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# BULLETIN OF THE U. S. BUREAU OF LABOR STATISTICS.

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## INDUSTRIAL ACCIDENT STATISTICS.

BY FREDERICK L. HOFFMAN.

### INTRODUCTION.

The industrial accident problem in the United States is one of increasing social and economic importance. The adoption of the principle of workmen's compensation by 24 States within the last few years foreshadows a time when such compensation for industrial accidents, and possibly industrial diseases, will become universal throughout the United States. It is also a foregone conclusion that the principle of compensation will be perfected in many important directions, in conformity with enlarged conceptions of social justice insisting upon the most prompt and adequate methods of relief. The elementary considerations of the problem are largely statistical, but unfortunately the statistical data required for a full understanding of the questions involved are wanting in completeness and comparability. In 1908 the writer made a first effort to bring together the general industrial accident data then available, including an estimate of the probable number of fatal and nonfatal injuries to wage earners, placed conservatively at 30,000 to 35,000 deaths per annum and at 2,000,000 casualties of all kinds.<sup>1</sup> The estimate was inclusive of casualties due to causes other than those arising out of the occupations of the injured; it was assumed at the time that about 50 per cent of such injuries were safely chargeable against the industries, or, in other words, were the direct result of the occupational risk. In view of the rapid development and broadening scope of the doctrine of workmen's compensation during the intervening period of years, it has seemed best for present purposes to limit the following discussion chiefly to industrial accidents, and this limitation explains an apparent material reduction in the estimate of the probable loss of life and of the serious nonfatal injuries to wage earners in American industries.

The number of salary and wage earners in the United States may be conservatively estimated for 1913 at 30,760,000 males and 7,200,000 females. This estimate is subject to correction on the basis of the

<sup>1</sup> Bulletin of the United States Bureau of Labor, No. 73, September, 1908.

census returns of 1910, which were not available when this estimate was made.<sup>1</sup> The probable approximate number of fatal industrial accidents among American wage earners, including both sexes, may be conservatively estimated at 25,000 for the year 1913, and the number of injuries involving a disability of more than four weeks, using the ratio of Austrian experience as shown by the table on page 147, at approximately 700,000. This estimate is arrived at by calculating separately the probable accident rates for the more important groups of occupations, of which the following may be considered typical and representative:

TABLE 1.—ESTIMATE OF FATAL INDUSTRIAL ACCIDENTS IN THE UNITED STATES IN 1913, BY INDUSTRY GROUPS.

[The fatality rates used in this estimate are approximations. They are slightly at variance with the exact rates for certain industries, particularly mining, for the year 1913. For metal mines in 1913 the fatality rate, according to the Bureau of Mines, was 3.54 per 1,000; for coal mines, 3.73; for quarries, 1.72. In the estimate it is assumed that for these industries in particular the approximate rates indicate more accurately the average risk for a period of years, it being considered that even the official rates fall short of absolute accuracy and completeness in the absence of a Federal law making the reporting of mine accidents compulsory upon all operators. The estimate was arrived at before Technical Paper 94 of the Bureau of Mines was published.]

Industry group.	Number of employees. <sup>1</sup>	Fatal industrial accidents. <sup>1</sup>	Rate per 1,000.
MALES.			
Metal mining.....	170,000	680	4.00
Coal mining.....	750,000	2,625	3.50
Fisheries.....	150,000	450	3.00
Navigation.....	150,000	450	3.00
Railroad employees.....	1,750,000	4,200	2.40
Electricians (light and power).....	68,000	153	2.25
Navy and Marine Corps.....	62,000	115	1.85
Quarrying.....	150,000	255	1.70
Lumber industry.....	531,000	797	1.50
Soldiers, United States Army.....	73,000	109	1.49
Building and construction.....	1,500,000	1,875	1.25
Draymen, teamsters, etc.....	686,000	686	1.00
Street railway employees.....	320,000	320	1.00
Watchmen, policemen, firemen.....	200,000	150	.75
Telephone and telegraph (including linemen).....	245,000	123	.50
Agricultural pursuits, including forestry and animal husbandry.....	12,000,000	4,200	.35
Manufacturing (general).....	7,277,000	1,819	.25
All other occupied males.....	4,678,000	3,508	.75
All occupied males.....	30,760,000	22,515	.73
All occupied females.....	7,200,000	540	.075

<sup>1</sup> Partly estimated.

Metal mining ranks as most hazardous, with a fatality rate of 4.0 per 1,000, and manufacturing industries in general rank lowest, with a rate of 0.25 per 1,000. All of the rates are for groups of occupations and not for specific employments. In coal mining, for illustration, the rate of 3.5 per 1,000 represents the accident hazard for the coal-mining industry as a whole, and not for the occupation of coal miner separately considered. The same observation applies to the other

<sup>1</sup> This report was made public under date of June 20, and made available during the month of August, 1914. The total number of persons aged 10 and over occupied in gainful occupations at the census of 1910 was returned as 38,167,336, of which 8,075,772 were females. Of the total at all ages, 1,990,225 were of ages 10 to 15, inclusive, the large majority of whom were engaged in nonhazardous occupations.

industries and occupational groups, all of which are subject to a widely varying individual occupational hazard, subsequently to be considered in detail as far as this is practicable at the present time.

The table is derived from the best sources available. At the present time there are no entirely complete and trustworthy industrial accident statistics for even a single important industry in the United States. The most reliable data are those for the iron and steel industry, mining, and railways. For most of the other groups the assumed industrial accident rates are relatively low, and in all probability the actual hazards for the groups are somewhat higher than is indicated by the table.

The lack of trustworthy industrial accident statistics in the United States is due to the absence of any uniform requirements in the various States as to reports of industrial accidents. Prior to the establishment of workmen's compensation systems no State received reports of all the accidents, or even of all the fatal accidents, in its industries. With the coming into force of workmen's compensation laws, with a strong motive for careful reporting, the methods of reporting are being gradually improved, but this applies only in a few of those States where such systems have been introduced, and even in such States there is as yet a regrettable lack of uniformity which stands in the way of comparison and combination of the statistics. Moreover, very few of the compensation States are yet securing information at all accurate in regard to the number of employees and the period during which they are at work, information which is absolutely essential in the computation of accident-frequency rates.

The extent to which the lack of uniformity in the definition of accidents which are reportable and tabulatable impairs the comparability of accident statistics may be seen by an examination of the distribution of a typical group of accidents according to the character or duration of disability. The Bureau of Labor Statistics found in the study of some 10,000 accidents in the iron and steel industry, involving disability of one day and over, that the disability terminated in 41.2 per cent in the first week, in 59.8 per cent in two weeks, in 77.7 per cent in four weeks, and in 93.1 per cent in 13 weeks. These periods are mentioned especially because under the compensation laws in force in many American and foreign States accidents involving a disability, in some States of less than one week, in others of less than two weeks, are ignored. In Austria those involving a disability of four weeks or less are not included in the accident insurance statistics, and in Germany those involving a disability of 13 weeks or less are not included.

As accident frequency rates have usually been computed in this country they have been upon the basis of the average number of men

employed, this average being obtained by no uniform method and oftentimes being little better than a guess. The figures representing number of men are, in American practice, further defective, as they take no account of the period during which the force was employed, and thus exposed to the risks of the employment. It is obvious that this factor is quite as important as that of the number of men. For an establishment working 365 days the employment of 1,000 men would mean 365,000 days, while in an establishment with the operating time limited, say, to 240 days in the year the employment of 1,000 men would mean exposure for only 240,000 days. It is obvious that in order to represent accurately the true hazard in two such establishments the accident rates must be computed with due regard to both number of men and period of employment. Of course, it is not possible to correct American figures at the present time so as to eliminate these defects, but it seems necessary to point out here the importance of an accurate knowledge of the number of men employed and the time at work and the somewhat limited value of accident rates when such accurate information is lacking.

Notwithstanding the lack of any thoroughly scientific study of the rate of accident frequency in different occupations in American industries, much valuable and suggestive information has been brought together during recent years, largely in connection with special investigations of commissions or committees appointed to consider the subject of workmen's compensation. Foremost among these investigations which are of permanent value are those covered by the reports of the New York Commission on Employers' Liability, 1910; the report of the Employers' Liability Commission of Ohio, 1911; the reports of the Iowa Employers' Liability Commission, 1912; the report of the Massachusetts Commission on Compensation for Industrial Accidents, 1911, and the report of the Massachusetts Industrial Accident Board for the year ending June 30, 1913; the report of the Employers' Liability Commission of the State of Illinois, and, finally, the report of the United States Employers' Liability and Workmen's Compensation Commission, published in two volumes in the year 1912. Among other important publications are the report of the Department of Commerce and Labor, prepared by the Commissioner of Labor, on Compensation for Injuries to Employees of the United States, published in February, 1913; a similar report, published in September, 1914, as Bulletin of the United States Bureau of Labor Statistics, No. 155; and a volume of opinions of the Solicitor for the Department of Commerce and Labor, dealing with workmen's compensation under the act of Congress granting to certain employees of the United States the right to receive from it compensation for injuries sustained in the course of their employment, approved May 30, 1908. Considerable information of value on the subject

of industrial accidents is contained in the first two annual reports of the Industrial Insurance Department of the State of Washington, for the years 1912 and 1913. Other official sources of information will be referred to in the discussion of the industrial accident hazard by industries and occupations.

Among important general works of reference mention may be made of the treatise on "Work Accidents and the Law," by Crystal Eastman, published in 1910 in connection with the Pittsburgh Survey; the volume on "Risks in Modern Industry," published by the American Academy of Political and Social Science in 1911, and, finally, the proceedings of the first and second annual meetings of the National Council for Industrial Safety, better known as the Cooperative Safety Congress.<sup>1</sup>

The medical aspects of the subject are well considered in Saunders's "Medical Hand Atlas of Diseases Caused by Accident," translated from the German by Pearce Bailey, M. D., published in 1900; Greer's "Industrial Diseases and Accidents," published in Bristol, 1909; Lawes's "Compensation for Industrial Diseases," published in 1909; Sir John Collie's treatise on "Malingering and Feigned Sickness," published in London, 1913; and Magruder's treatise on "Claims Arising from Results of Personal Injuries," published by the Spectator Co., New York, 1910.

All of these and many other sources of information are available for a scientific study of the industrial accident problem, but it is regrettable that as yet no thorough technical study has been made of industrial accidents with special reference to the causes of their occurrence or rate of frequency in particular occupations, the amount of resulting incapacity for work, and the most practical methods and means of prevention. All of the investigations which have been made thus far are somewhat general, but they are suggestive of the factors demanding consideration in a thoroughly technical study of the industrial accident problem of a particular industry, with a due regard to details. The most conclusive study which as yet has been made of the industrial accident problem in a particular industry is the report of the United States Bureau of Labor Statistics on accidents and accident prevention in the iron and steel industry, published as Volume IV of the "Senate Report on Conditions of Employment in the Iron and Steel Industry in the United States. Washington, 1913." This report admirably illustrates the general method of inquiry to be followed, but the investigation falls short of the required degree of completeness in that the acci-

<sup>1</sup> The following are some of the principal works in German: 1. Handbuch der Unfallmedizin, by Dr. C. Kaufmann, Stuttgart, 1907. 2. Lehrbuch der aezztlichen Sachverstaendigen Taetigkeit fuer die Unfall- und Invaliditaets-Versicherungs-Gesetzgebung, by Dr. L. Becker, Berlin, 1907. 3. Unfallverhuetung und Betriebsicherheit, Memorial of the Verband der Deutschen Berufsgenossenschaften, Berlin, 1910. 4. Jahresberichte der gewerblichen Berufsgenossenschaften ueber Unfallverhuetung fuer 1911, Volume VI, Berlin, 1913.

dents reported on were not considered in sufficient detail. This phase of the subject is partly brought out by the investigation of Miss Eastman on "Work Accidents and the Law," and the writer's analysis of nonfatal accidents in the coal-mining industry of Illinois. In other words, an investigation into the subject of industrial accidents, to be practically useful and conclusive, should include a large amount of descriptive material, in much the same manner as the facts regarding numerous industrial accidents are discussed from the legal point of view in the opinions of the Solicitor of the Department of Commerce and Labor dealing with workmen's compensation cases previously referred to.

The technical difficulties of a scientific study of the industrial accident problem are numerous and serious. Workmen's compensation legislation will necessarily lead to an increase in the *reported* number of accidents, particularly those of a trivial nature, involving a comparatively short incapacity for work. This has been the observed experience in foreign countries, and in 1908 a committee was appointed by the Home Office of the British Government "to inquire into the causes and circumstances of the increase in the number of reported accidents in certain classes of factories and workshops and other premises under the factory acts, and to report what additional precautional means are, in their opinion, necessary or desirable." This report,<sup>1</sup> including the evidence, which makes a volume of some 700 pages, constitutes one of the most useful contributions to the scientific study of the accident problem from a practical point of view. The report includes a preliminary survey of accident statistics, particularly those of the factory inspection department, and an extended consideration of the important question as to how far the increase of reported accidents represents a real increase of the risk or is due to an increase in reporting or to an expansion of the industries under consideration. As regards the causes tending to increase or decrease the accident risk, the committee considered the question of an increase in speed and pressure of work, the problem of fatigue in its particular relation to an increase of machinery, the operation of the workmen's compensation act, and finally, the important question of carelessness on the part of the workpeople themselves, with observations on the necessity of improvements in the guarding of machinery, the problem of casual, intermittent, and unskilled labor, the really serious problem of the employment of young and inexperienced persons, and also the subject of blood poisoning, particularly in its relation to minor injuries. The subject of the preparation of accident statistics was given separate consideration, with particular regard to the standard of reportability, the classifi-

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<sup>1</sup> Great Britain. Home Department. Accidents Committee. Report of the Departmental Committee on Accidents in Places under the Factory and Workshop Acts. London, 1911. (Cl. 5535.)

cation of accidents, and the number of persons employed. The lack of accurate information in regard to number of employees seriously hampered the committee in its investigation.

As the result of their deliberations and special investigations, the committee concluded "that a large proportion of the increase shown in the figures up to 1907 was apparent rather than real." They also thought that there had been a further increase in reporting since 1907, and therefore that the actual decrease of accidents in 1908 and 1909 was somewhat greater than shown by the figures. The committee further arrived at the important conclusion that "On the whole, in well-organized industries, in large industrial centers, it appears that all reportable accidents are now reported." In reply to the question as to how far the accident risk is affected by the state of trade, the committee pointed out that the reported accidents increased largely in 1907, when trade began to decline, and fell off in 1908, when trade was bad, but they had continued to fall in 1909, when trade recovered. They therefore concluded that—

Some increase of accident risk is to be expected in the course of a long period as the total volume of trade grows, and the area of risk is consequently enlarged. Apart from this gradual growth, there must also be an effect produced by any cyclical expansion or contraction of trade. It is impossible not to think that in times when trade is booming, when factories are working overtime, and when new and perhaps inexperienced hands are engaged, the tendency to accidents is increased. These tendencies, however, are masked in the statistics by other causes. There is, for instance, little doubt that the increase of reported accidents in 1907, when trade was slack, is due to the increase in reporting brought about by the workmen's compensation act of 1906, which came into force in the middle of 1907. Again, while growth of trade may increase the area of risk, this cause may be counteracted by improved precautions.

The foregoing observations are of special significance in view of the general acceptance of the doctrine of workmen's compensation by the several States, including at the present time approximately 60 per cent of the wage-earning population of the United States. The statistical frequency of fatal and nonfatal industrial accidents in the United States requires, therefore, to be considered with extreme care in view of the probable effect of workmen's compensation legislation in causing an increase in accident reporting. In any event, there can be no question but that workmen's compensation legislation tends to direct the attention of employers to the occurrence of accidents, and aside from suggesting methods and means for their prevention, tends to bring about improved recording and reporting of the facts, and their subsequent utilization for scientific tabulation and analysis. It may not be out of place to quote in this connection the final conclusion of the departmental committee previously referred

to, to the effect that "The committee conclude that the workmen's compensation act [of 1906] has reduced the accident risk by directing the attention of employers to the occurrence of accidents and the importance of preventing them, but has led to some increase in the number of reported accidents for the reasons given above."

### GENERAL ACCIDENT PROBLEM IN THE UNITED STATES.

The approximate number of accidental deaths in the United States may be conservatively placed at 82,520 per annum. For the United States registration area the mortality from accidents of all kinds was equivalent to a rate of 84.9 per 100,000 of population during the period 1901 to 1905, against 86.0 during the first five years ending with 1910, 84.6 during 1911, and 82.4 during 1912. For certain States, however, the rates<sup>1</sup> are much higher, as, for illustration, in 1911, in the order of their importance, 126.9 for Montana, 110.5 for California, 106.2 for Pennsylvania, and 102.2 for Colorado. These, it will be observed, are all mining States, and, as previously pointed out, the highest rate of accident frequency occurs in metal mining, estimated at 4.0 per 1,000 employed; and in coal mining 3.5 per 1,000. Excessive general accident rates<sup>1</sup> also are met with in typical mining centers, the rates, for illustration, for Birmingham, Ala., having been 151.9; for Scranton, Pa., 177.3; and for Butte, Mont., 138. These rates are no doubt in part affected by the admission to local hospitals of injury cases from near-by mining regions.

The general mortality from accidents in the registration area, by causes and according to sex, for the period 1910 to 1912, is given in Table 8. In this table the accident rate per 100,000 of total population has been estimated for each specific cause, according to sex, some of the facts disclosed by this analysis being as follows: For males the accident rate due to mining was 7.44 per 100,000 of population. The rate for quarries, for males, was 0.37. For machinery the rate for males was 4.29 and for females 0.11. For railway accidents the rate for males was 25.03 and for females 1.72. Finally, mention may be made of the casualties caused by electricity, for which the respective rates were 1.70 for males and 0.05 for females. For all causes combined the male accident rate was 125.90, against a rate of 39.14 for females. The estimated accident mortality of the United States for 1914 may be conservatively placed at 63,880 deaths of males and 18,640 deaths of females, or 82,520 deaths for the two sexes combined.

The foregoing analysis brings forcibly to public attention the excess in the mortality of males from casualties of all kinds, obviously more or less the immediate results of industrial activity. At the present

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<sup>1</sup> These accident rates include homicides, as the Census Office excludes only suicides in calculating the death rate from violence, for subdivisions of the registration area.

time the accidents due to industry are not separated in the United States Census statistics from those not directly connected with, or resulting from, the employment. It would not seem an impractical suggestion that in the future such a separation should be attempted, or that in any event the occupational mortality data published for the two years 1908 and 1909, and for the principal industries, should be continued and brought completely down to date.<sup>1</sup> As emphasizing the utility of general accident statistics, the brief table following is included in the present discussion to show the prevailing fatality rates by four divisional periods of life, of which the ages 15 to 64 may be considered typical of the industrial activity of wage earners in the United States.

