THE CLASSIFICATION OF INDUSTRIES FOR WORKMEN'S COMPENSATION INSURANCE.*

BY

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The existing "casualty" insurance classification† of industries is a relict of employers' liability. It grew out of the exigencies of competitive underwriting and its growth has been conditioned at every stage by the convenience of insurance solicitors. By reason of this genesis it is not adapted to the broader needs of compensation insurance; it is a thing of shreds and patches; it was never conceived as a whole nor based upon any reasoned principle of taxonomy.

So far as any consistent principle can be traced in the present manuals, it is that the entrepreneurial establishment shall be treated as a unit. Certain occupations, as office work and teaming, are segregated; but all other employments in the same plant are lumped together. Operations so diverse as wire drawing and piano finishing, beer brewing and cooperage manufacture, underground mining and brick making, are covered at one rate. Flat rates undeniably are preferred by employers and they are a great convenience to agents and auditors. The point of present interest, however, is that flat rates, under the pressure of competition, have produced an enormous multiplicity of classifications. Logically, indeed, the principle should work out to a separate risk class for every distinguishable business, trade or calling, and for every marketable commodity that is or may be produced as a separate enterprise. Competing insurers seize upon any real or supposed difference between related lines of work or production and make it the basis of a new classification at a slightly lower rate. Even apart from rate reductions, specific classifications are a selling advantage. An em-

* For helpful criticisms of this paper the writer is indebted to Dr. I. M. Rubinow of the Ocean, to S. B. Black of the American Mutual, and to W. H. Burhap and M. E. Snyder of the Industrial Commission of Wisconsin.

† The classification primarily had in mind is that of the "Bureau." Practically there is no other classification, though there are individual departures from, or modifications of, Bureau classifications.

ployer, it has been found, would rather pay $1.79 as a manufacturer of acetylene gas machines than be placed under the more general designation of machine shop and foundry at the same rate.

In pursuance of these salesmanlike principles, bedsteads and chairs have been differentiated from furniture, cloaks (*sic* ladies' suits and coats), cloth caps, collars and cuffs, furnishings, fur goods and shirts have been distinguished from clothing, and machinery manufacturing has been subdivided into a hundred or more branches. The varying integration and division of processes contributing to the same ultimate product introduces further complications. On the flat rate principle every such variation necessitates a new risk class: gasolene engine manufacturing with and without foundry, brick making including underground mining and brick making without underground mining, brush manufacturing, assembling only, and brush manufacturing including wood working. The aggregation of unrelated lines of production under one management is treated in the same manner, producing such miscellanies as military goods, which presumably range from brass buttons to lyddite shells and from cloth working to heavy ordnance manufacture.

Of the making of classifications by this easy method there is no end. The number of distinguishable commodities is indefinitely large and the possible permutations among them approach infinity. The manual makers have by no means fully grasped their opportunities. In all consistency, brewers' machinery, paper-making machinery, tanning machinery and wood-working machinery ought to rank with boot and shoe machinery, confectioners' machinery and textile machinery.* Overalls are as distinct from other clothing as are shirts and the ladies' waist industry is hardly second in importance to the cloak trade. Illustrations might be multiplied *ad libitum*. A very little ingenuity would evolve 3,000 risk classes as distinct, and industrially as significant, as most of those in the present manual.

The indivisibility of the establishment is perhaps the only general principle of classification observable in the manual, and even this principle is cast to the winds in the construction industry. The three broad divisions of grading and excavating, erecting, and in-

* Specific classifications for "paper-making machinery manufacturing," "woodworking machinery manufacturing" and even "lathe manufacturing" have actually been filed with the Industrial Commission of Wisconsin, though of course rejected as discriminatory.

terior finishing and equipping, are subdivided by occupations and these are again cross classified by height or depth of excavation or construction,* by materials or machinery employed,† and even by the destined use or occupancy of the structure.‡ Wherefore a $10,000 payroll may be, and often is, divided among a dozen or more risk classes at as many different rates. Indeed, a single employe may combine several classifications within his individual self. A handy man in a retail hardware store is rated at $.42 when he sells a gas stove and at $1.12 when he sets it up, at $1.18 when he cuts a lead trough and at $5.32 when he installs it.§ Some dialectical subtlety is required to reconcile the principle which lumps an iron foundry and a paper box factory at one common rate with that which distinguishes wood stair building from interior carpentry.

Many curious anomalies result from this juxtaposition of opposed classificatory theories—if, indeed, the term theory may be applied to practices which appear to rest upon no reasoned basis. On the one hand we have such inclusive classifications as creamery supplies,‖ which comprise machinery, butter tubs, paper cartons and coloring extract; on the other, such hair-splitting distinctions as that between the construction and waterproofing of concrete foundations, both of which are commonly performed by one gang of laborers at one continuous operation. At the one extreme we are invited to combine the accident experience of workers in wood, metal, glass, rubber and clay;** at the other, we are expected to separate the several occupations engaged in by the same individual in the course of a day's work. That amid such a medley of contradictions, rate differences occur which bear no relation to the hazards involved, need occasion no surprise. But the uninitiated are scarcely prepared to learn that the hazard of digging a six-foot trench and laying a pipe therein is doubled if sewage rather than water is to flow through the trench;†† that the hazard of a retail

* E. g., sewer building, maximum depth not over 7 feet; contractors, building three story residences, etc.

† E. g., railroad construction, with steam shovel, dredging by suction dredges.

‡ E. g., private residences, not mercantile or manufacturing premises; concrete construction, not grain elevators.

§ References are to Wisconsin Bureau rates in effect June 1, 1915.

