divide same into classes. From this conglomeration of figures they try to obtain adequate rates for each hazard and fail to do so. In consequence, statistics and experience tables of fire insurance companies are at a great variance.

As a contrast, how different is the method of making rates for life insurance. Life rates have for a basis reliable tables of mortality, and the classification of the hazard is easily arranged by taking the age of the applicant, as a class or group. The number of losses in each group to the number of risks of the same class is the measure which establishes the rate, and not, as in fire insurance, the amount of premiums received under each classification in comparison with the amount of losses sustained thereunder. In consequence, statistics and experience tables of life insurance companies are almost normal.

Mortality tables are made on this basis; that is, by comparison of the number of deaths under each class with the number of people living in the district under observation or in comparison with the number of people insured. Hence, the percentage of losses to number of living would be exactly the natural rate or basis rate, if lives were insured only for short periods, say for one year. And the computation of life insurance rates would be much simpler and less complicated if the actuary had to deal only with the death rate for each class, and if the class were not advanced one point each year, if he had not to take into account the expectation of life, the ultimate end, the death, which is the final loss. Therefore, if the actuary had to make his calculations from the death rate only, then the death rate per one thousand would correspond exactly with the rate to be charged for each one thousand dollars insurance. For instance, 10.01 being the death rate per one thousand living, at the age of 41 years, it follows that $10.01 will be the exact rate for $1,000, insurance for the class of the age of 41. This would be the natural rate or basis rate and it should pay the expected losses for that class under the principle of averages.

To this rate should be added a sufficiently large percentage to provide for commissions, expenses, taxes and dividends to stockholders. However, as it has been shown, for the life insurance actuary the death rate of each class is not sufficient information and therefore his calculations become more complicated, he must take into account the mean duration of life for each class, that is, the mean duration when the final loss will happen.

The making of life rates is so well understood that the argument needs no further comment. But what would be the result if the actuaries would eliminate tables of mortality, if they would try to construe rates for each class, that is for each year of the applicants on the same basis on which the fire insurance companies construe fire rates for the various classifications, that is on the comparison of amount of premiums received from each class to the proportion of loss sustained.

Life insurance rates would then be in a state of chaos more than fire rates, and life insurance would simply be impossible. Life companies make rates in accordance with the death rate for each class. The maximum amount of insurance to be carried on each risk that is, on each life, is a different problem and need not be considered in this treatise.

Now if the tables of mortality, or in other words, the number of losses to number of risks are the true foundation on which to base the rate, why not construe fire waste records on the same basis? In fact, the mortality tables used by the life insurance companies will answer the purpose for a fire waste record, if the companies will only get together and make the classifications and gather the necessary statistics. Under such a system any class or group of risks that shows 10.01 total losses out of every 100,000 risks, such class belongs to the same group to which the year 41 belongs in life insurance.

The natural or basis rate of any such class is $10.01 per $1,000 insurance, which rate must be loaded sufficiently to pay expenses. Or take a simpler example: If statistics prove that 50 shingle mills of a certain class burn out of every 1000 mills under observation, that is one out of twenty, then the proper basis rate for such a shingle mill is 5 p.c., which rate will pay the loss and must be loaded sufficiently to pay expenses. But what would be the result if premiums received were compared with amount of losses. The result certainly would be misleading as to the fire hazard.

The objection will be raised that life insurance losses are all total, while a large proportion of fire losses are only partial. This fact surely cannot be detrimental to the compiler. He will account for every partial loss by its proper fraction and the additions will make the final grand total for the statistics. In other words, a half loss, a quarter loss, a fifteen per cent. and a ten per cent. loss will add up to be one total loss.

This method will make the classification of fire hazards possible, whether same are total or partial. For instance, it is known that the loss on brick buildings is not as large as on contents. Consequently, the compiler of fire waste statistics would show in his account just as many fires for brick buildings as for their contents, but the fractions of losses for the buildings would be considerable smaller than for the contents, and it would follow that the addition of losses would put brick buildings in a more preferred class than their contents.

The mortality tables for fire risks—that is, the statistical fire loss records *for the basis rate*—should be compiled from risks *in which the fire originated*, they should not include the losses on risks damaged or destroyed on account of being exposures.

For the exposure hazard special tables should be prepared, which the fire actuary can adjust to a nicety, just as the mortality tables are adjusted by the life actuary, showing a finely arranged mathematical increase from hazard to hazard.

For the purpose of arriving at proper conclusions as to fire rates a further table of causes of fires from deficiencies of construction will probably be advisable.

Whether or not more tables than those mentioned should be arranged depends entirely on the desired extent of the classifications. They may be extended to include all the debits and credits for additional fire protection, or they may be simplified into fewer groups. In other words, fewer classifications means more tables of fire waste to measure the hazards and fewer tables means more classifications. It would lead this discussion too far to point out how the classification should be made.

The subject of classification is well understood at the present time by the makers of fire rates.

It has been fully shown in this discussion that the