TABLE 2.—GENERAL MORTALITY FROM ACCIDENTS DUE TO ALL CAUSES, UNITED STATES REGISTRATION AREA, 1910 TO 1912.

[Compiled from "Mortality Statistics," 1910 to 1912, Bureau of the Census.]

Age group.	Males.			Females.		
	Population. <sup>1</sup>	Deaths.	Rate per 100,000 population.	Population. <sup>1</sup>	Deaths.	Rate per 100,000 population.
Under 15 years.....	28,159,851	18,673	66.3	27,607,387	10,904	39.5
15 to 44 years.....	43,754,359	57,212	130.8	41,182,494	6,995	17.0
45 to 64 years.....	13,532,248	24,421	180.5	11,844,270	4,660	39.3
65 years and over.....	3,751,672	11,197	298.5	3,714,725	10,400	280.0
Age unknown.....		796			54	
Total.....	89,198,130	112,299	125.9	84,348,876	33,013	39.1

<sup>1</sup> The populations here given are the sums of the populations in the three years 1910, 1911, and 1912, in order that annual death rates may be computed for deaths occurring in the 3-year period.

The important fact is disclosed by this table that while the male accident rate is higher at all ages than the corresponding rate for females, the relative differences vary considerably, largely, of course, in consequence of the more general and hazardous industrial activity of male wage earners, as contrasted with women workers, who are employed usually in nonhazardous industries. At ages under 15, when the occupational risk is relatively slight, the ratio of the female accident rate to the male rate, taken as 100, was 59.6, decreasing to 13 at ages 15 to 44, and to 21.8 at ages 45 to 64. At ages 65 and over the relative rate for females was 93.8, as against the male rate taken as 100. The details of this analysis, by five-year periods of life and according to sex, and including the total population considered for the three-year period ending with 1912, are given in Table 9.

In continuation of this discussion it has seemed advisable to include a brief analysis of the general mortality from accidents in the United States registration area according to three of the more important

<sup>1</sup> The data for 1908 and 1909 are discussed on pages 20 to 31.

causes, or, specifically, railways, falls, and drownings. The details for railway accidents, by four divisional periods of life, are given in the table below:

TABLE 3.—FATAL ACCIDENTS DUE TO RAILWAYS, UNITED STATES REGISTRATION AREA, 1910 TO 1912.

[Compiled from "Mortality Statistics," 1910 to 1912, Bureau of the Census.]

Age group.	Males.		Females.		Relative female rate, taking the male rate as 100.
	Fatal accidents.	Rate per 100,000 population.	Fatal accidents.	Rate per 100,000 population.	
Under 15 years.....	937	3.3	256	0.9	27.3
15 to 44 years.....	14,585	33.3	606	1.5	4.5
45 to 64 years.....	5,169	37.8	352	3.0	7.9
65 years and over.....	1,362	36.3	236	6.4	17.6
Age unknown.....	335	.....	4	.....	.....
Total.....	22,328	25.0	1,454	1.7	6.8

The foregoing table is self-explanatory. It is evident that a large proportion of the male cases of fatal accidents due to railways must be the immediate result of employment in railway transportation.<sup>1</sup> The rate for all ages is shown to have been 25 for males, against 1.7 for females, or, in other words, to every 100 railway accidents to males the corresponding number of railway accidents to females is only 6.8.

The accident mortality due to falls, according to sex, and for four divisional periods of life, is given below:

TABLE 4.—FATAL ACCIDENTS DUE TO FALLS, UNITED STATES REGISTRATION AREA, 1910 TO 1912.

[Compiled from "Mortality Statistics," 1910 to 1912, Bureau of the Census.]

Age group.	Males.		Females.		Relative female rate, taking the male rate as 100.
	Fatal accidents.	Rate per 100,000 population.	Fatal accidents.	Rate per 100,000 population.	
Under 15 years.....	1,834	6.5	938	3.4	52.3
15 to 44 years.....	5,896	13.5	784	1.9	14.1
45 to 64 years.....	4,614	34.1	1,241	10.5	30.8
65 years and over.....	4,361	116.2	6,837	184.1	158.4
Age unknown.....	24	.....	3	.....	.....
Total.....	16,729	18.8	9,803	11.6	61.7

This table also is self-explanatory, but it may be pointed out that the rapid rise with increasing age, and for both sexes, in the accident

<sup>1</sup> The number of such deaths of railroad employees reported to the Interstate Commerce Commission in the fiscal year ending June 30, 1913, was 3,354, of which 2,939 were of steam railway employees on duty, 362 steam railway employees not on duty, 50 electric railway employees on duty, and 3 electric railway employees not on duty. See 27th Annual Report of the Interstate Commerce Commission, December 15, 1913, p. 53.

rate for falls, is in marked contrast to the almost stationary condition of the rate for railway accidents at ages 15 and over. Another very marked feature of the fatality rate due to falls is that for all ages the male rate is 18.8, and the female rate 11.6, or, in other words, to every 100 deaths of males from falls the relative number for females was 61.7, or decidedly higher than the corresponding ratio of 6.8 of female to male accidents resulting from railway injuries.

Accidents due to drowning follow quite a different course from accidents due to railways and falls. The facts are set forth in the table following:

TABLE 5.—FATAL ACCIDENTS DUE TO DROWNING, UNITED STATES REGISTRATION AREA, 1910 TO 1912.

[Compiled from "Mortality Statistics," 1910 to 1912, Bureau of the Census.]

Age group.	Males.		Females.		Relative female rate, taking the male rate as 100.
	Fatal accidents.	Rate per 100,000 population.	Fatal accidents.	Rate per 100,000 population.	
Under 15 years.....	3,329	11.9	675	2.4	20.2
15 to 44 years.....	7,895	18.0	686	1.7	9.4
45 to 64 years.....	2,227	16.5	138	1.2	7.3
65 years and over.....	472	12.6	61	1.6	12.7
Age unknown.....	205	.....	14	.....	.....
Total.....	14,128	15.8	1,574	1.9	12.0

For males the general accident rate due to drowning was 15.8, against a female rate of only 1.9. In other words, to every 100 drowning accidents to males the corresponding number of drowning accidents to females was only 12. To a considerable extent this excess in the drowning accident rate of males is to be attributed to the occupational exposure on the part of men employed in navigation and the fisheries, but also probably to greater carelessness or indifference in connection with swimming, skating, and other sporting activities.<sup>1</sup>

All other or nonspecified accidents combined are given in the table following, according to four divisional periods of life. The rates throughout are higher for males, and for all ages the rate was 66.3, against 23.9 for females. The differences are most pronounced at ages under 15 and over 65. The relative accident frequency from causes other than the three specified previously was, to every 100 deaths of males, 36 deaths of females. The details of fatal accidents due to railroads, falls, drowning, and other causes are given in Table 10.

<sup>1</sup> There are no complete and trustworthy statistics for the United States of the loss of life in navigation and the fisheries.

TABLE 6.—FATAL ACCIDENTS DUE TO CAUSES OTHER THAN RAILWAYS, FALLS, AND DROWNING, UNITED STATES REGISTRATION AREA, 1910 TO 1912.

[Compiled from "Mortality Statistics," 1910 to 1912, Bureau of the Census.]

Age group.	Males.		Females.		Relative female rate, taking the male rate as 100.
	Fatal accidents.	Rate per 100,000 population.	Fatal accidents.	Rate per 100,000 population.	
Under 15 years.....	12,573	44.6	9,035	32.7	73.3
15 to 44 years.....	28,836	65.9	4,919	11.9	18.1
45 to 64 years.....	12,471	92.2	2,929	24.7	26.8
65 years and over.....	5,002	133.3	3,266	87.9	65.9
Age unknown.....	232	.....	33	.....	.....
Total.....	59,114	66.3	20,182	23.9	36.0

Additional to the foregoing information on the general subject of accident frequency in the United States, the following table is included as representative of industrial insurance experience for the period 1904 to 1913. The table represents a total accident mortality of 33,790 males and 11,726 females. The table shows the age distribution of the deaths in the Prudential Insurance Co.'s experience by specified causes of accident and with distinction of sex. For illustration, there were 8,037 deaths of males from railroad accidents; and of this number 4,746, or 59 per cent of the total, were of ages 15 to 44. There were 966 deaths of females from railroad accidents; and of this total 296, or 30.6 per cent, were of ages 15 to 44. The details for accidents due to railways, mines and quarries, electricity, and machinery, by sex and divisional periods of life, are given below:

TABLE 7.—MORTALITY FROM ACCIDENTS, BY PRINCIPAL CAUSES, 1904 TO 1913.

[Industrial experience, the Prudential Insurance Co. of America.]

Cause of accident.	Under 15 years.		15 to 44 years.		45 years and over.		Total.
	Number.	Per cent.	Number.	Per cent.	Number.	Per cent.	
<b>MALES.</b>							
Railway accidents.....	1,010	12.6	4,746	59.0	2,281	28.4	8,037
Mines and quarries.....	53	4.8	753	67.4	311	27.8	1,117
Electricity.....	58	10.8	443	82.2	38	7.0	539
Machinery.....	29	6.6	301	68.4	110	25.0	440
All other accidents.....	6,432	27.2	9,718	41.1	7,507	31.7	23,657
Total.....	7,582	22.5	15,961	47.2	10,247	30.3	33,790
<b>FEMALES.</b>							
Railway accidents.....	290	29.0	296	30.6	390	40.4	966
Mines and quarries.....	.....	.....	.....	.....	.....	.....	.....
Electricity.....	8	50.0	6	37.5	2	12.5	16
Machinery.....	.....	.....	4	66.7	2	33.3	6
All other accidents.....	3,313	30.9	2,698	25.1	4,727	44.0	10,738
Total.....	3,601	30.7	3,004	25.6	5,121	43.7	11,726

The above-mentioned groups of accidents are typical of the more dangerous industrial pursuits, and the facts available fully confirm the previous conclusion that a large proportion of such accidents are directly attributable to occupational causes or conditions. The details of this analysis, by specific causes, are given in Table 11.

The foregoing statistical data and observations have reference chiefly to the general accident problem in its immediate relation to the more practical question of industrial accidents and the related economic problem of adequate compensation for injuries or diseases resulting from occupational activity. In the absence of trustworthy and complete statistics for American industries this brief survey will serve the purpose of emphasizing the magnitude of the subject as summed up in the statement that there are approximately 82,520 deaths per annum in the United States from accidents due to all causes, and that of this large number of deaths some 25,000 may safely be assumed to represent the loss of life directly due to occupational activity, chiefly in connection with the carrying on of dangerous industries, all of which are typical of the economic necessities of modern life. Considered from this point of view the accident problem assumes serious and far-reaching social and economic importance in that on the one hand the loss of life constitutes a serious curtailment of the nation's productive efficiency, while on the other a heavy and costly economic burden results from the required support of those who, deprived of the earnings of the breadwinner, become a public charge. Out of these broad social and economic considerations has developed the modern doctrine of workmen's compensation as a principle of social justice, and collateral thereto has been evolved a still more recent and nation-wide conception of the doctrine of community, corporate, and individual responsibility for the prevention of industrial and other accidents as a necessary prerequisite for the highest attainable degree of common good.

TABLE 8.—GENERAL MORTALITY FROM ACCIDENTS FROM EACH CAUSE, UNITED STATES REGISTRATION AREA, 1910 TO 1912.

[Compiled from "Mortality Statistics," 1910 to 1912, Bureau of the Census.]

Cause of accident.	Males.				Females.			
	Number of deaths.	Accident rate per 100,000 population.	Per cent distribution.	Estimate for 1914.	Number of deaths.	Accident rate per 100,000 population.	Per cent distribution.	Estimate for 1914.
Poisoning by food.....	646	0.72	0.58	365	565	0.67	1.71	319
Other acute poisonings.....	2,286	2.56	2.04	1,299	1,688	2.00	5.11	952
Conflagration.....	1,523	1.71	1.36	868	992	1.18	3.00	562
Burns.....	5,773	6.47	5.14	3,283	7,815	9.27	23.68	4,415
Absorption of deleterious gases.....	4,066	4.56	3.62	2,314	1,834	2.17	5.56	1,033
Drowning.....	14,128	15.84	12.58	8,037	1,574	1.87	4.77	891
Firearms.....	3,412	3.83	3.04	1,943	445	.53	1.35	252
Cutting or piercing instruments.....	268	.30	.24	152	49	.06	.15	29
Falls.....	16,729	18.76	14.90	9,519	9,803	11.61	29.70	5,529
Mines.....	6,639	7.44	5.91	3,775	23	.03	.07	14
Quarries.....	331	.37	.29	188	.....	.....	.....	.....
Machines.....	3,826	4.29	3.41	2,177	91	.11	.28	52
Railroad.....	22,328	25.03	19.88	12,700	1,454	1.72	4.40	819
Street car.....	4,684	5.25	4.17	2,664	989	1.16	2.97	552
Automobile.....	3,177	3.56	2.83	1,806	852	1.01	2.58	481
Other vehicles.....	5,533	6.20	4.93	3,146	865	1.03	2.62	491
Landslide, other crushing.....	1,436	1.61	1.28	817	61	.07	.18	33
Animals.....	1,442	1.62	1.28	822	123	.15	.37	71
Starvation.....	120	.14	.11	71	62	.07	.19	33
Cold.....	656	.74	.58	375	102	.12	.31	57
Heat.....	3,205	3.59	2.85	1,822	1,565	1.86	4.74	886
Lightning.....	543	.61	.48	310	96	.11	.29	52
Electricity.....	1,517	1.70	1.35	863	41	.05	.12	24
Fractures.....	896	1.01	.80	512	555	.66	1.68	314
Other accidents.....	7,135	7.99	6.35	4,052	1,378	1.63	4.17	779
Total estimate.....	112,299	125.90	100.00	63,880	33,013	39.14	100.00	18,640

TABLE 9.—GENERAL MORTALITY FROM ACCIDENTS, ALL CAUSES, BY AGE GROUPS, UNITED STATES REGISTRATION AREA, 1910 TO 1912.

[Compiled from "Mortality Statistics," 1910 to 1912, Bureau of the Census.]

Age group.	Males.			Females.		
	Population. <sup>1</sup>	Deaths.	Rate per 100,000 population.	Population. <sup>1</sup>	Deaths.	Rate per 100,000 population.
Under 5 years.....	10,164,128	9,540	93.9	9,933,768	7,563	76.2
5 to 9 years.....	9,302,473	4,764	51.2	9,150,166	2,351	25.7
10 to 14 years.....	8,693,250	4,369	50.3	8,523,453	985	11.6
15 to 19 years.....	8,552,317	7,080	82.8	8,581,654	1,256	14.6
20 to 24 years.....	8,652,218	10,810	124.9	8,469,470	1,340	15.8
25 to 29 years.....	8,018,020	11,055	137.9	7,445,476	1,155	15.3
30 to 34 years.....	6,907,504	9,633	139.5	6,272,183	1,035	16.5
35 to 39 years.....	6,360,718	9,927	156.1	5,730,662	1,166	20.3
40 to 44 years.....	5,263,582	8,707	163.4	4,683,049	1,063	22.7
45 to 49 years.....	4,493,802	7,856	174.8	3,954,276	1,053	26.6
50 to 54 years.....	3,986,265	6,997	175.5	3,388,295	1,185	35.0
55 to 59 years.....	2,811,524	5,155	183.3	2,456,239	1,123	45.7
60 to 64 years.....	2,240,657	4,413	197.0	2,045,460	1,299	63.5
65 to 69 years.....	1,632,326	3,471	212.6	1,542,741	1,555	100.8
70 to 74 years.....	1,060,566	2,823	266.2	1,044,239	1,905	182.3
75 to 79 years.....	626,170	2,078	331.8	635,990	2,295	360.9
80 to 84 years.....	293,736	1,534	527.5	317,996	2,200	691.8
85 to 89 years.....	106,146	882	830.9	125,679	1,517	1,230.9
90 to 94 years.....	27,650	324	1,171.8	35,427	710	2,004.1
95 to 99 years.....	5,352	75	1,401.3	8,435	150	1,778.3
100 years and over.....	2,676	10	373.7	4,218	38	900.8
Age unknown <sup>2</sup> .....	.....	796	.....	.....	54	.....
All ages.....	89,108,130	112,299	125.9	84,348,876	33,013	39.1

<sup>1</sup> The populations here given are the sums of the population in the three years 1910, 1911, and 1912, in order that annual death rates may be computed for deaths occurring in the 3-year period.

<sup>2</sup> The population of ages not specified was distributed on the basis of the percentage distribution in 1910 of the population of specified ages.



TABLE 11.—MORTALITY FROM ACCIDENTS, BY CAUSE OF ACCIDENT, 1904 TO 1913.

[Industrial experience, the Prudential Insurance Co. of America.]