‖ E. g., creamery supplies manufacturing.

** E. g., electric apparatus manufacturing.

†† The distinction appears to be that a watermain is a pipe in the bottom of a trench whereas a sewer is a trench with a pipe at the bottom.

book store is greater than that of a retail grocery, or that the rate for (traction) road roller manufacturing is higher by some 65 per cent. than that for traction engine manufacturing.

Some of the worst anomalies in the compensation manual recently have been removed. A number of miscellanies have been distributed to their several components and certain industry subdivisions have been consolidated.* But these reforms, however desirable in themselves, do not touch the root of the matter. The decisive objection to the existing classification goes to the very basis upon which it is built up. The present manual—always excepting the "contractors' schedule"—is essentially a classification of business enterprises with respect to the commodities which they produce or sell. Such a commodity classification is fundamentally incapable of meeting the primary requirements of compensation insurance.

These requirements are: (1) That each risk class shall afford a sufficient exposure for sound rate making, and (2) that the resultant rates shall secure an equitable distribution of insurance cost. The existing classification fails in both particulars.

(1) Soundness of compensation insurance rates implies something more than adequacy. Rates must be adequate, of course, but it is almost equally important that they shall not exceed the legitimate costs of insurance and that they shall not fluctuate extremely from year to year.† Opinions may differ as to the minimum exposure indicated by these desiderata but it certainly should be so large that a single injury—say a death or a permanent total disability—will not seriously affect insurance rates. Provisionally, the minimum exposure may be taken to be such that a single death will not affect the pure premium by more than one per cent.‡ Under the Wisconsin Compensation Act this would mean a payroll of $10,-

* The Bureau basis manual is decidedly superior in these particulars to any of its predecessors. Some of the recent and more drastic reforms, however, were brought about by the mandatory rulings of the Massachusetts and New York Insurance Departments and the Industrial Commission of Wisconsin.

† Cf. Dr. I. M. Rubinow, in *Proceedings of the Casualty Actuarial and Statistical Society of America*, Vol. I, p. 146 ff.

‡ Compare A. H. Mowbray, in *Proceedings of the Casualty Actuarial and Statistical Society of America*, Vol. I, pp. 24–30; also Dr. I. M. Rubinow, *ibid.*, pp. 12, 13.

000,000 for a class on which the pure premium is $3.00* and a correspondingly larger payroll for the less hazardous classifications. Under the New York law, owing to the more adequate death benefit, a still larger exposure is needed. More concretely, it may be said that a payroll of $20,000,000 would represent a reasonably adequate exposure on saw mills under the Wisconsin act and that, say, $25,000,000 would be required for the same industry in New York.† Assuming an annual payroll of $5,000,000 in each state, the requisite exposure would be obtained in four and five years' time, respectively. This period may be shortened by combining the experience of several states, in the method employed by the Bureau manual committee.

The point deserves emphasis, however, because it has sometimes been overlooked, that there are somewhat narrow limits of time and space within which exposures are comparable. Technology, and consequently the hazards of industry, change so rapidly that accident experience is quickly antiquated. In such an industry as packers' can maufacturing, e. g., the safety propaganda and the introduction of automatic processes have nearly eliminated the once dreaded stamping hazard.‡ A recently patented device bids fair to tame the barbarous corner staying machine. The drum barker has removed an important source of danger in paper mills equipped therewith. These are typical illustrations and they go to show a high rate of obsolescence in pure premium experience. A decade is perhaps the extreme limit of reliable pure premium accumulation.§

* The maximum death benefit under the Wisconsin Act is $3,000, or $.30 on a payroll of $1,000,000. The mere chance that 4 out of 9 men killed in the Wisconsin zinc mines were without dependents reduced the pure premium on $1,500,000 of payroll by $.80, or more than one fourth. The rare chance of third party liability for the one fatal accident to a clerical office employe affected the pure premium on a payroll of $20,000,000 by 150 per cent.

† The pure premium under the New York act should be greater than that under the Wisconsin act in the ratio of approximately 150: 100, but death benefits should be a decidedly larger proportion of the total.

‡ In one large Wisconsin plant, two years' experience shows a pure premium of $.30 as against the Bureau base rate of $5.60. The experience of the largest similar plant in the United States shows a still smaller cost as compared with a still higher insurance rate.

§ The preference is to accident rate and gravity. On such points as deferred mortality, remarriage and the development of latent disabilities, a much longer period of accumulation is both feasible and necessary.

Local variations are of less importance in the aggregate, because they affect a narrower range of industries, but their influence is sometimes very great. No underwriter would care to base the rate for coal mining in Colorado upon Iowa experience nor could the logging rate for the State of Washington safely be derived from Wisconsin experience. Even so thoroughly standardized an industry as boot and shoe making differs considerably in hazard as between New England and the Middle West.* Lastly, it is to be observed that even law differentials contain large elements of uncertainty. The decisions of courts and commissions, and still more the general spirit of administration, may give very different effects to similar statutory provisions.† Great caution must be used, therefore, in combining pure premium experience under different laws. As to the combined pure premium of a long term of years, under different compensation acts and in widely separated localities, the factors of disturbance are so numerous and so potent, that the aggregate result must be utterly untrustworthy.‡

In the face of these limitations, what are the prospects for sound rate making with the existing industry classification? The compiled experience of Massachusetts on some $800,000,000 of payroll indicates that five years' time will give an adequate exposure for about thirty of the 1,500 manual classifications. Wisconsin, in the same length of time, should accumulate a sufficient experience for some ten or fifteen risk classes. New York, with its enormous and highly diversified industry, should fare much better, yet it needs no prophet to foretell that even New York State will fail to obtain a dependable pure premium on more than a small minority of the present risk classes. Some relief from this situation can be obtained by combining the experience of different states on those

* The difference appears to consist, not in machinery or processes, but in the proportion of experienced workmen—experienced in the particular place of employment as well as in the industry at large.

