Sydney D., Travelers Ins. Co., Hartford, Conn.
*Nov. 15, 1918	Raywid, Joseph, Vice-President, Underwriters Statistical Bureau, 153 Fifth Ave., New York.
*Nov. 18, 1921	Roeber, William F., University of California, Berkeley, Cal.
*Nov. 21, 1919	Robbins, Rainard B., Assistant Actuary, New York Ins. Dept., Albany, N. Y.
*Nov. 18, 1921	Shepard, Elmer I., Asst. Professor of Mathematics, Williams College, Williamstown, Mass.
Nov. 15, 1918	Sibley, John L., Statistician, United States Casualty Co., 80 Maiden Lane, New York.
*Nov. 18, 1921	Smith, Arthur G., N. J. Compensation Rating & Inspection Bureau, 571 Market St., Newark, N. J.
*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.
Mar. 23, 1921	Thompson, Arthur E., Statistician, Royal Indemnity Co., 84 William St., New York.
(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. 18, 1921	Waters, Leland L., Actuary, National Accident Ins. Co., Lincoln, Neb.
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. 18, 1921	Welch, Eugene R., Secretary, State Compensation Ins. Fund, 525 Market St., San Francisco, Calif.
Mar. 23, 1921	Wheeler, Roy A., Associate Actuary, Liberty Mutual Ins. Co., 210 Lincoln St., Boston, Mass.

ASSOCIATES.

Date Enrolled	
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, Division of Insurance, State Department of Trade, Springfield, Ill.
*Oct. 22, 1915	Williamson, W. R., Assistant Actuary, Life Dept.,Travelers Ins. Co., Hartford, Conn.
*Oct. 22, 1915	Wood, Donald M., of Childs, Young & Wood, Insurance Brokers, Insurance Exchange, Chicago, Ill.
*Oct. 22, 1915	Woodman, Charles E., Comptroller, Ocean Accident & Guarantee Corp., 114 Fifth Ave., New York.

SCHEDULE OF MEMBERSHIP, NOVEMBER 18, 1921.

	Fellows	Associates	Total
Membership, Nov. 17, 1920.....................	152	47	199
Deductions:			
By resignation.............................	1	—	1
By withdrawal.............................	—	1	1
By death...................................	4	—	4
Additions:	147	46	193
By election, May 24, 1921..................	3	2	5
By election, Nov. 18, 1921..................	3	1	4
By 1921 examinations.......................	4	10	14
	157	59	216
Transfers from Associate to Fellow..............	—	4	4
Membership, November 18, 1921.................	157	55	212

STUDENTS

The following candidates for the grade of Associate have passed one of the two Parts of the examination, during the last three years:

Part 1.

ARNOLD, JOHN A., The Associated Companies, Hartford, Conn.

AULT, GILBERT E., Guardian Life Ins. Co., 50 Union Square, N. Y.

BAGLEY, RAYMOND E., Prentice-Hall Co., 70 Fifth Ave., New York.

BJORN, WALTER, Fort Worth Life Ins. Co., Fort Worth, Texas.

DUBUAR, CHARLES C., International Life Ins. Co., St. Louis, Mo.

FAIRBANKS, E. M., 32 Oakland Terrace, Hartford, Conn.

GINSBURGH, HAROLD J., Aetna Life Ins. Co., Hartford, Conn.

HALL, HARTWELL L., Travelers Ins. Co., Hartford, Conn.

ROFF, MRS. EDMUND L., Compensation Rating & Inspection Bureau, 571 Broad Street, Newark, N. J.

SOMMER, ARMAND, Y. M. C. A., Great Falls, Montana.

Part 2.

EVANS, WILLIAM E., Michigan Mutual Liability Co., Detroit, Mich.

WALKER, CHARLES A., Utica Mutual Ins. Co., Keith Bldg., Syracuse, N. Y.

CONSTITUTION

(As Amended May 24, 1921.)

Article I.—*Name.*

This organization shall be called the Casualty Actuarial Society.

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.

CONSTITUTION.

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,

BY-LAWS.

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.

EXAMINATION REQUIREMENTS

RULES REGARDING EXAMINATIONS FOR ADMISSION TO THE SOCIETY

(As Amended May 23, 1921.)

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 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.

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.

EXAMINATION REQUIREMENTS.

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*.

SYLLABUS.

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 precedure in compilation and use of statistics relating to casualty (including social) insurance problems.

EXAMINATION REQUIREMENTS.

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.

4. Economic theory of insurance, including the theory of social insurance.

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.

"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 without charge, upon application to the Secretary-Treasurer.