Cause of accident.	Under 15 years.		15 to 44 years.		45 years and over.		Total.
	Number.	Per cent.	Number.	Per cent.	Number.	Per cent.	
<b>MALES.</b>							
Railroad.....	1,010	12.6	4,746	59.0	2,281	28.4	8,037
Drowning.....	1,762	34.8	2,459	48.5	848	16.7	5,069
Falls.....	584	13.9	1,642	39.0	1,985	47.1	4,211
Miscellaneous.....	616	20.0	1,473	47.7	995	32.3	3,084
Vehicles, horses, etc.....	804	30.8	1,057	40.5	749	28.7	2,610
Burns, scalds, etc.....	1,533	67.3	451	19.8	295	12.9	2,279
Fractures.....	172	9.2	749	39.9	957	50.9	1,878
Asphyxiation, gas, etc.....	176	14.0	517	41.1	566	44.9	1,259
Gunshot.....	330	31.0	649	61.0	85	8.0	1,064
Mining, quarrying, etc.....	53	4.8	753	67.4	311	27.8	1,117
Heat, sunstroke, etc.....	83	8.6	290	30.1	591	61.3	964
Poison.....	335	37.2	296	32.9	269	29.9	900
Electricity.....	58	10.8	443	32.2	38	7.0	539
Machinery.....	29	6.6	301	68.4	110	25.0	440
Cold or exposure.....	4	2.5	47	29.4	109	68.1	160
Cuts or stabs.....	20	18.3	46	42.3	43	39.4	109
Lightning.....	13	18.6	42	60.0	15	21.4	70
Total.....	7,582	22.5	15,961	47.2	10,247	30.3	33,790
<b>FEMALES.</b>							
Railroad.....	280	29.0	296	30.6	390	40.4	966
Drowning.....	280	36.3	363	47.0	129	16.7	772
Falls.....	281	16.1	315	18.0	1,151	65.9	1,747
Miscellaneous.....	226	27.3	235	28.4	366	44.3	827
Vehicles, horses, etc.....	212	45.3	118	25.2	138	29.5	468
Burns, scalds, etc.....	1,737	51.4	807	23.9	833	24.7	3,377
Fractures.....	81	6.6	66	5.4	1,086	88.0	1,233
Asphyxiation, gas, etc.....	104	17.5	220	37.0	271	45.5	595
Gunshot.....	58	39.2	78	52.7	12	8.1	148
Heat, sunstroke, etc.....	66	9.3	100	14.1	542	76.6	708
Poison.....	248	32.1	371	48.0	154	19.9	773
Electricity.....	8	50.0	6	37.5	2	12.5	16
Machinery.....	.....	.....	4	66.7	2	33.3	6
Cold or exposure.....	2	6.5	7	22.6	22	70.9	31
Cuts or stabs.....	7	21.2	8	24.2	18	54.6	33
Lightning.....	11	42.3	10	38.5	5	19.2	26
Total.....	3,601	30.7	3,004	25.6	5,121	43.7	11,726

## OCCUPATIONAL ACCIDENT MORTALITY STATISTICS OF THE UNITED STATES CENSUS.

The Division of Vital Statistics of the United States Census has published the mortality statistics of occupations, by age, sex, and principal causes of death, for the two years 1908 and 1909, in a preliminary form, in anticipation of more extended treatment on the basis of the results of the census for 1910. It was pointed out in the discussion for the year 1908 that—

It seemed unwise to amplify the discussion of the data, which should be regarded as merely provisional in character until such time as detailed and specific figures can be presented after the population returns for 1910 are available and after a more satisfactory classification of occupations has been prepared. The cautions given relative to the use of ratios based upon deaths alone should be carefully heeded in all references to the occupational data in the present report.

The analysis for 1908 included a total of 196,207 deaths in which the occupation was returned in the death certificate, out of a total of 262,859 male deaths, ages 10 and over, or 74.6 per cent. The number of female deaths subjected to analysis by occupation was 26,205, out of a total number of deaths of 223,028, or 11.7 per cent. The highest proportion of occupational deaths, by divisional periods of life, for males, was obtained for the age period 25 to 34, or 86.5 per cent of the total; and for females at ages 20 to 24, for which 28 per cent of the deaths were returned with the occupation stated. In explaining the difficulties of an analysis of this kind, limited to deaths only, it is pointed out in the report for 1908 (published in 1910) that—

The relation of occupation to mortality is one of the most important and also one of the most difficult subjects of vital statistics. Difficulties are met with even when the investigation is confined to the aggregate death rates of the various occupations, and are even more in evidence when the effects of individual causes of death are to be considered. After a given mass of statistical returns of deaths is subdivided with reference to individual occupations, and the deaths by occupations again subdivided with reference to causes of death, it is evident that, except for the most common occupations and the most common causes of death, the statistical groups are likely to become so much reduced in size as to be unreliable for the computation of rates.

An inherent difficulty in the compilation of reliable statistics of the mortality of occupations is that the data are derived from two different and largely independent sources. The returns of deaths received from registration States and cities are copies of the original certificates of death, upon which the statements in regard to the occupations of decedents may be made by the relatives or friends, by the undertakers, or by the attending physicians. The occupations of the living population are stated by the census enumerators in more or less strict compliance with detailed instructions prepared for their use. It is evident that the accuracy of statement may vary greatly in the two sets of returns, notwithstanding which fact the only method of obtaining the death rates and derived "mortality figures" of occupations is by the direct comparison of the mortality and population returns.

It is further pointed out in the report that one of the two essential factors being unobtainable for the correct calculation of mortality rates by occupations—that is, the numbers employed—

If, then, it is impossible to compute accurate rates of occupational mortality on the basis of the data obtainable, it may be asked whether it is worth while to present the figures contained in the present report. The answer is that such figures of relative mortality, although based solely upon the returns of deaths, afford much information of practical sanitary value, which may be safely used as a guide to the prevention of excessive ratios of mortality in certain occupations from various diseases, e. g., tuberculosis, or from accidents. They are frequently suggestive and point the way to more conclusive investigations.

Moreover, at the present moment, when a concerted effort is to be made by sanitary and statistical authorities and by the organized medical profession to improve the quality of registration returns of deaths with respect to the statement of the occupations of decedents, it is desirable to have a compilation for a recent year prior to the attempt at improvement, to serve as a basis for measurement of the results obtained.

The same difficulty is inherent in the occupational accident mortality statistics of the Prudential Insurance Co. of America, elsewhere discussed, but for the same reasons as here pointed out the data there considered seem to justify publication on the ground that, in the absence of more trustworthy statistics, they provide at least an approximate indication of the accident factor as experienced in the principal industries of the United States at the present time.

These observations have reference only to the inherent limitations in the published information of deaths, by occupations, without reference to the corresponding numbers employed. The conclusions of the Division of Vital Statistics of the Census Office, of 1910, with reference to the report of 1908, are, therefore, still applicable to the present situation, and they are included as a useful contribution to the more scientific study of occupational classification and analysis:

What is needed, both for the mortality statistics and for the population statistics, is a list containing all the more important individual occupations, and with an exact statement of the terms included under each of its titles. Such a list is being prepared by the Bureau of the Census, based on the terms employed by the census enumerators in 1900 in reporting the occupations of the general population. For the purpose of securing a satisfactory adjustment of this list to the requirements of mortality statistics a recent compilation of the occupations reported on the certificates of death is necessary. Such a compilation will, moreover, furnish a means of determining the comparative value for mortality statistics of the old and the new classifications of occupations.<sup>1</sup>

It would be of considerable practical value if a determined effort were made to bring about a strictly scientific classification of industries and employments, with a due regard possibly to variations in local conditions, since frequently the same terms are not used, as, for illustration, in mining and lumbering, in different sections of the country.

The risk of error is, of course, much less in the statistical analysis of deaths by occupations only than in efforts which combine the numbers employed and the deaths assumed to have occurred on the basis of an identical classification which, unfortunately, is, as a rule, not the

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<sup>1</sup> See in this connection Bulletin No. 61 of the Bureau of Forestry, Washington, 1905, for terms used in forestry and logging, and report on the Mining Methods and Appliances Used in the Anthracite Coal Fields, Volume II, Geological Survey of Pennsylvania, 1883, also the descriptive report on Conditions of Employment in the Iron and Steel Industry, Volume III, Washington, 1913.

case. In the tables following the returns for the two years are combined and the facts are given in identically the same manner as subsequently for the experience data of the Prudential Insurance Co. of America, on the proportionate basis—that is, the mortality from accidents is shown in the form of a percentage of the deaths from all causes, by separate industries or occupations and divisional periods of life. The data, as pointed out, are of limited utility, but they are the only information available for the country at large at the present time aside from the statistics of the insurance company previously referred to.

The term “accidents” in the census report excludes suicides but includes homicides, which, however, are numerically so infrequent that their inclusion does not materially affect the calculation of the percentages. The information is given in two groups—first, deaths due to poisonous gases and other accidental poisonings; and second, all other accidents and injuries. To facilitate the scientific study of the subject the information is given in the tables following in corresponding detail, but the two groups are also combined so as to facilitate comparison with the accident mortality statistics, by occupations, of the Prudential Insurance Co., which experience, it is hardly necessary to point out, is practically derived from the same area, except that it includes also the principal Canadian provinces.

TABLE 12.—ACCIDENT MORTALITY, UNITED STATES REGISTRATION AREA, BY OCCUPATIONS AND AGE GROUPS, 1908 AND 1909.<sup>1</sup>

[Compiled from data in “Mortality Statistics,” 1908 and 1909, Bureau of the Census.]

Age group.	Occupied males.									
	Number of deaths from—					Per cent of deaths due to accidents and injuries.	Number of deaths from—			
	All causes.	Poisonous gases and other accidental poisonings.	Other accidents and injuries.	Total accidents and injuries.	All causes.		Poisonous gases and other accidental poisonings.	Other accidents and injuries.	Total accidents and injuries.	Per cent of deaths due to accidents and injuries.
	All occupations.					Clergymen.				
10 to 14 years.....	391	5	171	176	45.0	.....	.....	.....	.....	.....
15 to 19 years.....	10,789	101	2,752	2,853	26.4	.....	.....	1	1	33.3
20 to 24 years.....	24,196	234	4,985	5,219	21.6	10	.....	2	2	20.0
25 to 34 years.....	56,001	561	9,472	10,033	17.9	111	1	3	4	3.6
35 to 44 years.....	63,093	594	8,261	8,855	14.0	213	.....	8	8	3.8
45 to 54 years.....	68,903	540	6,444	6,984	10.1	342	4	10	14	4.1
55 to 64 years.....	69,254	348	4,000	4,348	6.3	494	2	13	15	3.0
65 years and over.....	113,469	294	3,753	4,047	3.6	1,194	1	25	26	2.2
Age unknown.....	618	17	220	237	38.3	3	.....	.....	.....	.....
Total.....	406,714	2,694	40,058	42,752	10.5	2,370	8	62	70	3.0

<sup>1</sup> A number of nonindustrial occupations have been included in Table 12 and in other tables for the purpose of convenience in comparing the accident liability in dangerous and nonhazardous employments.

TABLE 12.—ACCIDENT MORTALITY, UNITED STATES REGISTRATION AREA, BY OCCUPATIONS AND AGE GROUPS, 1908 AND 1909—Continued.

Age group.	Occupied males.										
	Number of deaths from—					Per cent of deaths due to accidents and injuries.	Number of deaths from—				Per cent of deaths due to accidents and injuries.
	All causes.	Poisonous gases and other accidental poisonings.	Other accidents and injuries.	Total accidents and injuries.	All causes.		Poisonous gases and other accidental poisonings.	Other accidents and injuries.	Total accidents and injuries.		
	Engineers and surveyors.					Lawyers.					
10 to 14 years.....											
15 to 19 years.....	47	1	17	18	38.3						
20 to 24 years.....	210	2	46	48	22.9	23		2	2	8.7	
25 to 34 years.....	415	4	85	89	21.4	207	2	16	18	8.7	
35 to 44 years.....	300	5	50	55	18.3	280	1	11	12	4.3	
45 to 54 years.....	257	4	24	28	10.9	458	2	19	21	4.6	
55 to 64 years.....	180	1	11	12	6.7	562	4	15	19	3.4	
65 years and over....	230	1	5	6	2.6	1,004	3	31	34	3.4	
Age unknown.....	2	1	1	2	100.0	3					
Total.....	1,641	19	239	258	15.7	2,537	12	94	106	4.2	
	Physicians and surgeons.					School-teachers.					
10 to 14 years.....											
15 to 19 years.....	2					21		3	3	14.3	
20 to 24 years.....	23	3	2	5	21.7	86		9	9	10.5	
25 to 34 years.....	207	8	14	22	10.6	163	1	10	11	6.7	
35 to 44 years.....	382	6	18	24	6.3	137		6	6	4.4	
45 to 54 years.....	486	6	21	27	5.6	161	1	1	2	1.2	
55 to 64 years.....	589	10	14	24	4.1	208		4	4	1.9	
65 years and over....	1,104	5	25	30	2.7	348	1	7	8	2.3	
Age unknown.....	1										
Total.....	2,794	38	94	132	4.7	1,124	3	40	43	3.8	
	Accountants, bookkeepers, clerks, and copyists.					Bankers, brokers, and officials of companies.					
10 to 14 years.....	15		8	8	53.3						
15 to 19 years.....	1,338	10	222	232	17.3	6		4	4	66.7	
20 to 24 years.....	2,458	22	158	180	7.3	41	1	7	8	19.5	
25 to 34 years.....	4,201	23	202	225	5.4	164	2	14	16	9.8	
35 to 44 years.....	3,056	24	123	147	4.8	283	4	15	19	6.7	
45 to 54 years.....	2,507	21	91	112	4.5	404	1	17	18	4.5	
55 to 64 years.....	2,254	9	68	77	3.4	524	1	16	17	3.2	
65 years and over....	1,998	10	61	71	3.6	776	3	19	22	2.8	
Age unknown.....	7					1					
Total.....	17,834	119	933	1,052	5.9	2,199	12	92	104	4.7	
	Commercial travelers.					Merchants and dealers.					
10 to 14 years.....						1		1	1	100.0	
15 to 19 years.....	3					67		11	11	16.4	
20 to 24 years.....	41	2	5	7	17.1	304	2	28	30	9.9	
25 to 34 years.....	143	3	12	15	10.5	1,464	11	84	95	6.5	
35 to 44 years.....	185	6	18	24	13.0	2,459	21	111	132	5.4	
45 to 54 years.....	256	3	22	25	9.8	3,521	24	152	176	5.0	
55 to 64 years.....	230	3	2	5	2.2	3,918	14	94	108	2.8	
65 years and over....	163	1	6	7	4.3	5,407	15	126	141	2.6	
Age unknown.....	3					5	1		1	20.0	
Total.....	1,024	18	65	83	8.1	17,146	88	607	695	4.1	

TABLE 12.—ACCIDENT MORTALITY, UNITED STATES REGISTRATION AREA, BY OCCUPATIONS AND AGE GROUPS, 1908 AND 1909—Continued.

Age group.	Occupied males.									
	Number of deaths from—					Number of deaths from—				
	All causes.	Poisonous gases and other accidental poisonings.	Other accidents and injuries.	Total accidents and injuries.	Per cent of deaths due to accidents and injuries.	All causes.	Poisonous gases and other accidental poisonings.	Other accidents and injuries.	Total accidents and injuries.	Per cent of deaths due to accidents and injuries.
	Hucksters and peddlers.					Hotel and boarding-house keepers.				
10 to 14 years.....	6		2	2	33.3					
15 to 19 years.....	36	2	6	8	22.2					
20 to 24 years.....	56		6	6	10.7	12		1	1	8.3
25 to 34 years.....	207	3	12	15	7.2	115	1	7	8	7.0
35 to 44 years.....	290	2	21	23	7.9	351	5	12	17	4.8
45 to 54 years.....	352		23	23	6.5	435	1	15	16	3.7
55 to 64 years.....	308		26	26	8.4	358	3	5	8	2.2
65 years and over.....	328	1	23	24	7.3	339		7	7	2.1
Age unknown.....						3				
Total.....	1,583	8	119	127	8.0	1,613	10	47	57	3.5
	Saloon keepers, liquor dealers, bartenders, and restaurant keepers.					Barbers and hairdressers.				
10 to 14 years.....	14		1	1	7.1	1		10	11	14.3
15 to 19 years.....	137		13	14	10.2	77	1	4	4	2.3
20 to 24 years.....	1,133	7	62	69	6.1	555	10	22	32	5.8
25 to 34 years.....	1,670	10	62	72	4.3	691	11	43	54	7.8
35 to 44 years.....	1,225	4	41	45	3.7	589	5	24	29	4.9
45 to 54 years.....	566	4	10	14	2.5	342	3	8	11	3.2
55 to 64 years.....	240	1	8	9	3.8	248		6	6	2.4
65 years and over.....	5		1	1	20.0	7		2	2	28.6
Age unknown.....										
Total.....	4,990	27	198	225	4.5	2,687	30	119	149	5.5
	Janitors and sextons.					Policemen, firemen, watchmen, and detectives.				
10 to 14 years.....	10									
15 to 19 years.....	38		7	7	18.4	6		2	2	50.0
20 to 24 years.....	145	1	12	13	9.0	364	12	63	75	20.6
25 to 34 years.....	281	2	25	27	9.6	1,653	10	65	75	11.5
35 to 44 years.....	425	3	30	33	7.8	1,017	8	93	101	9.9
45 to 54 years.....	525	6	16	22	4.2	1,226	10	94	104	8.5
55 to 64 years.....	566	4	20	24	4.2	1,203	7	58	65	5.4
65 years and over.....						1				
Age unknown.....										
Total.....	1,990	16	110	126	6.3	4,533	51	393	444	9.8
	Soldiers, sailors, and marines (United States).					Laborers (not agricultural).				
10 to 14 years.....						49		24	24	49.0
15 to 19 years.....	39	1	6	7	17.9	2,018	19	350	369	18.3
20 to 24 years.....	150		24	24	16.0	4,694	56	668	724	15.4
25 to 34 years.....	195	5	29	34	17.4	10,056	118	1,260	1,378	13.7
35 to 44 years.....	87		9	9	10.3	11,000	119	1,216	1,335	12.1
45 to 54 years.....	66	2	3	5	7.6	10,971	86	912	998	9.1
55 to 64 years.....	42					9,360	37	478	515	5.5
65 years and over.....	45		2	2	4.4	9,170	26	317	343	3.7
Age unknown.....	2					65	7	13	20	30.8
Total.....	626	8	73	81	12.9	57,383	468	5,238	5,706	9.9

TABLE 13.—ACCIDENT MORTALITY, UNITED STATES REGISTRATION AREA, BY OCCUPATIONS AND AGE GROUPS, 1908 AND 1909—Continued.