† A notable instance is the judicial extension of the Massachusetts act to cover occupational diseases. In Wisconsin it still is a moot point whether the specific indemnity period for certain enumerated injuries runs from the date of the accident or from the termination of temporary total disability. A substantial difference in the total cost of the act hinges upon this point.

‡ The writer does not wish to minimize the importance of combining the experience of different states—which he believes to be absolutely necessary—but only to emphasize the limitations thereof.

classes as to which local variations are unimportant. But a decade's experience of the United States would show a pitifully inadequate exposure for such classifications as blasting, chimney building, eyelet manufacturing, stairbuilding, suspender manufacturing, including metal parts, vending machine manufacturing, and many more of like industrial significance. For the great majority of the existing classifications, indeed, there is no escape from conjectural rate-making. The use of imputed pure premiums, derived from a standard distribution of accidents, is doubtless an advance over sheer underwriter's judgment, but it is far from being an acceptable substitute for actual experience upon an adequate exposure.

(2) The existing manual is equally unsatisfactory from the standpoint of equitable rates. It applies the same rate to establishments which have little similarity in kind and degree of hazard and it applies widely different rates to identical operations. Some of these inequalities are doubtless due to inadvertence or to insufficient experience, but many of them inhere in the very basis of classification. The manual, in fact, presupposes a high degree of correlation between product and hazard—a correlation which does not exist in industrial practice.

(*a*) The number and character of operations, and consequently the kind and degree of hazard, differ widely as between establishments turning out the same finished product. Most automobile manufacturers, e. g., buy their frames and many buy their bodies and engines as well, but a few concerns make all of these parts in their own plants. It results that one manufacturer pays a rate of $2.35* on frame manufacturing, $1.74 on body manufacturing, $1.12 on engine manufacturing and $.95 on the manufacture of other parts, including assembling and finishing, whereas his competitor pays a flat rate of $.95 upon all these operations. The total insurance cost of the finished commodity is evidently greater when the production is divided among several establishments than when it is combined under one management.

(*b*) There is a still greater range of variation in those classes which embrace, not individual products, but entire commercial lines. Agricultural machinery is a case point. Both in trade parlance and in the manual classification the term covers a wide range, from cream separators to threshing machines. A few large firms manu-

* References are to Wisconsin Bureau base rates.

facture a complete line of farm implements and so have given rise to the inclusive classification. But there are also many specialty plants, producing plows, mowers, hay tools, litter carriers, or ensilage feed cutters, as the case may be. Hence an agricultural machinery plant may be purely metal working or principally wood working; it may comprise a gray iron foundry, malleable foundry, steam and drop forge shop, oxy-acetylene welding department and planing mill or may be little more than a machine shop; it may use a ten-ton crane for the assembling of individual products or may turn out nothing heavier than two hundred pounds in weight. A flat rate for the whole class is about as equitable as a flat rate for stove founding and boiler making.

(*c*) The same equipment and the same working personnel, in the same establishment, may simultaneously produce a variety of commodities assignable to distinct manual classifications at widely different rates. A very large employer in Wisconsin manufactures road rollers (rate $2.97), threshing machines (rate $1.79) and automobiles (rate $.95). The same foundry, the same woodworking shop, the same forge shop and the same machine shop are used for all these products. Separate payrolls are kept for cost accounting purposes, but there is no physical separation of hazards so that separate rates would be an absurdity. Boilers (rate $2.94), mining machinery (rate $2.96) and gasolene engines (rate $1.79); carriages (rate $.92) and chairs (rate $1.12); windmills (rate $2.10) and pumps (rate $1.79), are other instances of inseparable combinations in large establishments.

The only remedy for these inequalities, consonant with the present manual, is a further multiplication of classifications. We should have automobile manufacturing, no body or frame manufacturing; automobile manufacturing, including body manufacturing, no frame manufacturing; automobile manufacturing, including body and frame manufacturing; ensilage feed cutter manufacturing; hay tool manufacturing; plow manufacturing, and so on *ad nauseam*. Even then it would be necessary to apply special average rates to particular establishments presenting unusual combinations.

In fine, the classification of compensation risks is involved in a vicious circle. Under the rule of establishment unity, differences of operative procedure can be allowed for only by the expedient of separate risk classes; whereupon competition multiplies the number

of risk classes beyond all possibility of obtaining adequate exposures for sound rate-making. From this impasse there appears to be no escape save by adopting a new basis of classification. Two such bases readily suggest themselves; the industry group and the fundamental operative procedure.

The industry group, as a basis of risk classification, is familiar to all students of European experience. The immense and varied industries of the German Empire, e. g., are comprised by some thirty-five risk groups.* On the same basis, a hundred classes should suffice for the industries of the United States. The superiority of such a group classification in amplitude of exposure and consequent stability of rates is not to be gainsaid. It has, besides, all the advantages which can be claimed for flat establishment rates. The common objection on the score of inequity is, for the most part, a misconception. That every commodity shall bear its specific accident cost and every consumer pay his exact quota of the total is neither practically attainable nor especially important.† It is not a serious evil that the users of household furniture pay a part of the accident cost of interior trim manufacturing. Accident cost in any case is but a minor element in retail price. Moreover, consumers do not specialize in particular commodities. What a given family loses in the price of furniture may be made up in the cost of flooring. The prime desideratum is that the cost of work accidents shall be distributed over the whole community and the prime requisite to this end is that competing entrepreneurs shall be placed upon an equal footing. If all furniture manufacturers pay the same insurance rates, albeit somewhat more than would be required by their own industry alone, all are able to shift the burden upon the consuming public. But inequality as between competing employers is, in so far, a failure of distribution. Judged by this

* Not counting territorial subdivisions. The number of risk grades, however, apart from merit rating, is somewhat greater, so that the comparison with American compensation manuals is not altogether legitimate.