Age group.	Occupied males.									
	Number of deaths from—					Number of deaths from—				
	All causes.	Poisonous gases and other accidental poisonings.	Other accidents and injuries.	Total accidents and injuries.	Per cent of deaths due to accidents and injuries.	All causes.	Poisonous gases and other accidental poisonings.	Other accidents and injuries.	Total accidents and injuries.	Per cent of deaths due to accidents and injuries.
	Servants and waiters.					Bakers and confectioners.				
10 to 14 years.....	7	1	1	2	28.6	1		1		100.0
15 to 19 years.....	201	3	32	35	17.4	65		13	13	23.0
20 to 24 years.....	441	7	47	54	12.2	149	5	17	22	14.8
25 to 34 years.....	1,361	25	84	109	8.0	348	6	31	37	10.6
35 to 44 years.....	1,398	14	82	96	6.9	432	5	28	33	7.6
45 to 54 years.....	1,246	14	71	85	6.8	450	5	29	34	7.6
55 to 64 years.....	792	7	30	37	4.7	381	3	9	12	3.1
65 years and over.....	474	2	13	15	3.2	426	3	16	19	4.5
Age unknown.....	6		1	1	16.7					
Total.....	5,926	73	361	434	7.3	2,252	27	144	171	7.6
	Blacksmiths.					Boot and shoe makers and repairers.				
10 to 14 years.....						1				
15 to 19 years.....	39		9	9	23.1	146		22	22	15.1
20 to 24 years.....	117	1	14	15	12.8	230		29	30	12.6
25 to 34 years.....	408	5	42	47	11.5	517	1	38	39	7.5
35 to 44 years.....	574	5	58	63	11.0	535	5	35	40	7.5
45 to 54 years.....	796	3	66	69	8.7	686	3	26	29	4.2
55 to 64 years.....	944	4	43	47	5.0	884	14	30	44	5.0
65 years and over.....	1,880	4	68	72	3.8	2,252	6	58	64	2.8
Age unknown.....	6		1	1	16.6	6				
Total.....	4,764	22	301	323	6.8	5,266	30	238	268	5.1
	Browers, maltsters, distillers, and rectifiers.					Butchers.				
10 to 14 years.....										
15 to 19 years.....	4		1	1	25.0	44		7	7	15.9
20 to 24 years.....	16		3	3	18.8	136	5	12	17	12.5
25 to 34 years.....	45		3	3	6.7	416	7	35	42	10.1
35 to 44 years.....	117	2	10	12	10.3	569	6	36	42	7.4
45 to 54 years.....	166	2	10	12	7.2	641	5	33	38	5.9
55 to 64 years.....	137		9	9	6.6	552	1	24	25	4.5
65 years and over.....	87		2	2	2.3	566	1	11	12	2.1
Age unknown.....	1					4				
Total.....	573	4	38	42	7.3	2,928	25	158	183	6.3
	Cabinetmakers and upholsterers.					Carpenters and joiners.				
10 to 14 years.....	1					4		2	2	50.0
15 to 19 years.....	21					83	4	18	22	26.5
20 to 24 years.....	74	1	8	9	12.2	375	4	93	97	25.9
25 to 34 years.....	164		15	15	9.1	1,076	12	231	243	22.6
35 to 44 years.....	230	3	20	23	10.0	1,671	9	225	234	14.0
45 to 54 years.....	300	5	16	21	7.0	2,448	20	290	310	12.7
55 to 64 years.....	346	2	18	20	5.8	3,124	12	217	229	7.3
65 years and over.....	737	3	15	18	2.4	6,231	19	238	257	4.1
Age unknown.....	3					18		3	3	16.7
Total.....	1,876	14	92	106	5.7	15,030	80	1,317	1,397	9.3

TABLE 12.—ACCIDENT MORTALITY, UNITED STATES REGISTRATION AREA, BY OCCUPATIONS AND AGE GROUPS, 1908 AND 1909—Continued.

Age group.	Occupied males.									
	Number of deaths from—					Number of deaths from—				
	All causes.	Poisonous gases and other accidental poisonings.	Other accidents and injuries.	Total accidents and injuries.	Per cent of deaths due to accidents and injuries.	All causes.	Poisonous gases and other accidental poisonings.	Other accidents and injuries.	Total accidents and injuries.	Per cent of deaths due to accidents and injuries.
	Cigar makers and tobacco workers.					Compositors and printers, lithographers and pressmen.				
10 to 14 years.....						1		1	1	100.0
15 to 19 years.....	43		9	9	20.9	162	1	26	27	16.7
20 to 24 years.....	100	1	6	7	7.0	265	5	25	30	11.3
25 to 34 years.....	256	2	11	13	5.1	551	4	27	31	5.6
35 to 44 years.....	341	3	26	29	8.5	614	7	33	40	6.5
45 to 54 years.....	443	2	21	23	5.2	522	3	23	26	5.0
55 to 64 years.....	380	2	11	13	3.4	350	1	12	13	3.7
65 years and over.....	392	2	6	8	2.0	381	4	8	12	3.1
Age unknown.....	2					2		2	2	100.0
Total.....	1,957	12	90	102	5.2	2,848	25	157	182	6.4
	Coopers.					Engineers and firemen (not locomotive).				
10 to 14 years.....	8	1	3	4	50.0	61	1	27	28	45.9
15 to 19 years.....	20					289	5	87	92	31.8
20 to 24 years.....	60	2	3	5	8.3	942	15	177	192	20.4
25 to 34 years.....	113		14	14	12.4	1,151	16	200	216	18.8
35 to 44 years.....	153		8	8	5.2	1,372	9	136	145	10.6
45 to 54 years.....	172	1	7	8	4.7	1,262	6	80	86	6.8
55 to 64 years.....	536	1	10	11	2.1	1,188	1	43	44	3.7
65 years and over.....						13		5	5	38.5
Age unknown.....										
Total.....	1,062	5	45	50	4.7	6,278	53	755	808	12.9
	Glass blowers and glassworkers.					Hat and cap makers.				
10 to 14 years.....	3		1	1	33.3					
15 to 19 years.....	63		18	18	28.6	8		1	1	12.5
20 to 24 years.....	113		9	9	8.0	27		2	2	7.4
25 to 34 years.....	202	3	17	20	9.9	63	1	1	2	3.2
35 to 44 years.....	169	2	11	13	7.7	102		3	3	2.9
45 to 54 years.....	117	2	9	11	9.4	77	1	4	5	6.5
55 to 64 years.....	101		5	5	5.0	77	1	3	4	5.2
65 years and over.....	101		3	3	3.0	93		4	4	4.3
Age unknown.....	1		1	1	100.0					
Total.....	870	7	74	81	9.3	447	3	18	21	4.7
	Iron and steel workers.					Leather makers.				
10 to 14 years.....	3									
15 to 19 years.....	115	2	44	46	40.0	15		4	4	26.7
20 to 24 years.....	345	4	103	107	31.0	42		5	5	11.9
25 to 34 years.....	915	11	237	248	27.1	109		9	9	8.3
35 to 44 years.....	1,084	9	200	209	19.3	122	1	6	7	5.7
45 to 54 years.....	992	7	117	124	12.5	167	2	7	9	5.4
55 to 64 years.....	754	5	46	51	6.8	152	2	8	10	6.6
65 years and over.....	826		21	21	2.5	228		8	8	3.5
Age unknown.....	4		1	1	25.0	1	1		1	100.0
Total.....	5,038	38	769	807	16.0	836	6	47	53	6.3

TABLE 12.—ACCIDENT MORTALITY, UNITED STATES REGISTRATION AREA, BY OCCUPATIONS AND AGE GROUPS, 1908 AND 1909—Continued.

Age group.	Occupied males.									
	Number of deaths from—				Per cent of deaths due to accidents and injuries.	Number of deaths from—				Per cent of deaths due to accidents and injuries.
	All causes.	Poisonous gases and other accidental poisonings.	Other accidents and injuries.	Total accidents and injuries.		All causes.	Poisonous gases and other accidental poisonings.	Other accidents and injuries.	Total accidents and injuries.	
	Leather workers.					Machinists.				
10 to 14 years.....	13		2	2	15.4	214		45	45	21.0
15 to 19 years.....	31	1	2	3	9.7	609	7	83	90	14.8
20 to 24 years.....	46		3	3	6.5	1,175	12	145	157	13.4
25 to 34 years.....	95		7	7	7.3	1,077	14	111	125	11.6
35 to 41 years.....	147	1	8	9	6.1	1,087	10	80	90	8.3
45 to 54 years.....	221	2	8	10	4.5	1,031	10	56	66	6.4
55 to 64 years.....	417	3	8	11	2.6	1,179	1	37	38	3.2
65 years and over.....	2	1		1	50.0	4		2	2	50.0
Age unknown.....										
Total.....	973	8	38	46	4.7	6,376	54	559	613	9.6
	Marble and stone cutters.					Masons (brick and stone).				
10 to 14 years.....										
15 to 19 years.....	16		6	6	37.5	30	1	8	9	30.0
20 to 24 years.....	45			8	17.8	115	1	17	18	15.7
25 to 34 years.....	170	2	17	19	11.2	351	2	58	60	17.1
35 to 44 years.....	299		23	23	7.7	625	9	83	92	14.7
45 to 54 years.....	401	3	21	24	6.0	771	12	77	89	11.5
55 to 64 years.....	407	2	13	15	3.7	960	7	64	71	7.4
65 years and over.....	316		11	11	3.5	1,599	6	61	67	4.2
Age unknown.....	3	1		1	33.3	2				
Total.....	1,657	8	99	107	6.5	4,453	38	368	406	9.1
	Mill and factory operatives (textiles).					Millers (flour and grist).				
10 to 14 years.....	13		3	3	23.1					
15 to 19 years.....	174	3	39	42	24.1	5		1	1	20.0
20 to 24 years.....	234	1	31	32	13.7	13		1	1	7.7
25 to 34 years.....	510	3	51	54	10.6	25		2	2	8.0
35 to 44 years.....	529	4	49	53	10.0	51	1	10	11	21.6
45 to 54 years.....	587	7	32	39	6.6	85		7	7	8.2
55 to 64 years.....	514		27	27	5.3	164		5	5	3.0
65 years and over.....	660	4	27	31	4.7	412		13	13	3.2
Age unknown.....	3	1	1	2	66.7					
Total.....	3,224	23	260	283	8.8	755	1	39	40	5.3
	Painters, glaziers, and varnishers.					Plasterers and whitewashers.				
10 to 14 years.....	1									
15 to 19 years.....	105	2	28	30	28.6			2	2	25.0
20 to 24 years.....	324	5	65	70	21.6	40	2	8	10	25.0
25 to 34 years.....	968	11	150	161	16.6	108		18	18	16.7
35 to 44 years.....	1,423	15	159	174	12.2	177	3	11	14	7.9
45 to 54 years.....	1,598	17	167	184	11.5	189	1	19	20	10.6
55 to 64 years.....	1,474	12	100	112	7.6	205	3	13	16	7.8
65 years and over.....	1,398	6	46	52	3.7	249	3	4	7	2.8
Age unknown.....	4		1	1	25.0	1		1	1	100.0
Total.....	7,295	68	716	784	10.7	977	12	76	88	9.0

TABLE 12.—ACCIDENT MORTALITY, UNITED STATES REGISTRATION AREA, BY OCCUPATIONS AND AGE GROUPS, 1908 AND 1909—Continued.

Age group.	Occupied males.										
	Number of deaths from—					Per cent of deaths due to accidents and injuries.	Number of deaths from—				Per cent of deaths due to accidents and injuries.
	All causes.	Poisonous gases and other accidental poisonings.	Other accidents and injuries.	Total accidents and injuries.	All causes.		Poisonous gases and other accidental poisonings.	Other accidents and injuries.	Total accidents and injuries.		
	Plumbers, gas and steam fitters.					Tailors.					
10 to 14 years.....	84	1	22	23	27.4	1	1	13	14	14.0	
15 to 19 years.....	202	1	25	26	12.9	297	2	11	13	4.4	
20 to 24 years.....	579	8	58	66	11.4	605	6	32	38	6.3	
25 to 34 years.....	648	6	56	62	9.6	820	6	24	30	3.7	
35 to 44 years.....	389	.....	39	39	10.0	868	15	29	44	5.1	
45 to 54 years.....	263	2	18	20	7.6	733	8	22	30	4.1	
55 to 64 years.....	186	3	6	9	4.8	1,329	3	31	34	2.6	
65 years and over.....	2	.....	1	1	50.0	1	.....	.....	.....	.....	
Age unknown.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	
Total.....	2,353	21	225	246	10.5	4,754	41	162	203	4.3	
	Tinners and tinware makers.					Sailors, pilots, fishermen and oystermen, boatmen and canal men.					
10 to 14 years.....	1	.....	.....	.....	.....	6	.....	3	3	50.0	
15 to 19 years.....	35	.....	5	5	14.3	96	3	39	42	43.8	
20 to 24 years.....	69	.....	12	12	17.4	293	2	89	91	31.1	
25 to 34 years.....	166	2	21	23	13.9	598	14	161	175	29.3	
35 to 44 years.....	201	1	24	25	12.4	630	11	143	154	24.4	
45 to 54 years.....	248	1	19	20	8.1	724	6	130	136	18.8	
55 to 64 years.....	241	.....	10	10	4.1	752	5	77	82	10.9	
65 years and over.....	268	1	8	9	3.4	1,278	3	48	51	4.0	
Age unknown.....	1	.....	.....	.....	.....	26	.....	15	15	57.7	
Total.....	1,230	5	99	104	8.5	4,403	44	705	740	17.0	
	Draymen, hackmen, teamsters, etc.					Farmers, planters, and farm laborers.					
10 to 14 years.....	10	.....	4	4	40.0	121	.....	36	36	29.8	
15 to 19 years.....	365	4	96	100	27.4	2,340	15	590	605	25.9	
20 to 24 years.....	874	6	168	174	19.9	3,803	22	755	777	20.4	
25 to 34 years.....	2,516	14	329	343	13.6	6,674	50	1,116	1,166	17.5	
35 to 44 years.....	2,621	16	356	372	14.2	7,249	69	1,003	1,072	14.8	
45 to 54 years.....	2,082	6	268	274	13.2	10,239	70	917	987	9.6	
55 to 64 years.....	1,432	9	150	159	11.1	14,861	47	851	898	6.0	
65 years and over.....	1,168	5	85	90	7.7	45,535	80	1,380	1,460	3.2	
Age unknown.....	6	.....	1	1	16.7	203	2	45	47	23.2	
Total.....	11,074	60	1,457	1,517	13.7	91,025	355	6,693	7,048	7.7	
	Gardeners, florists, etc., nurserymen, vine growers.					Livery-stable keepers and hostlers.					
10 to 14 years.....	1	.....	.....	.....	.....	1	.....	.....	.....	.....	
15 to 19 years.....	21	.....	4	4	19.0	19	1	6	7	36.8	
20 to 24 years.....	41	2	7	9	22.0	51	1	9	10	19.6	
25 to 34 years.....	148	.....	18	18	12.2	214	.....	32	32	15.0	
35 to 44 years.....	216	.....	22	22	10.2	350	6	33	39	11.1	
45 to 54 years.....	344	7	16	23	6.7	414	3	31	34	8.2	
55 to 64 years.....	483	3	28	31	6.4	347	1	26	27	7.8	
65 years and over.....	1,152	2	40	42	3.6	249	.....	13	13	5.2	
Age unknown.....	2	.....	.....	.....	.....	1	.....	.....	.....	.....	
Total.....	2,408	14	135	149	6.2	1,646	12	150	162	9.8	

TABLE 12.—ACCIDENT MORTALITY, UNITED STATES REGISTRATION AREA, BY OCCUPATIONS AND AGE GROUPS, 1908 AND 1909—Continued.

Age group.	Occupied males.									
	Number of deaths from—					Number of deaths from—				
	All causes.	Poisonous gases and other accidental poisonings.	Other accidents and injuries.	Total accidents and injuries.	Per cent of deaths due to accidents and injuries.	All causes.	Poisonous gases and other accidental poisonings.	Other accidents and injuries.	Total accidents and injuries.	Per cent of deaths due to accidents and injuries.
	Lumbermen and raftsmen.					Miners and quarrymen.				
10 to 14 years.....	31	1	20	21	67.7	35	2	23	25	71.4
15 to 19 years.....	119	1	71	72	60.5	1,055	1	313	313	71.8
20 to 24 years.....	214	.....	115	115	53.7	2,184	8	1,339	1,347	61.7
25 to 34 years.....	231	2	83	85	36.8	2,122	12	990	1,002	47.2
35 to 44 years.....	297	3	73	76	25.6	1,869	18	511	529	28.3
45 to 54 years.....	267	.....	25	25	9.4	1,430	4	191	195	13.6
55 to 64 years.....	348	2	15	17	4.9	1,657	4	109	113	6.8
65 years and over.....	25	2	13	15	60.0	47	.....	32	32	68.1
Age unknown.....	25	2	13	15	60.0	47	.....	32	32	68.1
Total.....	1,532	11	415	426	27.8	10,835	49	4,205	4,254	39.3
	Steam-railroad employees.					Stock raisers, herders, and drovers.				
10 to 14 years.....	4	.....	4	4	100.0	1	.....	8	9	32.1
15 to 19 years.....	377	.....	304	304	80.6	28	1	14	14	25.5
20 to 24 years.....	1,227	5	894	899	73.3	55	2	32	34	20.0
25 to 34 years.....	2,703	9	1,779	1,788	66.1	170	2	31	32	18.5
35 to 44 years.....	2,319	10	1,283	1,293	55.8	194	1	32	33	12.5
45 to 54 years.....	1,855	3	844	847	45.7	263	1	32	33	12.5
55 to 64 years.....	1,438	3	418	421	29.3	295	2	27	29	9.8
65 years and over.....	1,088	3	196	199	18.3	551	4	20	24	4.4
Age unknown.....	71	.....	63	63	88.7	3	.....	.....	.....	.....
Total.....	11,082	33	5,785	5,818	52.5	1,560	11	164	175	11.2
	Occupied females.									
	All occupations.					School-teachers.				
10 to 14 years.....	156	.....	11	11	7.1	91	1	7	8	8.8
15 to 19 years.....	4,465	54	184	238	5.3	382	4	13	17	4.5
20 to 24 years.....	7,196	84	192	276	3.8	543	3	18	21	3.9
25 to 34 years.....	10,138	72	240	312	3.1	401	4	8	12	3.0
35 to 44 years.....	8,720	52	192	244	2.8	319	2	10	12	3.8
45 to 54 years.....	8,499	45	205	250	2.9	240	.....	6	6	2.5
55 to 64 years.....	8,026	30	173	203	2.5	300	3	9	12	4.0
65 years and over.....	6,420	17	185	202	3.1	3	.....	.....	.....	.....
Age unknown.....	44	.....	1	1	2.3	3	.....	.....	.....	.....
Total.....	53,664	354	1,383	1,737	3.2	2,279	17	71	88	3.9
	Bookkeepers, accountants, clerks, and copyists.					Laundresses.				
10 to 14 years.....	.....	.....	.....	.....	.....	5	.....	1	1	20.0
15 to 19 years.....	386	1	22	23	6.0	93	.....	2	2	2.2
20 to 24 years.....	682	7	11	18	2.6	183	2	3	5	2.7
25 to 34 years.....	692	6	15	21	3.0	420	5	10	15	3.6
35 to 44 years.....	321	6	11	17	5.3	458	2	12	14	3.1
45 to 54 years.....	152	.....	1	1	.7	477	1	9	10	2.1
55 to 64 years.....	69	1	1	2	2.9	311	.....	10	10	3.2
65 years and over.....	51	.....	4	4	7.8	230	.....	3	3	1.3
Age unknown.....	2	.....	.....	.....	.....	2	.....	.....	.....	.....
Total.....	2,355	21	65	86	3.7	2,179	10	50	60	2.8

TABLE 12.—ACCIDENT MORTALITY, UNITED STATES REGISTRATION AREA, BY OCCUPATIONS AND AGE GROUPS, 1908 AND 1909—Concluded.