† This passage may appear inconsistent with what is said in an earlier section (pp. 15 and 16) on the inequality of American insurance rates. The former passage, however, deals with inequality as between competing entrepreneurs, the latter with inequality as between commodities or consumers. The entrepreneur does specialize in specific commodities and to him it is not a matter of indifference that competitors enjoy lower insurance rates, since he can not shift the excess upon consumers.

criterion, the German group system is probably more equitable than any classification in use in this country.

The substantial objection to a group classification springs from a quite different source—the competitive organization of insurance. The advantages of the system depend upon including in each group a considerable number of industries, the specific hazards of which will necessarily depart more or less widely from the group average. If, therefore, one insurer applies a level rate to the group, a competitor, by offering lower rates on the least hazardous members, may take away the cream of the business. On this rock has split every attempt by competing insurers to achieve a rational grouping of risk classes.

The most recent, as also the most promising, of these attempts is embodied in the rate-groups* of the Bureau Basis Manual. It is perhaps supererogatory to observe that a rate group is composed, not of all the industries which chance to bear the same rate, but of those only which are presumed to be similar in both kind and degree of hazard. Three such groups, all taken from the metal schedule, may be put in illustration: the tool and hardware group (Wisconsin rate $.84), the foundry-and-machine-shop group (Wisconsin rate $1.79) and the heavy machinery group (Wisconsin rate $2.96). The first of these groups comprises builders' hardware, carpenters' and other hand tools, horseshoes, scales and other like products. The foundry-and-machine-shop group covers most branches of machinery manufacturing, while the heavy machinery group includes boilers, electric cranes, mining machinery, road rollers and steam shovels and dredges. None of the foregoing groups is delimited by clearly defined lines, whether of trade organization or operative hazard. Thus the tool and hardware group does not include plumbers' fittings, bolts, nuts or nails, all of which apparently fall within the category of builders' hardware, consid-

* To be distinguished from the code-groups, which latter are based on character of product rather than degree of hazard. So far as the writer is informed, the rate groups actually used by the Bureau Manual Committee have not been made public. The constituents of the principal groups can, however, be determined by necessary inference. It is not conceivable that the individual pure premiums of a dozen risk classes should be so nearly identical as to produce the identical base rate of $1.79. Either the pure premiums were averaged to produce a group pure premium or the actual pure premium of the leading member was imputed to the entire group.

ered as a risk group, whereas it does include the manufacture of railroad car scales which would seem to belong rather with the machine-shop-and-foundry group. Yet more anomalous is the exception of hundred-ton locomotives and ten thousand horse power turbines from the heavy machinery class. The general machine-shop-and-foundry group shows equally curious exceptions. On the one hand, wheelbarrows and windmills are ranked with locomotives; on the other hand, boot and shoe machinery, textile machinery and printing presses are rated even lower than hand tools. If it be assumed that the rate groups were based upon similarity of hazard, it is plain that they have been strongly and erratically modified by competitive considerations. Still further disintegration is threatened by the action of non-Bureau companies in making exceptions not heretofore recognized by the Bureau.* In short, the Bureau's grouping system was neither consistent nor thorough-going at the outset and the pressure of competition tends constantly in the direction of greater inconsistency.

The other proposed basis of classification is less familiar—so much so indeed that its very terminology is wholly unsettled. What is had in mind is not the multitudinous and shifting occupations of individual workmen,† but those fundamental and relatively standardized industry divisions which are commonly recognized as distinct departments of the individual establishment. It appears possible to resolve all manufacturing industries into a comparatively small number of such fundamental operations or processes. Thus founding (in its several kinds, brass, malleable, gray iron and steel), machining (machine shop work), forging, boilermaking, woodworking, pattern making, painting and assembling, are well-known and fundamental processes which together make up the machinery manufacturing industry. Sawing and barking, sulphite pulp making, pulp grinding, and papermaking similarly constitute the pulp and paper industry. In like manner, the textile and clothworking trades may be resolved into carding, fulling, spinning, weaving, bleaching, dyeing and finishing, knitting and sewing. The processes enumerated are fundamental in that each is common to the production of many specific commodities and is at the same

* See, e. g., note 2.

† The writer has sometimes been understood as advocating an occupational classification. On the contrary, he believes such a classification, as a basis of compensation insurance rates, to be wholly impracticable.

time relatively uniform and standardized within itself. The hazard of a gray iron foundry, e. g., is much the same whether the factory product be gasolene engines, windmills, dynamos, or aeroplanes, The sewing hazard is essentially identical in the manufacture of burlap bags, ladies' cloaks and workingmen's overalls. Illustrations might be multiplied but those already given will perhaps suffice to elucidate the principle.

The adoption of a classification upon this principle would at once remove many of the difficulties which now confront the makers of manuals. It would secure an adequate exposure, for it would bring together the entire experience of operations which now are divided among many specific classifications. It would enable the collection of pure statistical experience, for it would separate unlike hazards which now are so frequently combined. Lastly, it would automatically adjust the rate of each establishment to the actual hazards thereof. The automobile manufacturer who does much assembling and little manufacturing would pay the assembling rate upon a correspondingly large proportion of his payroll. The agricultural implement maker who has neither a foundry nor a wood working department would be equitably treated as compared with a competitor who operates both and the manufacturer of kitchen chairs would pay a higher rate than the manufacturer of upholstered couches.*

To an operational classification may be objected that it is a radical departure from existing practice and that it would require the subdivision of payroll in numerous establishments now covered by flat rates. The establishment classification has been long in use. It has struck deep roots in the customs and habits of thought, not only of underwriters but of employers as well. An immense structure of tradition and experience has been built upon it. It is not, therefore, to be discarded lightly nor on merely academic grounds. This objection, nevertheless, is evidently not decisive if it can be shown that the long term advantages of the innovation will outweigh the temporary inconvenience. The second objection is much less serious. The additional bookkeeping trouble, whether to employer or insurer, is not of great moment. Most employers can and do, already, keep payroll accounts by departments. It has been urged, indeed, that subdivision tempts the employer to pad his

* Singularly enough, the reverse is now the case.

payroll in the low-rated, at the expense of the higher-rated, classifications. But there appears no good reason to believe that this species of fraud would prove either more attractive or harder to control than the understatement of total payroll under the flat rate system.

If the foregoing argument is well taken the existing industry classification must be reconstructed before compensation insurance can be placed upon a scientific basis. Either an industry-group or an operational classification would apparently meet the fundamental requirements of the case. It is unlikely, however, that either of these principles will be accepted in its entirety. The necessary reconstruction probably will take the form of a series of compromises between differing, but not irreconcilable, views. There are doubtless industries which are sufficiently standardized to justify flat establishment rates and sufficiently large to stand upon their own feet in the matter of accident insurance.* There are other industries which are so nearly and obviously related in point of hazard that the grouping system could be applied without much protest from any one.† But a flat establishment rate upon a specific industry classification is inequitable wherever establishments turning out the same product differ markedly in operational hazard.‡

Moreover a grouping system after the German model which should combine industries of widely different hazards would encounter strong opposition from employers accustomed to specific rates. In respect to many industries, therefore, an operational subdivision would appear to be the most satisfactory solution. Fortunately all three principles find some acceptance in present insurance practice. It should not be very difficult to determine the limits within which each is properly applicable.

Obviously, however, the task is not a simple one. To work out a classification which shall be at all adequate to the purpose will need the co-operation of underwriters, statisticians and technolo-

* Cereal milling is perhaps as good an illustration as any.

† The manufacture of adding machines, comptometers and typewriters is a case in point.

‡ Operational hazard throughout this paper is taken to mean the inherent hazard of a given fundamental operation—e. g., pulp wood grinding—as distinguished from those hazards of which merit rating takes account.

gists. It will need, also, a high degree of openmindedness, of willingness to try experiments and to hold fast that which is good. Not least of all, it will need the sanction of governmental authority. No group of private insurers, however earnest or intelligent, can establish a scientific risk classification in the face of unscrupulous competition. Just as competitive pressure has disintegrated well-marked industry groups, so it would resolve operative departments into a hopeless muddle of individual occupations. Whatever may be true of competition in service, or even in rates, competition in misclassification is an unmixed evil. Not only does it open a wide door to discrimination and to every form of unfair competition; it vitiates that statistical experience which is the foundation of all sound insurance rate making.* Every consideration of public policy, as also every legitimate insurance interest, requires uniformity of risk classification and of the rules governing payroll division. Nothing in past or present experience justifies a hope that such uniformity can be brought about by voluntary agreement.

Strangely enough, the greatest obstacle to such a reform as is here suggested is the opposition of insurance carriers. The deplorable fact is that liability insurance in the United States has never been conducted upon a scientific or even upon a healthy business basis. The immediate root of the evil appears to be the dependence upon an investment, rather than an underwriting profit. The causes of this untoward development do not concern the present inquiry. The fact is noted only because of one unfortunate result: that liability insurers have devoted their chief energies to securing a large volume of premiums and have given all too little heed to the scientific foundations of their business. Even now it is the entrepreneurs, and not the technical experts, who are privileged to speak with the voice of authority. Whence it happens that the

* Already we have seen attempts to classify as clerical office employes the markers and assorters of laundries, the packers and shippers of a chemical factory and the attendants of an electrical equipment store. Indeed, the reports of audited experience on Wisconsin compensation policies issued in 1913 show a most amazing want of uniformity in classification on the part of both Bureau and non-Bureau companies. Choice gems are the classification of an agate and enamel ware factory as "enamelling," of a harness factory as "leather novelties manufacturing," of a horse blanket factory as "clothing manufacturing," and of an automobile frame manufacturer as "automobile manufacturing." All but one of the misclassifications here cited were by members of the Bureau.

liability companies approach the question of risk classification, first of all, from the standpoint of selling advantage. Viewed from this standpoint, a radical revision of the manual is but a weariness to the flesh.