Age group.	Occupied females.									
	Number of deaths from—					Per cent of deaths due to accidents and injuries.	Number of deaths from—			
	All causes.	Poisonous gases and other accidental poisonings.	Other accidents and injuries.	Total accidents and injuries.	All causes.		Poisonous gases and other accidental poisonings.	Other accidents and injuries.	Total accidents and injuries.	Per cent of deaths due to accidents and injuries.
	Nurses and midwives.						Servants and waitresses.			
10 to 14 years.....	61	1	5	6	9.8	2,096	23	86	109	6.6
15 to 19 years.....	172	1	8	9	5.2	3,358	45	93	138	4.1
20 to 24 years.....	299	3	4	7	2.3	5,258	32	118	150	2.9
25 to 34 years.....	233	2	10	12	5.2	4,982	20	86	106	2.1
35 to 44 years.....	284	2	8	10	3.5	5,159	27	107	134	2.6
45 to 54 years.....	323	3	9	12	3.7	5,350	16	107	123	2.3
55 to 64 years.....	416	2	14	16	3.8	2,817	9	83	92	3.3
65 years and over....	1					23		1	1	4.3
Age unknown.....										
Total.....	1,789	14	58	72	4.0	29,134	172	687	859	2.9
	Mill and factory operatives (textiles).						Dressmakers and seamstresses.			
10 to 14 years.....	10					2				
15 to 19 years.....	281	1	13	14	5.0	178	2	4	6	3.4
20 to 24 years.....	284	1	7	8	2.8	369	4	11	15	4.1
25 to 34 years.....	299	2	7	9	3.0	624	3	14	17	2.7
35 to 44 years.....	205	1	5	6	2.9	658	5	11	16	2.4
45 to 54 years.....	160		7	7	4.4	625	3	18	21	3.4
55 to 64 years.....	93		6	6	6.5	491	4	9	13	2.6
65 years and over....	89		2	2	2.2	582	2	12	14	2.4
Age unknown.....	1					2				
Total.....	1,422	5	47	52	3.7	3,531	23	79	102	2.9

## INDUSTRIAL ACCIDENT STATISTICS OF THE STATE OF NEW YORK.

There is at the present time no uniformity in either the reporting of industrial accidents or the methods of tabulation and analysis for the several States. The subject is still in its initial stage, and mere arbitrary conformity to the precedent set by even an important industrial State would not be justified in the absence of thoroughly well-considered fundamental principles of accident reporting, as well as the use of standard certificates and standardized methods of classification, tabulation, and analysis. A study of the methods in use for a period of years in representative States provides a considerable amount of useful and suggestive information, emphasizing the great practical importance of complete returns and the necessity of a supplementary analysis of the facts in full detail. The returns of fatal industrial accidents in the State of New York for the period April, 1911, to March, 1913, although probably incomplete, are of much practical utility in that they bring out the main sources of fatalities, or, in

other words, the returns localize the immediate causes or conditions responsible for their occurrence. The tables and text following present an analysis of 1,047 fatalities officially reported during the two years under consideration, subdivided under (1) fatal accidents in factories; (2) fatal accidents in mines and quarries; and (3) fatal accidents in building and engineering. Each of these three main groups is subdivided according to well-defined general conditions more or less connected with the immediate circumstances responsible for fatal accidents in industry. The main divisions are: (a) Mechanical power; (b) heat and electricity; (c) fall of person; (d) weights and falling objects; (e) vehicles and animals; and (f) miscellaneous. The table following exhibits the fatal accidents in connection with mechanical power in factories, numbering 172, equivalent to 16.4 per cent of the 378 fatalities due to all causes:

TABLE 13.—CAUSES OF FATAL INDUSTRIAL ACCIDENTS, STATE OF NEW YORK, 1911 TO 1913.

**Factories: Mechanical power.**

[Compiled from Bulletins 48 to 55, Department of Labor, State of New York.]

Cause.	Number.	Per cent of total fatal accidents (all industries).
<b>Transmission of power:</b>		
Motors (engines, dynamos, flywheels, etc.).....	3	0.3
Gearing.....	8	.8
Shafting.....	24	2.3
Belts and pulleys.....	19	1.8
<b>Conveying and hoisting machinery:</b>		
Elevators and lifts.....	33	3.2
Cranes (steam, electric, portable, etc.).....	15	1.4
Hoisting and conveying machinery, not elsewhere specified.....	13	1.2
Locomotives and trains.....	31	3.0
<b>Woodworking machinery:</b>		
Saws.....	8	.8
Lathes.....	1	.1
<b>Paper and printing machinery:</b>		
Calenders and other paper-making machinery.....	2	.2
Printing presses.....	1	.1
<b>Textile machinery:</b>		
Picking machines.....	1	.1
Other or indefinite.....	1	.1
<b>Leather-working machinery:</b>	3	.3
<b>Metal-working machinery:</b>		
Drop hammers.....	1	.1
Rollers.....	1	.1
Other or indefinite.....	2	.2
<b>Polishing machines:</b>		
Struck by fragments of wheels.....	1	.1
Other or indefinite.....	1	.1
<b>Machines used in bakeries, confectionery establishments, etc.....</b>	1	.1
<b>Machines, not elsewhere specified.....</b>	2	.2
<b>Total.....</b>	<b>172</b>	<b>16.4</b>

It is brought out by this table that the principal causes of fatal accidents in factories in connection with mechanical power were (1) elevators and lifts, causing 33 deaths; (2) locomotives and trains, causing 31 deaths; and (3) shafting for the transmission of power, causing 24 deaths. These three causes combined account for 51.2

per cent of the 172 fatalities in connection with mechanical power due to all causes.

The next table exhibits the accidents in factories in connection with heat and electricity. There were 82 of these fatalities, equivalent to 7.8 per cent of the fatal accidents due to all causes:

TABLE 14.—CAUSES OF FATAL INDUSTRIAL ACCIDENTS, STATE OF NEW YORK, 1911 TO 1913.

Factories: Heat and electricity.

[Compiled from Bulletins 48 to 55, Department of Labor, State of New York.]

Cause.	Number.	Per cent of total fatal accidents (all industries).
Explosions (powder, dynamite, etc.)	2	0.2
Explosion and ignition of gases, dust, etc.	12	1.1
Explosion of boilers, steam pipes, etc.	13	1.2
Other injuries from steam or hot liquids.	4	.4
Caustics.	1	.1
Explosion of molten metal.	5	.5
Other accidents from molten metal.	1	.1
Vats, pans, etc. (containing hot liquid, etc.)	3	.3
Electricity	24	2.3
Fire and heat, not elsewhere specified.	17	1.6
Total	82	7.8

The principal cause of the fatalities in this group was electricity, accounting for 24 deaths, followed by fire and heat not otherwise specified, 17 deaths; explosions of boilers, steam pipes, etc., 13 deaths, and explosions of gas, dust, etc., 12 deaths. These four groups of causes, therefore, account for 80.5 per cent of the 82 deaths from all causes occurring in connection with heat and electricity.

Fatal industrial accidents caused by the fall of the person numbered 67, or 6.4 per cent of the fatalities due to all causes. The details are given in the following table:

TABLE 15.—CAUSES OF FATAL INDUSTRIAL ACCIDENTS, STATE OF NEW YORK, 1911 TO 1913.

Factories: Fall of person.

[Compiled from Bulletins 48 to 55, Department of Labor, State of New York.]

Cause.	Number.	Per cent of total fatal accidents (all industries).
Fall of person—		
From ladder, scaffold, platform, etc.	21	2.0
From machinery, trucks, engines, etc.	2	.2
By collapse of support.	6	.6
Through opening in floor.	6	.6
In hoistway, shaft, etc.	11	1.1
On stairs, steps, etc.	2	.2
On level by tripping.	2	.2
On level by slipping of tool.	1	.1
Other or indefinite.	16	1.5
Total	67	6.4

The principal cause of fatalities in this group was falls from ladders, scaffolds, platforms, etc., accounting for 21 deaths, followed by falls in hoistways, shafts, etc., 11 deaths. These two specified classes of causes account for 47.8 per cent of the 67 fatalities due to all causes in this group.

Fatal accidents in connection with weights and falling objects numbered 28, or 2.7 per cent of the fatalities due to all causes, as follows:

TABLE 16.—CAUSES OF FATAL INDUSTRIAL ACCIDENTS, STATE OF NEW YORK, 1911 TO 1913.

Factories: Weights and falling objects.

[Compiled from Bulletins 48 to 55, Department of Labor, State of New York.]

Cause.	Number.	Per cent of total fatal accidents (all industries).
Falling objects (not dropped):		
Rock, earth, etc.....	1	0.1
Pile of material or part thereof.....	10	1.0
Objects from trucks in transit.....	1	.1
Other or indefinite.....	2	.2
Fall or weight of objects being handled by injured person:		
Objects in course of manufacture or repair.....	3	.3
Objects being moved or carried by hand.....	4	.4
Objects being loaded or unloaded.....	5	.5
All other or indefinite.....	2	.2
Total.....	28	2.7

The leading cause of fatalities in this group was falls of material, or a portion thereof, numbering 10, followed by objects falling in the course of being loaded or unloaded, which accounted for 5 deaths. These two groups of causes, therefore, accounted for 53.6 per cent of the 28 fatalities from all causes.

Fatal accidents caused by vehicles and animals numbered only 4. This class of causes, in connection with factories, is therefore relatively unimportant. The question may arise here as to how far these accidents were accurately and completely reported, for in view of the extended use of industrial railways in connection with the operation of large factories it is reasonable to suppose that the fatalities on this account were more numerous than is disclosed by the official returns.

Fatal accidents in factories due to miscellaneous causes numbered 25, or 2.4 per cent of the fatalities from all causes. The details of this group are given in the table following.

TABLE 17.—CAUSES OF FATAL INDUSTRIAL ACCIDENTS, STATE OF NEW YORK, 1911 TO 1913.

**Factories: Miscellaneous causes.**

[Compiled from Bulletins 48 to 55, Department of Labor, State of New York.]

Cause.	Number.	Per cent of total fatal accidents (all industries).
Hand tools.....	1	0.1
Tools in hands of fellow workmen.....	1	.1
Striking against projecting parts.....	1	.1
Injuries from nails, slivers, etc.....	3	.3
Poisonous gases.....	12	1.1
All other causes.....	7	.7
<b>Total.....</b>	<b>25</b>	<b>2.4</b>

The principal cause of death in this class of causes was poisonous gases, which accounted for 12, or 48 per cent, of the 25 fatalities from all causes in this group.

The second large group of industries under consideration is mines and quarries, accounting for 40 deaths, or 3.8 per cent, of the mortality from all causes. Fatal accidents resulting from the use of mechanical power, or in connection therewith, numbered 14, as shown in detail in the table below:

TABLE 18.—CAUSES OF FATAL INDUSTRIAL ACCIDENTS, STATE OF NEW YORK, 1911 TO 1913.

**Mines and quarries: Mechanical power.**

[Compiled from Bulletins 48 to 55, Department of Labor, State of New York.]

Cause.	Number.	Per cent of total fatal accidents (all industries).
Conveying and hoisting machinery:		
Skips and cages.....	4	0.4
Other conveying and hoisting.....	3	.3
Mine and quarry cars and locomotives.....	6	.6
Machinery not otherwise specified.....	1	.1
<b>Total.....</b>	<b>14</b>	<b>1.3</b>

The principal cause of fatalities in this class of causes was mine and quarry cars and locomotives, which accounted for 6 deaths, or 42.9 per cent of the total mortality from accidents in the group.

Fatal accidents in connection with heat and electricity accounted for 13 deaths, or 1.2 per cent of the fatalities from all causes. The details are given in the table following.

TABLE 19.—CAUSES OF FATAL INDUSTRIAL ACCIDENTS, STATE OF NEW YORK, 1911 TO 1913.

**Mines and quarries: Heat and electricity.**

[Compiled from Bulletins 48 to 55, Department of Labor, State of New York.]

Cause.	Number.	Per cent of total fatal accidents (all industries).
Powder, etc. (except blasts).....	1	0.1
Blasts.....	11	1.5
Electricity.....	1	.1
Total.....	13	1.2

The principal cause of death in this group was blasts, which accounted for 11 deaths, or 84.6 per cent of the 13 fatalities in this group.

Weights and falling objects accounted for 12 deaths, or 1.1 per cent of the fatalities from all causes. The details are given in the table below:

TABLE 20.—CAUSES OF FATAL INDUSTRIAL ACCIDENTS, STATE OF NEW YORK, 1911 TO 1913.

**Mines and quarries: Weights and falling objects.**

[Compiled from Bulletins 48 to 55, Department of Labor, State of New York.]

Cause.	Number.	Per cent of total fatal accidents (all industries).
Fall or slide of rock or ore (quarry).....	3	0.3
Fall or slide of rock or ore (mine).....	7	.7
Piles of material.....	1	.1
Other or indefinite.....	1	.1
Total.....	12	1.1

The principal cause of death was falls or slides of rock or ore in mines, which accounted for 7 deaths, or 58.3 per cent of the deaths from all causes in this group.

There was only 1 fatality due to vehicles and animals in the group of mines and quarries, the conclusion in this case being the same as with regard to factories, but there is a possibility of accidents of this kind not being accurately and completely reported.

The third large group is building and engineering. The total number of deaths in this group was 629, or 60.1 per cent of the fatalities due to all causes. In the subdivision mechanical power there were 225 fatalities, or 21.5 per cent of the deaths from all causes, as shown in detail in the table following.

TABLE 21.—CAUSES OF FATAL INDUSTRIAL ACCIDENTS, STATE OF NEW YORK, 1911 TO 1913.

**Building and engineering: Mechanical power.**

[Compiled from Bulletins 48 to 55, Department of Labor, State of New York.]

Cause.	Number.	Per cent of total fatal accidents (all industries).
Transmission of power:		
Motors (engines, flywheels, etc.).....	1	0.1
Gearing.....	4	.4
Belts.....	2	.2
Total.....	7	.7
Conveying and hoisting machinery:		
Elevators and hoists—		
Breaking and slipping of apparatus.....	3	.3
Unexpected starting or stopping.....	3	.3
Struck by elevators, etc.....	2	.2
Struck by counterweights.....	2	.2
Caught between elevator and shaft.....	8	.8
Other or indefinite.....	6	.6
Total.....	30	2.9
Derricks, cranes, shovels, etc.:		
Breaking or slipping of apparatus.....	23	2.2
Swinging of load, bucket, etc.....	9	.9
Unexpected starting or stopping.....	1	.1
Loading or unloading.....	6	.6
Other or indefinite.....	9	.9
Total.....	48	4.6
Conveying and hoisting apparatus, not elsewhere specified.....	9	.9
Locomotives and cars—		
Boarding and alighting.....	6	.6
Coupling or uncoupling.....	4	.4
Unexpected starting or stopping.....	4	.4
Collisions or derailments.....	14	1.3
Struck by train.....	81	7.7
Fell from train.....	10	1.0
Other or indefinite.....	1	.1
Total.....	120	11.5
Other machinery used in building, etc.:		
Crushers and mixers.....	1	.1
Drills, hammers, etc.....	1	.1
Pile drivers.....	2	.2
Jacks and other mechanical instruments.....	2	.2
Compressed-air hose.....	2	.2
Other or indefinite.....	3	.3
Total.....	11	1.1
Total, mechanical power.....	225	21.5

The principal cause of fatalities in this group was locomotives and cars, which accounted for 120 deaths, or 53.3 per cent of the 225 deaths due to all causes in this group.

Heat and electricity accounted for 114 deaths, or 10.9 per cent of the fatalities from all causes. The details of this group are given in the table following.

TABLE 22.—CAUSES OF FATAL INDUSTRIAL ACCIDENTS, STATE OF NEW YORK, 1911 TO 1913.

**Building and engineering: Heat and electricity.**

[Compiled from Bulletins 48 to 55, Department of Labor, State of New York.]

Cause.	Number.	Per cent of total fatal accidents (all industries).
<b>Explosives:</b>		
<b>Blasts—</b>		
Delayed or premature shots.....	11	1.1
Drilling into blasts.....	18	1.7
Tamping.....	2	.2
Other (including flying objects).....	8	.8
<b>Total.....</b>	<b>39</b>	<b>3.7</b>
Explosion and ignition of gas or dust.....	3	.3
Explosion of boilers, steam pipes, etc.....	9	.9
Electricity.....	62	5.9
Fire and heat, not elsewhere specified.....	1	.1
<b>Total, heat and electricity.....</b>	<b>114</b>	<b>10.9</b>

The principal cause of death was electricity, accounting for 62 deaths, followed by premature or other blasts, 39 deaths, the two causes combined accounting for 88.6 per cent of the 114 fatalities from all causes in this group.

Industrial accidents resulting from the fall of the person numbered 159, or 15.2 per cent of the fatalities from all causes. The details of this group are given in the table following:

TABLE 23.—CAUSES OF FATAL INDUSTRIAL ACCIDENTS, STATE OF NEW YORK, 1911 TO 1913.

**Building and engineering: Fall of person.**

[Compiled from Bulletins 48 to 55, Department of Labor, State of New York.]

Cause.	Number.	Per cent of total fatal accidents (all industries).
<b>Fall of person—</b>		
<b>From ladders:</b>		
By breaking of ladder.....	1	0.1
By slipping or twisting of ladder.....	4	.4
By fall from ladder.....	6	.6
Other or indefinite.....	1	.1
<b>Total.....</b>	<b>12</b>	<b>1.1</b>
<b>From scaffolds:</b>		
By breaking of scaffold.....	16	1.5
By breaking of tackles or supports.....	4	.4
By tilting of scaffold.....	1	.1
By slipping or tilting of loose boards.....	1	.1
Fall from scaffold, not elsewhere specified.....	18	1.7
Other or indefinite.....	2	.2
<b>Total.....</b>	<b>42</b>	<b>4.0</b>
<b>Collapse of structure or part.....</b>	<b>2</b>	<b>.2</b>
From telephone poles, etc.....	7	.7
Into shafts, hoistways, etc.....	16	1.5
From girders, joists, roof, etc.....	51	4.9
Into trenches, excavations, etc.....	2	.2
Fall by tripping, not elsewhere specified.....	1	.1
Other or indefinite.....	26	2.5
<b>Total, fall of person.....</b>	<b>159</b>	<b>15.2</b>

The principal cause of accidents in this group was falls from girders, joists, roofs, etc., accounting for 51 deaths, followed by falls from scaffolds, etc., accounting for 42 deaths, the two causes combined accounting for 58.5 per cent of the fatalities from all causes in this group.

Fatal industrial accidents caused by weights and falling objects numbered 93, or 8.9 per cent of the fatalities from all causes. The details of this group are given in the following table:

TABLE 24.—CAUSES OF FATAL INDUSTRIAL ACCIDENTS, STATE OF NEW YORK, 1911 TO 1913.

**Building and engineering: Weights and falling objects.**

[Compiled from Bulletins 48 to 55, Department of Labor, State of New York.]

Cause.	Number.	Per cent of total fatal accidents (all industries).
<b>Falling objects not dropped:</b>		
Rock, earth, etc. (open excavation) .....	25	2.4
Rock, earth, etc. (tunnels) .....	26	2.5
Pile of material or part thereof .....	4	.4
Objects from trucks in transit .....	1	.1
Collapse of structure or part .....	4	.4
Other or indefinite .....	20	1.9
<b>Total .....</b>	<b>80</b>	<b>7.6</b>
<b>Falling tools or objects dropped by other persons.....</b>		
<b>Fall or weight of objects being handled by injured person:</b>	<b>1</b>	<b>.1</b>
Objects used in construction or repair by injured person.....	3	.3
Objects being moved or carried by hand.....	6	.6
All other or indefinite.....	3	.3
<b>Total .....</b>	<b>12</b>	<b>1.1</b>
<b>Total, weight and falls of objects.....</b>	<b>93</b>	<b>8.9</b>

The principal cause of death in this group was the falling of rock or earth in tunnels, accounting for 26 deaths, followed by falls of rock and earth in open excavations, 25 deaths, making a total for the two causes of 51 deaths, or 54.8 per cent of the 93 fatalities in this group.

Fatal accidents caused by vehicles and animals in connection with building and engineering numbered 8, or 0.8 per cent of the deaths from all causes. One of these was due to unexpected starting or stopping, 3 to falls from wagons, cars, etc., 3 to falls from dump wagons, cars, etc., and 1 to a cause not assigned.

In the group hand tools (hammers, hatchets, etc.) there was only 1 fatal accident, or 0.1 per cent of the deaths from all causes.

There were 29 fatalities in the group building and engineering due to miscellaneous causes, or 2.8 per cent of the deaths from all causes, being as follows: One due to striking against or catching between edges or projecting parts, etc.; 1 due to flying objects not from machines, tools, or explosions; 4 due to poisonous gases; and 23 due to all other causes.

The foregoing analysis is of considerable practical importance. The tables visualize at a glance the causes or conditions more or less directly responsible for the occurrence of fatal accidents in some of the principal industries of New York State. It is to be regretted that corresponding information should not be available for nonfatal injuries, but for present purposes the foregoing tabulation is sufficient to emphasize the social and economic importance of a strictly technical study of the industrial accident problem in American industry.

Additional details regarding fatal accidents reported in New York State during the 18 months ending with March 1, 1913, differentiating groups of employments and the sex of the injured, are given in Table 31. It is shown by this table that the larger numbers of fatalities occurred in the order named: In open excavations (96 deaths), excavations in shafts and tunnels (93), track laying, etc. (82), the iron and steel industry (55), electric wiring and installation (51), in the manufacture of vehicles (44), structural iron and steel work (42), wood construction (38), masonry (34), painting and decorating (31), manufacture of pulp and paper (20), and mines (20). In these 12 groups there occurred 606 fatal accidents, or 65.5 per cent of the 925 fatalities in all industries subject to the New York factory inspection laws.

Reports are required to be made of industrial diseases in the State of New York, and the returns for the period September, 1911, to August, 1913, are available for analysis. The returns give the number of cases reported and the fatalities according to the disease contracted, and the industry or employment in which the same occurred. The details of this analysis are given in full in Table 32. During the period under observation there were 284 cases of industrial diseases, with 33 deaths, or a fatality rate of 11.6 per cent. The number of cases of lead poisoning was 239, with 29 deaths, or 12.1 per cent; there were 4 cases of arsenical poisoning, with no deaths; 1 case of brass poisoning, with no death; 3 cases of mercury poisoning, with 1 death; 1 case of phosphorus poisoning, with 1 death; 1 case of wood-alcohol poisoning, with no death; 5 cases of anthrax, with 1 death; and 30 cases of caisson disease, with 1 death. Most of the cases of lead poisoning occurred in connection with house painting, or 99 cases, with 14 deaths, or 14.1 per cent, and in the manufacture of electric storage batteries, in which there were 35 cases with 1 death, or 2.9 per cent. Another suggestive return is for the painting of carriages, wagons, automobiles, and cars, there having been 25 cases of lead poisoning in this group, with 4 deaths, or 16 per cent. The returns, in all probability, are wanting in absolute accuracy and completeness, but they afford a fairly trustworthy indica-

tion of the extent of industrial diseases under the limitations of the terms as used in the New York factory-inspection law.

Some interesting additional information is made available by the returns of the Department of Labor of the State of New York, for the two years ending March, 1913. During this period there were 137,384 accidents reported in all industries, or, respectively, 132,185 accidents to males and 5,199 to females. As the reports were not made under a compensation law, it is probable that many accidents were unreported. In the absence of information as to number of employees accident frequency rates can not be computed. The accidents in manufacturing establishments, according to age and sex, are given in the table following:

TABLE 25.—INDUSTRIAL ACCIDENTS IN THE STATE OF NEW YORK, BY AGE AND SEX, APRIL, 1911, TO MARCH, 1913.

**Manufacturing industries.**

[Compiled from Bulletins 48 to 55, Department of Labor, State of New York.]

Age group.	Accidents to males.		Accidents to females.		Total accidents.
	Number.	Per cent.	Number.	Per cent.	
Under 16 years.....	278	} 4.1	112	} 25.3	{ 390
16 to 18 years.....	3,564		1,202		
Over 18 years.....	89,436	95.9	3,885	74.7	93,321
Total.....	93,278	100.0	5,199	100.0	98,477

According to this table, of the accidents to males 4.1 per cent occurred at ages 18 and under against 25.3 per cent for females.

The details for accidents in mines and quarries are given in the table below:

TABLE 26.—INDUSTRIAL ACCIDENTS IN THE STATE OF NEW YORK, BY AGE AND SEX, APRIL, 1911, TO MARCH, 1913.

**Mines and quarries.**

[Compiled from Bulletins 48 to 55, Department of Labor, State of New York.]

Age group.	Accidents to males.		Accidents to females.		Total accidents.
	Number.	Per cent.	Number.	Per cent.	
Under 16 years.....	1	} 1.4	.....	.....	{ 1
16 to 18 years.....	21		.....	.....	
Over 18 years.....	1,523	98.6	.....	.....	1,523
Total.....	1,545	100.0	.....	.....	1,545

Since women are not permitted to be employed in the mines and quarries of New York State, the accidents in this group are limited to males. Of the total number, 1.4 per cent were accidents to persons 18 years of age and under.

The details for accidents in building and engineering are given in the table following:

TABLE 27.—INDUSTRIAL ACCIDENTS IN THE STATE OF NEW YORK, BY AGE AND SEX, APRIL, 1911, TO MARCH, 1913.

**Building and engineering.**

[Compiled from Bulletins 48 to 55, Department of Labor, State of New York.]

Age group.	Accidents to males.		Accidents to females.		Total accidents.	
	Number.	Per cent.	Number.	Per cent.		
Under 16 years.....	24	} 0.9			{ 24	
16 to 18 years.....	303					303
Over 18 years.....	37,035		99.1			
Total.....	37,362	100.0			37,362	

In this group also few if any women are employed, and in any event none were injured, according to the reports of the labor department. Of the total number injured, only 0.9 per cent were persons 18 years of age and under.

The final summary for all industries subject to the factory-inspection laws of the State of New York are given in the table below:

TABLE 28.—INDUSTRIAL ACCIDENTS IN THE STATE OF NEW YORK, BY AGE AND SEX, APRIL, 1911, TO MARCH, 1913.

**All industries.**

[Compiled from Bulletins 48 to 55, Department of Labor, State of New York.]

Age group.	Accidents to males.		Accidents to females.		Total accidents.
	Number.	Per cent.	Number.	Per cent.	
Under 16 years.....	303	0.3	112	2.2	415
16 to 18 years.....	3,888	2.9	1,202	23.1	5,090
Over 18 years.....	127,994	96.8	3,885	74.7	131,879
Total.....	132,185	100.0	5,199	100.0	137,384

According to this tabulation, of the accidents to males, 3.2 per cent were to persons 18 years of age and under, against 25.3 per cent for females.

Tables 25 to 28, inclusive, and observations refer exclusively to nonfatal accidents. The inclusion of fatalities would not have materially affected the general conclusions. The table following exhibits in brief outline the nature of the injury sustained in accidents in the three different groups—factories, mines and quarries, and building and engineering.

TABLE 29.—INDUSTRIAL ACCIDENTS IN THE STATE OF NEW YORK, BY NATURE OF THE INJURY, APRIL, 1911, TO MARCH, 1913.

[Compiled from Bulletins 48 to 55, Department of Labor, State of New York.]

Nature of injury.	Number.	Per cent.
<i>Factories.</i>		
Lacerations, cuts, and bruises.....	70,609	68.7
Burns.....	8,088	7.9
Sprains or dislocations.....	4,232	4.1
Fractures.....	2,539	2.5
Suffocation, effect of heat, gas, etc.....	211	.2
Multiple or other injuries.....	17,004	16.6
Total.....	102,683	100.0
Fatalities (included above).....	378	.4
Complete severance or loss of member or part.....	3,143	3.1
<i>Building and engineering.</i>		
Lacerations, cuts, and bruises.....	26,317	64.1
Burns.....	1,324	3.2
Sprains or dislocations.....	2,060	5.0
Fractures.....	1,586	3.9
Suffocation, effect of heat, gas, etc.....	200	.5
Multiple or other injuries.....	9,545	23.3
Total.....	41,032	100.0
Fatalities (included above).....	629	1.5
Complete severance or loss of member or part.....	429	1.0
<i>Mining and quarrying.</i>		
Lacerations, cuts, and bruises.....	1,112	66.7
Burns.....	39	2.4
Sprains or dislocations.....	67	4.0
Fractures.....	102	6.1
Suffocation, effect of heat, gas, etc.....	7	.4
Multiple or other injuries.....	340	20.4
Total.....	1,667	100.0
Fatalities (included above).....	40	2.4
Complete severance or loss of member or part.....	30	1.8
<i>All industries.</i>		
Lacerations, cuts, and bruises.....	98,038	67.4
Burns.....	9,451	6.5
Sprains or dislocations.....	6,359	4.4
Fractures.....	4,227	2.9
Suffocation, effect of heat, gas, etc.....	418	.3
Multiple or other injuries.....	26,889	18.5
Grand total.....	145,382	100.0
Fatalities (included above).....	1,047	.7
Complete severance or loss of member or part.....	3,602	2.5

This is an exceptionally interesting and suggestive table concisely emphasizing the material differences in the nature of the injuries sustained in different groups of employment. The table affords only a general survey of a situation which is of great practical importance in the administration of workmen's compensation laws. For illustration, burns caused 7.9 per cent of the accidents in manufactures, against 2.4 per cent in mines and quarries, and 3.2 per cent in building and engineering. In contrast, fractures caused 2.5 per cent of the accidents in manufactures, against 6.1 per cent in mines and quarries, and 3.9 per cent in building and engineering. Of the

total accidents in manufactures 0.4 per cent were fatal, against 2.4 per cent in mines and quarries, and 1.5 per cent in building and engineering. The complete severance or loss of a member, or part of the same, at the time of the accident—that is, without reference to subsequent operative results—occurred in 3.1 per cent of the accidents in manufactures, 1.8 per cent in mines and quarries, and 1.1 per cent in building and engineering.

A further analysis, according to the part of the body injured, of the industrial accident experience of New York State is available. The details in the table below are given for each of the three main divisions of New York State injuries—that is, manufacturing, building and engineering, and mining and quarrying:

TABLE 30.—INDUSTRIAL ACCIDENTS IN THE STATE OF NEW YORK, BY PARTS OF THE BODY INJURED, APRIL, 1911, TO MARCH, 1913.

[Compiled from Bulletins 48 to 55, Department of Labor, State of New York.]

Part injured.	Accidents in—					
	Manufacturing.		Building and engineering.		Mining and quarrying.	
	Number.	Per cent.	Number.	Per cent.	Number.	Per cent.
Eyes.....	10,312	10.0	1,331	3.2	128	7.7
Other head injuries.....	8,548	8.3	7,305	17.8	194	11.6
Trunk or internal.....	5,402	5.3	2,602	6.3	91	5.5
Arms or hands.....	17,197	16.8	6,050	14.8	197	11.8
Fingers.....	38,400	37.4	8,259	20.1	451	27.0
Legs or feet.....	18,162	17.7	11,032	26.9	435	26.1
Multiple or other.....	4,662	4.5	4,453	10.9	171	10.3
Total.....	102,683	100.0	41,032	100.0	1,667	100.0

This table confirms the previous observation that an analysis of this kind must needs prove of practical value in the framing of workmen's compensation legislation or the administration of workmen's compensation laws. It is shown, for illustration, that of the accidents in manufacturing industries 10 per cent were accidents to the eyes, against 7.7 per cent in mines and quarries, and only 3.2 per cent in building and engineering. In contrast, accidents to fingers account for 37.4 per cent of the total number of accidents in manufacturing industries, against 27 per cent in mining and quarrying, and 20.1 per cent in building and engineering.

The foregoing statistics and observations apply not only to the State of New York but, it may safely be assumed, to American industries generally, unless, obviously, carried on or operated under fundamentally different conditions than those known to prevail in the Empire State. This conclusion applies particularly to mining, which in New York State is of very limited extent and which can not be considered representative of the vastly more developed mining

industries, for illustration, of Pennsylvania or Montana. The methods of tabulation and analysis, however, suggest the direction in which uniformity in the presentation of the facts for the several States is particularly desirable, aside, of course, from the urgently required adoption of a standard accident certificate with regard to the essential facts of industrial accidents as to the age, sex, specific occupation, industry, previous duration of employment, nature of the injury, part of the body injured, cause of the injury, and the economic, medical and surgical results.

TABLE 31.—FATAL INDUSTRIAL ACCIDENTS IN THE STATE OF NEW YORK, BY INDUSTRY AND SEX, SEPTEMBER, 1911, TO MARCH, 1913.<sup>1</sup>

[Compiled from Bulletins 43 to 55, Department of Labor, State of New York.]

Industry.	Males.	Females.	Total.
<i>Factories.</i>			
Stone, clay, and glass products:			
Stone.....	5		5
Miscellaneous mineral products.....	4		4
Lime, cement, and plaster.....	12		12
Brick, tile, and pottery.....	5		5
Glass.....	1		1
Total.....	27		27

<sup>1</sup> In this connection the following statistics, derived from the report of the Public Service Commission (First District), New York, should be of interest:

*Number of employees killed or disabled for 3 or more days by accident, and accident rate per 1,000 employees, for public-service employees, 1908 to 1911.*

[Compiled from reports of New York Public Service Commission, First District.]

Year.	Number of wage earners, mid-December.	Killed.		Disabled for 3 days and over.	
		Number.	Rate per 1,000 wage-earners.	Number.	Rate per 1,000 wage-earners.
<i>Gas-works employees.</i>					
1908.....	5,721	1	0.2	171	29.9
1909.....	6,585	1	.2	306	46.5
1910.....	7,581	6	.8	535	70.6
1911.....	8,767	11	1.3	1,142	130.3
Total, 1908 to 1911.....	28,654	19	.7	2,154	75.2
<i>Electrical employees.</i>					
1908.....	3,856	6	1.6	66	17.1
1909.....	4,680	9	1.9	408	87.2
1910.....	5,085	9	1.8	442	86.9
1911.....	5,711	12	2.1	607	106.3
Total, 1908 to 1911.....	19,332	36	1.9	1,523	78.8
<i>Street railway, including surface, elevated, and subway employees.</i>					
1908.....	29,591	55	1.9		
1909.....	36,799	46	1.3		
1910.....	37,339	53	1.4		
1911.....	39,937	45	1.1		
1912.....	39,275	36	.9		
Total, 1908 to 1912.....	182,941	235	1.3		

TABLE 31.—FATAL INDUSTRIAL ACCIDENTS IN THE STATE OF NEW YORK, BY INDUSTRY AND SEX, SEPTEMBER, 1911, TO MARCH, 1913—Continued.

Industry.	Males.	Females.	Total.
<i>Factories—Concluded.</i>			
Metals, machines, and conveyances:			
Brass, copper, aluminum, etc.....	6		6
Iron and steel products.....	55		55
Electrical apparatus.....	8		8
Vehicles.....	44		44
Boat and ship building.....	8		8
Agricultural machinery.....	4		4
Total.....	125		125
Wood manufactures:			
Sawmill products.....	2		2
Planing-mill products.....	6		6
Miscellaneous wood articles.....	1		1
Furniture and cabinetwork.....	2		2
Pianos, organs, and musical instruments.....	1		1
Total.....	12		12
Leather, canvas, and rubber goods:			
Leather.....	5		5
Leather and canvas goods.....	5		5
Rubber and gutta-percha goods.....	1		1
Total.....	11		11
Chemicals, oils, paints, etc.:			
Drugs and chemicals.....	11	1	15
Paints, dyes, and colors.....	2		2
Wood alcohol and essential oils.....	1		1
Animal and mineral oil products.....	4		4
Soap, perfumery, and cosmetics.....	3		3
Miscellaneous chemical products.....	1		1
Total.....	25	1	25
Paper:			
Pulp and paper.....	20		20
Printing and paper goods:			
Paper goods.....	1		1
Printing and bookmaking.....	6	1	7
Wall paper.....	1		1
Total.....	8	1	9
Textiles:			
Wool manufactures.....	6		6
Cotton goods.....	5		5
Hosiery and knit goods.....	3		3
Other textiles of silk, wool, or cotton.....	3	1	4
Total.....	17	1	18
Clothing, millinery, laundry, etc.:			
Men's garments and furnishings.....	3	2	5
Women's garments and furnishings.....	4		4
Men's hats and caps.....	1		1
Women's headwear.....		1	1
Laundering.....	1		1
Total.....	9	3	12
Food, liquors, and tobacco:			
Flour, cereals, and groceries.....	15		15
Slaughtering and meat packing.....	1		1
Dairy products.....	1		1
Bakery and confectionery.....	7		7
Beverages.....	8		8
Total.....	32		32
Water, light, and power:			
Water pumping.....	1		1
Gas.....	8		8
Gas and electric power.....	1		1
Electric light and power.....	15		15
Steam heat and power.....	1		1
Garbage disposal.....	3		3
Total.....	29		29
Miscellaneous:			
Elevators in tenant factories.....	6		6

TABLE 31.—FATAL INDUSTRIAL ACCIDENTS IN THE STATE OF NEW YORK, BY INDUSTRY AND SEX, SEPTEMBER, 1911, TO MARCH, 1913—Concluded.