The time is at hand, however, for a diligent searching of hearts. The shadow of state or mutual monopoly looms large upon the horizon. If private insurers would remain in the compensation field they must establish themselves anew in the public confidence. Probably no one thing has done more to discredit their methods than their confessed uncertainty as to both rates and classifications. That liability experience would not afford a sufficient basis for compensation insurance rates was inevitable. But the *relative* hazards of industry were not fundamentally altered by a change in statutory liability for accidents. It was fairly to be expected that insurance companies, out of a quarter-century's experience, would have evolved a reasonably stable classification of long-established industries and reasonably dependable risk factors for each. Instead, we find a constant shifting, not alone of absolute, but as well of relative rates, together with a never-ending division and recombination of risk classes. Malleable foundries have been rated with gray iron foundries, then with machine shops, then at a point between the two; ensilage cutter manufacturing has been shifted from the heavy machinery to the machine-shop-with-foundry and lastly to the machine-shop-without-foundry group, all within a twelvemonth; the classification of gasolene engine manufacturing has been changed three times within the term of one annual policy. The like illustrations might be multiplied through a list that it were tedious to recite. In the face of such evident confusion the layman loses all confidence in insurance rates. His scepticism offers a favorable soil for the growth of mushroom insurance organizations, with resulting disastrous demoralization of rates. Not even an adequate rate law will wholly remedy this situation for adequate rates cannot be determined without adequate exposures and adequate exposures cannot be had without a radical revision of the existing risk classification.

Oral Discussion.

Mr. Mowbray: Dr. Downey's paper is of first importance because it raises for our consideration, questions regarding the fundamentals of the compensation business which should receive thorough

study not only by casualty actuaries, but by managers and underwriters of all companies.

Among the questions raised by the paper, are the following:

1. Is the present system of classifying compensation risks satisfactory or even justifiable?
2. What other systems are available?
3. Are they better than the present system?
4. Can they be substituted for it?

Dr. Downey answers the first question with an emphatic negative, at least from the actuarial point of view, and believes the same answer will be forthcoming from the thoughtful employer. He does not attempt to answer for the agent but several remarks indicate he thinks the present classification system though based on "salesmanlike principles" is a failure even from this point of view.

He mentions two other systems as possible substitutes but dismisses the first, the industry group system, as unsuited to competitive conditions. The other, based upon the process hazard notion, he discusses more fully. He believes both systems superior to that now in use.

The analysis underlying Dr. Downey's suggestions seems to be about as follows:

1. The basis for rate differentiation is difference in hazard producing a difference in insurance cost.
2. In general this does not follow product but process.
3. Therefore a system of classification based upon product will be unsatisfactory.

The crux in this reasoning lies in the second proposition. My own study of classifications and grouping of classifications tends to confirm its soundness. Dr. Downey, however, does not resort to à priori reasoning to establish this point, but cites many examples of misfits in the present system.

4. Since process or operation is the element on which hazard generally depends this is the best basis for classification.

With this reasoning I am in thorough accord. The difficult question to answer is the fourth. To suddenly abandon the present system and adopt Dr. Downey's suggestion would be so violent a change, that the resultant upheaval might almost be described as an "earthquake," and even if the change be accomplished gradually, there are some who will maintain the division of pay roll called for, will render the system impractical. While some consideration must be given these objections I do not believe they are so serious as to prevent the use of the system. We would, perhaps, have to have a bit higher grade talent in our auditing departments. We might for a time have to be on our guard against trickiness in division of pay roll for underwriting purposes. But there are plenty of industries now where pay roll division, optional or required, for less logical reasons presents the same difficulties.

The serious difficulty seems to be the transition, for while criticizing the present system unsparingly even Dr. Downey admits "it has struck deep roots in the customs and habits of thought, not only of underwriters, but of employers as well." I have not had sufficient opportunity to study the question to feel justified in proposing a definite program to this end. It would seem however that requirement of division of pay roll for different operations where it is now optional and amalgamation of classifications where the hazard is essentially the same, would be steps in the right direction.

MR. BLACK: Mr. Forbes proposes a method for obtaining an average rate for each employer which will reflect the various processes used and the proportion thereof. Dr. Downey proposes a brand-new industry classification based on fundamental processes involved. He does not seek to produce an average rate for the employer, but would give to the payroll expended on each process its proper rate. Because the processes determine the hazard, a process classification with rates on each process will produce equitable rates between employers. On the other hand, the formula method, by determining the relative proportions of various processes in plants of the same class, would produce an average rate for all plants of that class. For particular plants which vary from the average, rates would be produced which would reflect this variation.

The formula is proposed particularly for the handling of "Container Manufacturing" as a side-line of the principal products of a plant. The manual rate would be an average rate based on the average amount of payroll expended in container manufacturing and the governing classification for all plants of that class. A plant having a smaller proportion than the average of container payroll (if a rate for the particular kind of container is higher than the rate for the governing classification) would obtain a lower rate than the average such plant, and vice versa.

Through a process classification as explained by Dr. Downey the payroll expended in the manufacturing of containers would take the manual rate applicable thereto.

An equitable rate would theoretically be produced in both cases. The weakness of Mr. Forbes's method is that in the formula which he would apply to a particular plant he uses quantities which are tremendously variable. The rating received would depend upon the number of workers employed in the container manufacturing department at the particular time that the inspection was made for rating purposes. It is well known that aside from the very largest plants it is quite the custom to manufacture containers, or a large part of the total number used, during slack seasons in the regular work. Thus from day to day or from season to season there would be a big variation in the number of people employed in the container department as compared with the department where the regular work is done. Thus upon the information obtained by an inspector before the policy goes into effect will be determined the

rate for the entire plant. It is conceivable that there would be a fluctuation of fifty per cent. from season to season in the proportion of payrolls expended in the various departments. Obviously this will fail frequently to produce an equitable rate.

That the formula should produce an equitable rate, it would be necessary to determine the number of employee-days exposure in the container manufacturing department as compared with the regular department. As this is ordinarily impossible to determine, the next best thing would be to determine the actual payroll expended in the various departments. In this way only can the relative proportions of exposure be even approximated. If a determination of payroll is necessary, it is very evident that a payroll auditor at the end of the policy term is better able to determine the payroll expended in each department than an inspector at the beginning of the policy term. By giving to each process, which roughly represents each department, the proper manual rate, as proposed by Dr. Downey, applying such rate to the actual payroll expended in each department, as determined by the payroll auditor, as equitable a rate will be given the employer as would be produced by the formula method determined after a careful audit of the payrolls.

It is clear then that the formula method only complicates the matter. A further very great disadvantage is that it vitiates experience. At the present time on lamentably few classifications is experience available for the determination of rates. If a process classification were used, there being comparatively few processes and these few common to all industries, it would soon be possible to obtain sufficient experience to indicate proper rates. The formula method however, giving to each plant a different rate, or producing in effect an infinite number of classifications, will make it impossible ever to determine the proper rates for the different classifications.

The principal objection to process classification is the impossibility of determining the actual payrolls expended on the different processes. It has been pointed out that this objection is equally applicable to the formula method. I might also point out that this objection may be urged against the present system of classification. Let me illustrate by a manufacturing establishment with which I am more or less familiar. This plant manufactures carriages, chairs and automobile bodies. In accordance with the existing rate manuals there should be given to this plant a rate on the chair manufacturing, a rate on the carriage manufacturing and a rate on the automobile body manufacturing, and a division of payroll would be required accordingly. A process classification would classify this plant as follows: Foundry, machine shop, wood-working department and painting department. Each of these departments is distinct and in each department work is done on all the products turned out by the establishment. With a cost accounting system the payroll expended on each product can be determined of course; but it is the different departments that determine the hazards and not the partic-

ular article upon which the men happen to be working. I submit that a division of payroll in accordance with these departments would not only be more equitable but far more logical than the existing method of classification.

MR. MICHELBACHER: In discussing Dr. Downey's paper, it should be understood that anything I say refers only to the practical side of the problem which is presented.

I have no doubt that Dr. Downey's suggestions, if they could be carried out in practice, would very much simplify the writing of workmen's compensation insurance. From a theoretical standpoint, it is probably desirable to have as few manual classifications as possible. With a few manual classifications, there will be a greater possibility of securing a sufficient payroll exposure for each classification. This will insure accurate premium rates as far as such rates can be determined by experience. It also follows theoretically that the underwriting of workmen's compensation insurance will be simpler with a few general, broad classifications to govern the underwriter in classifying risks. These two advantages are probably offset by the practical dangers which will creep into the business, first, by reason of a division of payroll in a given risk which must be made in order to enable the insurance carrier to properly assess the risk for insurance in accordance with rates based upon occupational or industrial classifications, and second, by reason of the dissatisfaction such risk classification would arouse among employers.

Mr. Downey very properly modifies his comparison between the German classification system and the classification system used by the Bureau in connection with its Basic Manual. He makes the general assertion that the "immense and varied industries of the German Empire are comprised by some thirty-five risk groups," and then modifies this assertion by stating that these thirty-five risk groups do not include territorial sub-divisions and that no mention has been made of the number of risk grades within risk groups.

As a matter of interest, I have consulted the 24th Annual Report of the U. S. Commissioner of Labor, Volume I, and find that the risk tariff of the accident association for the glass industry comprises six risk grades and twenty separate branches of industry. These should be compared with the number of classifications in the Basic Manual covering the glass industry, to secure a correct idea of the simplicity of the German system as compared with the Bureau system.

It is probably true that if the classifications in the Basic Manual were grouped according to rate, we should find that our Basic Manual does not contain more than six risk grades for the entire glass industry. When the work of the Conference Committee on Pure Premiums has been completed, the entire basic manual will contain but one hundred fifteen risk grades. At the present time there are not more than one hundred seventy-nine risk grades. It should also be noted that the branches of industry which are grouped

into six risk classes are more or less analogous to the manual classifications. For example, there is a classification "Manufacture of Plate and Window Glass"; another "Grinding of Mirror and of Plate Glass"; a third "Manufacture of Green Glass"; a fourth "Artificial Glass Flowers and Glass Fruits."

The tariff for premium rates used by the Accident Association for the Building Trades of the Northwest in Germany comprises fourteen risk grades and approximately twenty-seven separate industrial classifications. Again, the separate industrial classifications follow more or less what Dr. Downey has been pleased to term the "entrepreneural" grouping method. There are, for example, individual classifications, for "Roofing," "Cabinet Making," "Tile Working," "Locksmithing," all of which goes to show that if the complete manual of rates for workmen's compensation insurance in Germany were compiled, it probably would be as lengthy as the manual used by the Workmen's Compensation Service Bureau.

As I understand the situation, the German employers started out with an idea similar to Dr. Downey's idea; namely, that all establishments should be grouped roughly according to general, broad divisions of industry. These groupings of industry have resulted in the formation of the various accident associations. There are accident associations for the glass industry, for the building trades, for the textile industry, etc. It was then found necessary to establish risk grades within these industrial groupings, in order that the cost of workmen's compensation insurance might be equitably distributed among the members of the association. In the beginning, this formation of risk grades was made on the basis of occupation or process in a number of these associations. Experience has shown (according to the report of the U. S. Commissioner of Labor) that computations of risk ratings by occupations or processes are too complicated for use and that several accident associations, which had adopted this method, have been compelled to give it up, because of the difficulties in carrying it out into practice.