Industry.	Males.	Females.	Total.
<i>Mines and quarries.</i>			
Mines.....	20		20
Quarries.....	14		14
Total.....	34		34
<i>Building and engineering.</i>			
Excavating:			
Open excavations.....	96		96
Shafts and tunnels.....	93		93
Dredging.....	18		18
Total.....	207		207
Erecting and structural work:			
Iron and steel.....	42		42
Masonry.....	34		34
Concrete.....	16		16
Wood.....	38		38
Structural work, not specified.....	14		14
Total.....	144		144
Finishing and furnishing:			
Roofing (except sheet metal).....	4		4
Sheet-metal work.....	9		9
Painting and decorating.....	31		31
Plumbing, piping, etc.....	5		5
Electric wiring and installation.....	51		51
Installation of machinery, boilers, etc.....	16		16
Total.....	116		116
Wrecking and moving.....	6		6
Other, or miscellaneous:			
Road making and paving.....	9		9
Track laying, etc.....	82		82
Total.....	91		91
Grand total.....	919	6	925

TABLE 32.—INDUSTRIAL DISEASES REPORTED IN NEW YORK STATE, DURING THE 2 YEARS FROM SEPTEMBER, 1911, TO AUGUST, 1913.

[Compiled from Bulletins 48 to 56, Department of Labor, State of New York.]

Industry.	Cases reported.	Fatal cases.	Per cent fatal.
<i>Lead poisoning.</i>			
Manufacturing:			
White lead.....	8		
White metal goods.....	1		
Paints, inks, and colors.....	9	1	11.1
Electric batteries.....	25	1	2.9
Tinware.....	4		
Brass goods.....	1		
Wire and wire goods.....	7		
Electric cables.....	1		
Cut glass.....	2	1	50.0
Rubber goods.....	1		
Linoleum.....	2		
Cigars (labeling).....	1		
Artificial flowers.....	1	1	100.0
Casket trimmings.....	1		
Surgical instruments.....	1		
Smelting.....	4	1	25.0
Printing.....	4	1	25.0
Shipbuilding.....	1		
Painting (in shops, etc.):			
Carriages, wagons, automobiles, and cars.....	25	4	16.0
Agricultural implements.....	5		
Heating apparatus.....	1		
Metal house trim.....	3		
Pianos.....	1		
Architectural ironwork.....	2		
Theatrical scenery, signs, etc.....	5	1	20.0
Miscellaneous.....	1		

TABLE 32.—INDUSTRIAL DISEASES REPORTED IN NEW YORK STATE, DURING THE 2 YEARS FROM SEPTEMBER, 1911, TO AUGUST, 1913—Concluded.

Industry.	Cases reported.	Fatal cases.	Per cent fatal.
<i>Lead poisoning—Continued.</i>			
Building:			
House painting.....	99	14	14.1
Plumbing, etc.....	4	2	50.0
Other or indefinite.....	9	2	22.2
Total.....	239	29	12.1
<i>Poisonings other than lead.</i>			
Arsenic poisoning:			
Manufacture of—			
Colors.....	2		
Paint.....	1		
Tanning of leather.....	1		
Total.....	4		
Brass poisoning:			
Setting gun sights.....	1		
Mercury poisoning:			
Manufacture of—			
Rubber goods.....	1	1	100.0
Fur goods.....	1		
Hair goods.....	1		
Total.....	3	1	33.3
Phosphorus poisoning:			
Manufacture of matches.....	1	1	100.0
Wood-alcohol poisoning:			
Varnishing.....	1		
<i>Anthrax.</i>			
Tanning of leather.....	2	1	50.0
Baggage handling (steamship).....	1		
Manufacture of rugs.....	1		
Veterinary.....	1		
Total.....	5	1	20.0
<i>Caisson disease.</i>			
Shafts and tunnels.....	30	1	3.3
Grand total.....	284	33	11.6

### INDUSTRIAL ACCIDENT STATISTICS OF MASSACHUSETTS.<sup>1</sup>

The experience of the State of Massachusetts under the workmen's compensation law adopted in 1911 and amended in 1912 includes 474 fatal accidents and 89,694 nonfatal accidents reported to the Industrial Accident Board. The statistical digest of these accidents is briefly summarized as follows:

Aside from the 474 fatal accidents occurring to persons entitled to compensation for injury, if insured, there were 71 additional fatalities reported to the Industrial Accident Board, which on investigation were found not to have occurred in the course of the employment, or which for other reasons were not subject to the workings of the compensation act. In other words, out of 545 fatal accidents in Massachusetts industries during the year ending June 30, 1913, the proportion entitled to compensation, if protected by insurance, was 87.0 per cent. Of the 474 fatal injuries to which

<sup>1</sup> Data are from First Annual Report of the Massachusetts Industrial Accident Board.

the act applied, 290, or 61.2 per cent, were insured. In 112 of these cases no dependents were left, but in the remaining 362 cases there were 873 dependents, and of this number 770 were totally dependent, and 103 were partially dependent, upon the supporting member of the family. The economic importance of workmen's compensation is therefore clearly brought out by the provision made for the needs of dependent survivors in cases of fatal industrial accidents. The large majority of the persons fatally injured were married, and in about 60 per cent of the cases the surviving widows were left in a state of dependency.

Of the 89,694 nonfatal accidents, 68,586, or 76.5 per cent, were reported as injuries which incapacitated the employee for two weeks or less, and of this number 36,901, or about 41 per cent of the nonfatal accidents reported, represented injuries incapacitating the employee for one day only. The practical usefulness of requiring the reporting of industrial accidents involving less than one day's loss of labor is clearly established by the results of this analysis. Even though no compensation is ever likely to be paid for such accidents the reporting of the same does not involve a serious office difficulty, whereas from an economic as well as from a medical point of view the facts are of considerable importance. The details of the Massachusetts experience for the year ending June 30, 1913, are given in the table below:

TABLE 33.—DURATION OF DISABILITY CAUSED BY NONFATAL INJURIES ACCORDING TO EXPERIENCE UNDER THE WORKMEN'S COMPENSATION LAW OF MASSACHUSETTS FOR YEAR ENDING JUNE 30, 1913.

Duration of disability.	Persons injured.	
	Number.	Per cent.
2 weeks and under <sup>1</sup> .....	68,586	76.5
2 to 4 weeks.....	10,568	11.8
4 to 8 weeks.....	6,638	7.4
8 to 13 weeks.....	2,355	2.6
13 to 26 weeks.....	1,275	1.4
Over 26 weeks.....	272	.3
Total.....	89,694	100.0

<sup>1</sup> Of the accidents causing disability of less than two weeks, 36,901, or 41 per cent of the nonfatal accidents, caused a disability duration of one day or less.

The number of days' work lost as the result of nonfatal industrial accidents in Massachusetts during the year ending June 30, 1913, estimated on the basis of the mean duration of disability, was 1,156,787; or in weeks the amount of time lost was 165,255. On the basis of days lost the Industrial Accident Board found that the number of persons employed in Massachusetts industries and constantly disabled on account of industrial accidents was 3,855 during the year ending June 30, 1913. The average duration of disability,

of 89,694 accidents, was 12.9 days, but this duration includes the accidents involving the loss of one day's labor, which it would seem requires to be construed as the first day of the injury, although the actual loss may not have been for the entire day.

The wage loss resulting from the industrial accidents was estimated by the board at \$2,965,225, or approximately \$10,000 for each working day. Of this amount, \$2,631,085, or 88.7 per cent, was a wage loss to insured wage earners and \$334,140 was a wage loss to uninsured injured employees, or their dependents. The estimated payments by insurance companies for medical and hospital attention, disability and dependency compensation, including the estimated contingent liabilities to dependents of workmen fatally injured, and for those whose disability had not terminated at the end of the calendar year, was \$1,677,380.82. This amount is exclusive of the cost of insurance administration. The average amount paid for disability and medical attention, according to the estimate of the Industrial Accident Board, was \$5,000 for each working day, and the average cost for each reported accident, not including the cost of insurance administration, was \$18.70.

In considering the results of this experience it is necessary to keep in mind the nature of the industries carried on in Massachusetts, and particularly the predominance of the textile industries and the boot and shoe industries, both of which are relatively free from extreme occupational hazard but peculiarly liable to injuries of a minor character involving but a comparatively short duration of disability. An additional factor peculiar to Massachusetts is the unusually large proportion of women employed in industry, for according to the returns of the United States census for 1910 the number of occupied males was 1,086,767, and the number of occupied females was 444,301. The relative proportion of female employees to every 100 males was, therefore, 40.9, as compared with 24.0 for Pennsylvania, 32.6 for New York, and 26.8 for the continental United States. The Massachusetts experience, therefore, can not safely be applied to the Nation as a whole, if only because of the comparative absence of the most dangerous industries, such as mining, smelting, logging, etc. The three Massachusetts industry groups showing the largest number of nonfatal accidents are the metal or iron and steel group, the textile group, and road, street, and bridge transportation. The 474 fatal accidents in Massachusetts industries subject to the workmen's compensation act were distributed by industrial groups as follows.

TABLE 34.—NUMBER OF FATAL ACCIDENTS, BY INDUSTRY GROUPS, UNDER THE MASSACHUSETTS WORKMEN'S COMPENSATION ACT, JULY 1, 1912, TO JUNE 30, 1913.

Industry group.	Fatal accidents.	Industry group.	Fatal accidents.
Road, street, and bridge transportation	183	Agriculture and forestry.....	6
Building trades.....	71	Paper.....	5
Trade.....	42	Chemical products.....	5
Miscellaneous industries.....	31	Metal and metal products.....	5
Textiles.....	25	Extraction of minerals.....	4
Iron and steel.....	24	Clay, glass, and stone products.....	4
Water transportation.....	21	Express companies.....	3
Food and kindred products.....	10	Post, telegraph, and telephone.....	2
Lumber and its manufacture.....	9	Professional service.....	1
Leather and its finished products.....	8	Printing and bookbinding.....	1
Domestic and personal service.....	8		
Liquors and beverages.....	6	Total.....	474

The principal causes of these fatal accidents, represented by at least 10 deaths or more, are summarized in the table below:

TABLE 35.—CAUSES OF FATAL ACCIDENTS, UNDER THE MASSACHUSETTS WORKMEN'S COMPENSATION ACT, JULY 1, 1912, TO JUNE 30, 1913.

Cause.	Fatal accidents.	Cause.	Fatal accidents.
Railroad equipment.....	119	Boiler explosions and burns.....	15
Falls.....	66	Excavating.....	14
Vehicles.....	43	Cranes.....	11
Hand labor.....	37	Miscellaneous (unclassified).....	11
Elevators.....	33	Asphyxiation, drowning, etc.....	10
Electricity.....	25	All other causes.....	70
Street railways.....	20		
		Total.....	474

The ages of the persons fatally injured, by divisional periods of life but without reference to the exposure to risk, are given in the table following, which brings out the fact that of the 474 accidents, 248, or 52.3 per cent, occurred at the age period of 21 to 39, which from an economic point of view must be considered of most importance.

TABLE 36.—AGES OF PERSONS FATALLY INJURED, UNDER THE MASSACHUSETTS WORKMEN'S COMPENSATION ACT, JULY 1, 1912, TO JUNE 30, 1913.

Age group.	Number fatally injured.	Per cent at each age.
Under 16 years.....	4	0.8
16 to 20 years.....	18	3.8
21 to 29 years.....	135	28.5
30 to 39 years.....	113	23.8
40 to 49 years.....	83	17.5
50 to 59 years.....	66	13.9
60 years and over.....	55	11.6
Total.....	474	100.0

The classified weekly wages of those fatally injured indicate that the large majority were persons earning wages not much above the minimum for family existence and inadequate as a source of pecuniary provision for dependent survivors in the event of death. Of the 474 persons fatally injured, 27, or 5.7 per cent, earned \$8 or less; 288, or 60.8 per cent, earned from \$8 to \$15; 102, or 21.5 per cent, earned from \$15 to \$20; and only 57, or 12 per cent, earned over \$20.

Among the 89,694 nonfatal accidents there were 967 cases of special injuries, for which additional compensation is provided by the act. The periods for which this compensation is paid are shown in the table following:

TABLE 37.—SUMMARY OF SPECIAL INJURIES, UNDER THE MASSACHUSETTS WORKMEN'S COMPENSATION ACT, JULY 1, 1912, TO JUNE 30, 1913.

Nature of injury.	Cases.		Period of additional compensation (weeks).
	Number.	Per cent.	
Both feet lost.....	1	0.1	} 100
Both eyes lost.....	2	.2	
One eye lost.....	47	4.9	} 50
One hand lost.....	35	3.6	
One foot lost.....	22	2.3	
Two or more fingers lost.....	133	13.7	} 25
Two or more toes lost.....	21	2.2	
One finger lost.....	672	69.5	} 12
One toe lost.....	34	3.5	
Total.....	967	100.0	.....

The frequency of nonfatal accidents in proportion to the exposure to risk has not as yet been accurately determined in connection with the Massachusetts experience otherwise than as subsequently stated. The most recent data of the bureau of statistics show that there are approximately 600,000 wage earners employed in manufacturing occupations in Massachusetts, all of whom, if insured, come under the act. This number, however, is exclusive of those engaged in agriculture, forestry, animal husbandry, quarrying, transportation, trade, express companies, personal and domestic service, telegraph and telephone companies, and a number of other trades and occupations not specifically enumerated by the Industrial Accident Board. With the exception of those employed in domestic service, farm laborers, and railway employees, who are otherwise covered by Federal legislation, all these employees, when insured, are subject to the operations of the act. Including steam railway employees engaged in interstate business and other classes of labor not specifically classified by the Massachusetts Bureau of Statistics and those employed in construction work on buildings, trade, express business, and various other forms

of transportation, and excluding all domestic service and all agricultural laborers specifically exempt by the act, according to the minimum estimate of the board there are at least 800,000 wage earners in Massachusetts eligible, if insured, to come under the workmen's compensation act. In adopting the exact terms of the report of the board in the foregoing observations, it is practically certain that the best possible estimate of persons subject to the operations of the act has been arrived at, and additional thereto it may be stated, in the words of the commission, that approximately 81 per cent of the injured were insured. Unfortunately there are no accurate data as regards the number of employees covered by insurance under the act, and with special reference to specific employments or occupations, in the aggregate, and making allowance for a reasonable margin of error, the minimum number of persons insured under the act is fixed by the board at 600,000. For certain groups of employments the number of persons insured has been estimated by the board with approximate accuracy, and the following table shows the number of accidents per 1,000 employees for 25 selected branches of industry:

TABLE 38.—ACCIDENT RATES PER 1,000 EMPLOYEES IN THE PRINCIPAL INDUSTRIES OF MASSACHUSETTS, JULY 1, 1912, TO JUNE 30, 1913, UNDER THE WORKMEN'S COMPENSATION ACT.

Industry.	Average number of employees.	Number of accidents.	Accident rate per 1,000 employees.
Automobile factories.....	3,654	779	213.2
Electrical supplies.....	20,317	4,119	202.7
Foundries and metal working.....	37,544	6,868	182.9
Slaughtering and packing houses.....	3,871	611	157.8
Box makers (wood).....	3,887	541	139.2
Car and railroad shops.....	5,569	741	133.1
Rubber factories.....	16,885	2,020	119.6
Printing and publishing.....	7,518	792	105.3
Bakeries.....	6,868	675	98.3
Pianos and organs.....	4,125	364	88.2
Furniture.....	8,453	684	80.9
Paper and pulp mills.....	15,620	1,233	78.9
Tanneries.....	11,372	858	75.4
Cotton mills.....	112,384	7,467	66.4
Jewelry factories.....	9,899	654	66.1
Box makers (paper).....	4,186	266	63.5
Woolen and worsted mills.....	54,248	3,360	61.9
Candy.....	6,794	418	61.5
Carpet mills.....	5,928	360	60.7
Knitting mills.....	10,142	510	50.3
Shoes.....	91,502	4,516	49.4
Marble and stone cutters.....	4,885	236	48.3
Dyeing and finishing textiles.....	10,757	458	42.6
Makers of blank books, envelopes, tags, paper bags, etc.....	4,421	167	37.8
Clothing makers.....	12,052	188	15.6

According to this tabulation the eight most dangerous industries were automobile factories, electrical supplies, foundries and metal working, slaughtering and packing houses, box makers (wood), car and railroad shops, rubber factories, and printing and publishing.

The average rate for the entire group of 25 selected branches was 82.2 per 1,000 employees, or 8.2 per cent.

The causes of fatal and nonfatal accidents in Massachusetts are given in considerable detail, arranged in alphabetical order, with numerous subdivisions. The large majority of accidents occurred in connection with hand labor, which, of course, as such, can not be considered the cause of an accident but rather a contributory condition. The subdivision of direct causes in connection with the 29,737 nonfatal accidents attributed to hand labor was as follows: Caught by material, 12,632 accidents; flying particles from hammering tools, 539; slivers, sharp edges, corners, etc., 11,641; strains from lifting, etc., 1,832; struck by tools, 3,093. The proportion of all nonfatal accidents attributed to hand labor or contributory conditions was 33.2 per cent of the total of nonfatal accidents due to all causes.

Occupational diseases were included in this classification, and it is of interest to note that there were 104 cases attributed to nonfatal occupational diseases, or, respectively, 13 to anthrax, 12 to lead poisoning, 2 to arsenic poisoning, and 77 to miscellaneous occupational diseases. Of the 13 cases of anthrax, 9 occurred at tanneries and 2 in the manufacture of shoes. The 12 cases of lead poisoning were too generally distributed to connect the same conclusively with any specific industrial process. There were only two fatal cases of occupational diseases, one of which was a case of anthrax in a tannery, and one classed under miscellaneous causes in chemical work.