What then is the lesson to be drawn from the German experience? It seems to me to be just this: The German employers starting out with a plan similar to Dr. Downey's plan, found it practically impossible to make that plan work out. The result was a modification of the rating plan to more nearly fit the industrial establishment—the "entrepreneural" classification scheme had to be resorted to finally to make the mutual insurance scheme workable with the least amount of friction and dissatisfaction. We have found the same state of affairs in the United States in Washington, Nevada, Oregon and one or two other states where a general industrial grouping has been adopted for state insurance purposes in connection with workmen's compensation laws. The dissatisfaction which exists among certain employers in these states causes me to very much disagree with Dr. Downey's contention that the "common objection on the score of inequity is for the most part a misconcep-

tion." This then seems to me to be the greatest criticism, practically speaking, of Dr. Downey's plan. Under present conditions, such a plan would create great dissatisfaction among employers who would not be satisfied to have their industries divided into separate processes and grouped roughly with other industries of somewhat similar character for rate making purposes. We find today that with our present manual there is quite a rivalry among employers whose plants are thrown into a given classification for an adjusted rate which will more accurately base the insurance premium upon the characteristics of the individual risk.

Dr. Downey's plan, if put into practical application without any modifications whatsoever, would largely do away with the "Safety First" movement. If employers were to find their establishments divided by processes and grouped for insurance purposes with a resulting rate covering all of the risks in a given class, they would not be particularly interested in making their individual plant as safe as possible, for they would feel somehow that they were being assessed for accidents occurring in processes carried on in the worst possible manner and would consequently have no incentive to make their own plant as safe as it possibly could be made.

A modification which would probably obviate this danger would be the application of a schedule rating plan in connection with the occupational or industrial process risk grouping scheme. Instead of using a universal schedule rating plan, however, it would be necessary to have many individual plans to take care of the various characteristics of the processes or occupations comprising the separate risk groups. I agree that one universal schedule does not adequately meet the needs of the present rating scheme. The Workmen's Compensation Service Bureau recognizes this and has in preparation some seventeen individual schedules which will be used in connection with general classes of risks. Some day we shall probably have a schedule which is particularly adapted to risks engaged in woodworking, in glass making, in textile manufacturing, etc. The application of these schedules will, however, be confined to the establishment. Under Dr. Downey's scheme, the rate to be used in connection with such schedule would be what is at present termed "an average rate" obtained by dividing the payroll in a given establishment according to the character of the processes or occupations engaged in and using with these separate payrolls the proper rate.

I maintain that the average rating of an establishment can be done under existing conditions in just as satisfactory a manner as it can be done under Dr. Downey's scheme. To further this contention, I need only point to formulae which have been developed by the Workmen's Compensation Service Bureau, two of which are presented in a paper before the Society, entitled "Schedule Rating By Formula." Take, for example, the so-called "Container" formula. This formula, if applied to an establishment where con-

tainers are made, would produce an adequate rate based upon the degree of container hazard presented in the given risk. A division of payroll would not be necessary. Experience for the separate processes would not be necessary, for existing experience will give all the information necessary to put the formula into practical application.

Instead of rearranging the entire rating scheme, we can use the rating scheme we have at present with all of the experience which has been developed under this scheme, if formulae of this character are used wherever they seem to be necessary. The application of a formula of this character requires some statistical investigation, it is true. An investigation must be made to determine the average percentage of employees in a given establishment engaged in the various processes, but this investigation can be made with the existing machinery of the Inspection Department in a very short time. It will not be necessary to compile three or four years' experience to make the plan workable, and moreover, a formula of this character will accurately rate risks in accordance with the individual characteristics of these risks. Formulae will therefore do away with any dissatisfaction which may exist among employers. Each risk will be rated upon its individual merits, and after all, this is the only practical basis of rating at the present time, because of the diversified character of our industrial processes.

Buildings in which industrial establishments are housed differ widely; machinery used in creating a given product may differ widely; the character of the management and the moral hazard may vary widely from risk to risk; the physical condition of the plant may be entirely different as between two risks in the same town; widely different as between two risks situated in different states. All of these items must be taken into consideration. It is not fair to throw industrial establishments into groups and require the careful employer to pay for the losses of his careless competitors. Neither is it equitable to divide an establishment into processes and group processes for rate making purposes.

In closing, let me point out that Dr. Downey's plan would involve much additional work for statistical departments. The present classification system could not be entirely dropped for at least five years, because of outstanding claims. This would necessitate having two systems in operation for five years. The dropping of the present system would require a complete revision of each statistical office with detailed instruction in the new order of things for underwriters and statistical employes.

The work of the Statistical Committee of this Society in revising the Classfication Code of the Bureau has made necessary the change of some two hundred thirty-five code numbers. Statisticians inform me that this change will cause a great deal of trouble in their departments. Imagine, if you can, what a state of affairs would be created if the entire manual were suddenly dropped and a new manual substituted for new busines written after a certain date!

Moreover, I am not so certain that Dr. Downey's plan would be as simple as he wishes us to believe. Because the rate is the same for "Foundries-steel" and "Foundries-automobile mfg.," it does not necessarily follow that employers will be satisfied with these rates. Rate makers will always be called upon to justify rates. The only justification of rates is based upon experience, consequently, the statistician would be called upon, under Dr. Downey's plan, to keep separate experience, for each process in each industry. This will cause the statisticians' classification code to become as complicated, or even more complicated than the present code. This state of affairs is, of course, predicated upon the fact that employers will not change. If Dr. Downey's plan will do away with the necessity for justifying rates, then we may expect a simplification of statistical work. I do not believe, however, that Dr. Downey's plan will accomplish this end.