Additional to the statistics published by the Industrial Accident Board, a considerable amount of useful information regarding the workmen's compensation experience of Massachusetts is published in the annual report of the insurance commissioner.<sup>1</sup> The total amount of pay roll upon which premiums were based was \$489,795,362. The amount of earned premiums was \$5,252,667, and the amount paid in losses was \$1,071,101, resulting in a loss cost of \$0.35 per \$100 of pay roll. The total amount incurred in losses was 32.6 per cent of the earned premiums. The losses were distributed as follows: The amount paid on account of death and specified injuries was \$161,788; the amount paid in weekly indemnities was \$571,984; and the amount paid for medical services was \$337,329. The estimated outstanding liabilities amounted to \$642,742, of which \$382,672 was charged to deaths and specified injuries, \$230,438 to weekly indemnities, and \$29,632 to medical services. The experience, according to the principal classifications, with terminated policies between July 1, 1912, and December 31, 1913, limited to risk classes having pay rolls of \$3,000,000 and over, was as follows.

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<sup>1</sup> Fifty-ninth Annual Report of the Insurance Commissioner of Massachusetts, Part II.

TABLE 39.—MASSACHUSETTS WORKMEN'S COMPENSATION EXPERIENCE IN PRINCIPAL RISK CLASSIFICATIONS AND WITH TERMINATED POLICIES, JULY 1, 1912, TO DEC. 31, 1913.

Risk classification.	Pay rolls upon which premiums are based.	Earned premiums.	Total losses paid.	Total estimated losses outstanding.	Total losses incurred.	Per \$100 of pay roll.	
						Net loss cost.	Non-participating rates, March, 1914.
Boot and shoe manufacturers.....	\$42,264,508	\$294,731	\$36,224	\$14,417	\$50,641	\$0.12	\$0.30
Boot and shoe machinery manufacturers....	3,007,881	31,716	6,514	262	6,776	.23	.60
Calico printers.....	3,485,353	35,547	6,534	1,280	7,814	.22	.75
Carpenters, construction work, not bridge building.....	4,170,829	129,687	31,747	21,096	52,753	1.26	2.62
Carpet and rug manufacturers.....	3,814,409	27,376	3,782	1,794	5,546	.15	.50
Clerical office employees in manufacturing plants.....	24,945,105	46,589	2,160	378	2,538	.01	.12½
Clerical office employees not in manufacturing plants.....	25,572,328	39,937	2,646	148	2,794	.01	.10
Clothing and garment manufacturers.....	3,774,171	18,095	1,970	1,037	3,027	.08	.30
Contractors: Wooden residences, private stables, etc.....	4,003,993	98,907	8,504	1,802	10,306	.26	1.87
Drivers.....	12,932,321	184,952	45,612	40,625	86,237	.67	1.12
Dry-goods stores.....	3,519,255	14,530	2,235	411	2,646	.08	.25
Hotels (excluding laundry).....	4,535,176	33,809	6,484	3,475	9,959	.22	.30
Jewelry manufacturers.....	4,832,453	40,512	5,311	2,200	7,511	.16	.40
Machine shop without foundry.....	9,491,841	119,094	29,259	7,635	36,894	.39	.80
Masonry work (not otherwise classified); no blasting.....	3,000,890	139,325	36,458	27,243	63,701	2.12	3.75
Printers (power), publishers, lithographers, and newspaper offices.....	7,810,831	69,616	12,179	9,185	21,364	.27	.59
Restaurants and counter lunch rooms.....	3,403,833	20,632	6,720	3,761	10,481	.31	.35
Salesmen, collectors, and messengers.....	5,261,289	9,786	1,092	66	1,153	.02	.12½
Stores (not otherwise classified), retail.....	14,524,238	49,496	7,569	1,539	8,908	.06	.20
Stores (not otherwise classified), wholesale.....	3,954,502	18,120	6,074	1,241	7,315	.18	.35
Street railway companies: Electric, all systems, urban and interurban.....	10,244,046	182,213	34,126	29,677	63,803	.62	5.90
Tanners and curriers.....	3,795,431	51,464	9,196	4,636	13,832	.36	2.29
Textile manufacturers, cotton and woolen mills, excluding shoddy manufacturers.....	86,339,122	571,404	120,101	80,994	201,095	.23	.85
Wire-drawing works.....	3,879,764	45,692	16,416	10,553	26,993	.70	2.00
Writing and blank-book paper manufacturers.....	4,874,252	46,424	12,480	9,693	22,173	.45	.75

With regard to the rates charged, the following quotation from the report of the insurance commissioner for 1913 is of interest:

We have now had two years of workmen's compensation in Massachusetts. At the outset there was very little in the way of pertinent experience to guide the companies or the insurance department or independent experts in the judging of rates for insurance covering this liability. As, however, the companies had the service to sell and the public were the buyers, rates were naturally fixed by the sellers, and high enough so that they would not lose by the transactions, the same as the dealer in any line of goods makes a price that will give him a profit. It was soon seen that the rate was too high, and a horizontal cut of 25 per cent was made. Other changes followed, all in the direction of reducing rates, until now they are at a level where there is probably no question of their sufficiency as a whole, but rather one of adjustment; that is, the lowering of one rate that experience shows to be too high and the increase of another which is too low, the increases and the decreases about offsetting each other, and thus leaving the total costs of this insurance about the same as at present.

As regards individual rates, the report states that:

Since the enactment of the workmen's compensation law it has been evident to all who have considered the matter that justice demands that an individual plant which is conspicuously meritorious by reason of its physical condition should not pay as high a rate for its workmen's compensation coverage as another plant in the same industry where conditions are only average. In recognition of this view the insurance commissioner, as outlined in the fifty-seventh annual report, established an inspection bureau, which became operative soon after the enactment of the workmen's compensation act. Its duties were to inspect the plants of those employers for whom applications for special reduced rates were made by the insurance companies. Application blanks were prepared by the insurance department and furnished to the insurance companies, together with a blank designed to afford an opportunity for giving the experience of the applicant for a reduced rate in respect to accidents in his plant covering a series of years of its operation.

The subject of schedule rating is briefly referred to in part as follows:

The establishment of this system means: First, that a schedule be prepared by experts in modern methods of accident prevention which will show what charge should be made for each defect which causes the risk to be poorer than the standard with which it is compared, and what credit shall be allowed for each point in respect to which it is a better risk than the standard; second, that every risk must be inspected by capable disinterested inspectors in order to ascertain the actual facts to be used in making the charges and allowing credits for establishing the rates. This method must be followed for each and every one of the thousands of risks in a given State. It is evident that the task of applying such an analytical standard in Massachusetts would be a work of great magnitude, and that its very basis is a correct rate for the average risk of the various classes.

It is undoubtedly a fact that inspections made by individual companies are not absolutely satisfactory for the reason that the competitive element is always present, and presumably to some extent influences the inspector's report and the underwriter's conclusions drawn therefrom. Individual company inspections mean a duplication of labor, since several companies under competition would repeat each other's work. Furthermore, the inspections are not uniform. Some are good, others indifferent. A central bureau, therefore, which would make inspections for all insurance carriers (both stock and mutual) without prejudice, absolutely free from the conscious or subconscious element of competition, would be in a position to produce results which would be uniform and free from many objections inherent in rating systems operated by individual companies independently of each other, and would bring about a standardization in accident prevention methods, as well as cut down the expenses of rate making. While such inspections would naturally be verified in some cases by representatives of the State for the purpose of determining the good faith of the bureau making the inspections, it would not seem to be necessary for the State to employ a sufficient staff to verify all such inspections, since the principle having been established and its operation placed in competent hands

there should be no difficulty in accurately measuring each varying degree of hazard according to the principles of the schedule. This system would not take into consideration a generally recognized factor in the establishment of individual rates—namely, the moral hazard of the risk. It should be possible, however, to work out a scheme for recognizing this factor. Such a scheme would probably give due weight to the actual experience which any given risk can show from its past record.

The experience which has thus far been had under the Massachusetts workmen's compensation act seems to have met the reasonable expectations of employers, employees, and the general public. The adjustments of claims under the act have, as a rule, been prompt, and the number of requests for arbitration proceedings has not been excessive. Only 26 cases have been appealed to the supreme judicial court. About 3,000 claims regarding which there was some dispute were adjusted by the mediation members of the board by conference with employees and insurers. The amount paid by employers in Massachusetts for premiums under the workmen's compensation act is estimated at 1.2 per cent of the pay roll. The average wages in the manufacturing industries were estimated at \$551.36 a year. The actual cost of losses under the workmen's compensation act, to be charged against the finished product of Massachusetts industries, according to the Industrial Accident Board, was \$0.0009 for each dollar of product, exclusive of the cost of insurance administration; or, in the words of the board, "the consumer paid for every \$10 unit of purchased product less than 1 cent as the per capita cost for the actual losses paid under the workmen's compensation act."

### INDUSTRIAL ACCIDENT STATISTICS OF ILLINOIS.<sup>1</sup>

Commencing with the six months ending December 31, 1907, the Bureau of Labor Statistics of Illinois has issued reports of considerable interest and value on industrial accidents. The reports are in conformity with a law which became effective July 1, 1907, providing as follows:

SECTION 1. Be it enacted by the people of the State of Illinois, represented in the General Assembly: That it shall be the duty of every person, firm or corporation employing laborers, artisans, mechanics, miners, clerks, or any other servants or employees of any character, to make a report to the State bureau of labor statistics of every serious injury entailing a loss of thirty or more days' time, or death of every employee caused by accident while in the performance of any duty or service for such employer within thirty (30) days from the date of such injury or death. Such report shall give the name of the employer, character of business of such employer, where located, date of injury or death, name of person killed or injured, character of employment or service, and cause of such injury or death, and when injury alone, then the character and extent of such injury,

<sup>1</sup> Data are compiled from reports of the Bureau of Labor Statistics, Industrial Accidents 1907 to 1912.

residence, nativity and age of the person injured or killed, whether married or single, and, if known, how many persons are dependent upon such employee.

SEC. 2. It shall be the duty of the State bureau of labor statistics to cause such reports to be made and to enforce the provisions of this act and shall cause all of such accidents or deaths by accidents to be classified into trades or kinds of employment, and shall cause the same to be published at least once each year on or before January 1st.

SEC. 3. Any person, firm, or corporation failing or refusing to make the reports as provided in section 1 of this act shall be deemed guilty of a misdemeanor and shall, upon conviction, be fined in a sum not less than twenty-five (\$25.00) dollars nor more than two hundred (\$200.00) dollars.

In accordance with this act, employers were required to report all fatal and nonfatal accidents involving a loss of thirty days' working time or more.

During the six months ending December 31, 1907, a total of 1,392 casualties were reported, of which number 298, or 21.4 per cent, were fatal. Out of this beginning a considerable experience has developed, which is briefly presented, chiefly in the tables (47 to 57) following this discussion. The reports published annually are unusually complete and contain much information in detail regarding the causes of accidents and the character of the injury, together with information as to time and place, age, sex, conjugal condition, etc., and, of course, the occupation at the time of injury. Commencing with the year 1912 the scope of the inquiry was enlarged to include accidents causing a loss of 15 days' time or more, and also all accidents occurring under the workmen's compensation act, which became effective May 1, 1912, and which, therefore, on December 31 had been in operation for eight months. Under this law reports were required to be made by employers (electing to come under the act) of nonfatal accidents causing a loss of time of more than one week, together with information as to the wages paid, the hours employed, the amount of compensation received or payable, and the expenses of taking care of the victims of industrial accidents. It is conceded that the reports are not entirely complete, owing to the fact that some fatal accidents, and probably many minor injuries, are not reported to the labor bureau. During the year 1912 there were 589 fatal accidents, of which 183, or 31.1 per cent, occurred to employees under the compensation act, and 406, or 68.9 per cent, to employees whose employers had rejected the act. Of the total nonfatal accidents reported, 8,730 occurred under the compensation act and 3,409 outside of the law; the total number of nonfatal accidents reported for the year was, therefore, 12,139, as compared with 4,510 nonfatal accidents reported in 1911. The increase is largely

in consequence of the workmen's compensation law requiring the reporting of accidents causing less than 30 days' loss of time.

With special reference to compensation, the report for 1912 states that out of 183 fatal accidents, compensation was allowed in only 79 cases, for a total sum of \$177,317, or an average compensation at death of \$2,245. Additional thereto the sum of \$2,153 was allowed for medical and other services. This information, however, is incomplete, for considerable sums were paid on account of cases in which the final settlement had been delayed, including 23 cases, with a total allowance of \$42,032. In view of the changes in the law, and the incomplete reports, the consolidated statistics for the period 1908 to 1912 are not as satisfactory as would be desirable. It has seemed best not to include, as a rule, the data contained in the first report for 1907 for reasons which do not seem to require discussion. The table following exhibits the economic aspects of the industrial accident problem in the State of Illinois as emphasized by the number of children and dependents of persons killed or injured during the five-year period ending with 1912:

TABLE 40.—NUMBER OF DEPENDENTS OF PERSONS KILLED OR INJURED IN INDUSTRIAL ACCIDENTS IN ILLINOIS, BY INDUSTRIES, JAN. 1, 1908 TO DEC. 31, 1912.

Industry.	Fatal accidents.			Nonfatal accidents.		
	Persons killed.	Children of persons killed.	Dependents of persons killed.	Persons injured.	Children of persons injured.	Dependents of persons injured.
Coal mining.....	1,014	1,391	2,068	3,955	4,976	7,061
Contracting.....	118	73	125	702	538	845
Manufacturing.....	512	1,248	392	13,061	15,428	8,667
Railroading:						
Elevated.....	22	37	44	1	.....	.....
Interurban.....	37	17	37	108	128	204
Steam.....	1,214	1,284	1,936	5,206	5,239	8,634
Street.....	36	44	67	284	315	522
Underground.....	9	4	11	96	87	148
Stone quarrying.....	17	14	23	123	92	162
Miscellaneous.....	105	97	169	2,160	1,417	2,383
Total.....	3,084	3,209	4,872	25,696	18,221	28,626

<sup>1</sup> Data cover only 1908, 1909, and cases under workmen's compensation law, 1912.

According to this table, there were 3,084 persons killed in the industries of the State of Illinois during the five years ending with 1912, and 25,696 were injured, a total of 28,780 accidents, limited in the manufacturing industries, however, to the years 1908 and 1909, and the workmen's compensation cases for 1912. The table is therefore merely a consolidated return of available statistics, and useful chiefly for the purpose of emphasizing the relative loss of life, according to principal industries, and the resulting economic loss as measured by the number of children and dependents; for, as shown by the table, in the case of fatal accidents there were 4,872 dependents, and

in the case of nonfatal accidents, 28,626, a combined total of 33,498, which, however, is unquestionably a considerable understatement of the facts.

The conjugal condition of the persons injured in Illinois industries is briefly set forth in the next table for the further purpose of emphasizing the economic aspects of the industrial accident problem in a representative industrial State. For all industries combined, it appears that the conjugal condition was reported for 3,283 persons fatally injured, and of this number 2,048, or 62.4 per cent, were married. The details, by industries, are given in the table below:

TABLE 41.—CONJUGAL CONDITION AS FAR AS REPORTED OF PERSONS KILLED OR INJURED IN ILLINOIS INDUSTRIES, JULY 1, 1907, TO DEC. 31, 1912.

Industry.	Fatal accidents.			Nonfatal accidents.		
	Persons killed.	Married persons killed.	Per cent married.	Persons injured.	Injuries to married persons.	Per cent married.
Coal mining.....	1,112	665	59.8	4,225	2,357	55.0
Contracting.....	81	50	61.7	623	377	60.5
Manufacturing.....	540	349	64.6	13,221	7,470	56.5
Railroading:						
Elevated.....	22	15	68.2	5	2	40.0
Interurban.....	40	21	52.5	116	72	62.1
Steam.....	1,301	846	65.0	5,581	3,516	63.0
Street.....	44	28	63.6	304	187	61.5
Underground.....	10	4	40.0	106	62	58.5
Stone quarrying.....	19	10	52.6	127	75	59.1
Miscellaneous.....	114	60	52.6	1,995	1,102	55.2
Total.....	3,283	2,048	62.4	26,303	15,220	57.8

The age factor is also of considerable economic importance. In the table following the accidents are summarized by divisional periods of life, but unfortunately the data can not be correlated to the ages of the industrially employed population. Such information is not available through the census, and it would be hazardous to apply an assumed age distribution on the basis of past experience, in view of the practical certainty that conditions have undergone a material change in recent years.

TABLE 42.—AGES OF PERSONS KILLED OR INJURED IN ILLINOIS INDUSTRIES, JULY 1, 1907, TO DEC. 31, 1912.

Age group.	Fatal accidents.		Nonfatal accidents.	
	Number killed.	Per cent of total.	Number injured.	Per cent of total.
Under 20 years.....	158	4.7	1,872	7.0
20 to 24 years.....	498	14.7	5,088	19.0
25 to 29 years.....	619	18.3	5,139	19.2
30 to 34 years.....	475	14.0	3,856	14.4
35 to 39 years.....	404	13.7	3,207	12.0
40 to 44 years.....	295	8.7	2,527	9.4
45 to 49 years.....	253	7.5	1,927	7.2
50 to 54 years.....	202	6.0	1,154	4.3
55 to 59 years.....	127	3.8	680	2.5
60 years and over.....	131	3.9	571	2.1
Age not reported.....	160	4.7	769	2.9
Total.....	3,382	100.0	26,790	100.0

The table itself is self-explanatory, but additional details for 10 separate industrial groups are given in Tables 50 and 51.

A large proportion (62.7 per cent) of persons killed or injured in Illinois industries are of foreign birth. The nativity factor is one of considerable importance in the settlement of workmen's compensation claims, which call for the payment of indemnities to the widows, living in their native land, of foreigners killed in this country. The table following exhibits the consolidated returns for the ten principal industry groups.

TABLE 43.—NATIVITY OF PERSONS KILLED OR INJURED IN ILLINOIS INDUSTRIES, JULY 1, 1907, TO DEC. 31, 1912 (CASES UNDER WORKMEN'S COMPENSATION LAW, 1912, NOT INCLUDED).

Nativity.	Fatal accidents.		Nonfatal accidents.		Nativity.	Fatal accidents.		Nonfatal accidents.	
	Number killed.	Per cent of total.	Number injured.	Per cent of total.		Number killed.	Per cent of total.	Number injured.	Per cent of total.
American.....	1,431	44.7	6,732	37.3	Mexican.....	7	0.2	2	.....
Armenian.....			17	.1	Norwegian.....	18	.6	77	0.4
Austrian.....	114	3.6	834	4.6	Polish.....	184	5.7	2,173	12.0
Belgian.....	12	.4	10	.1	Roumanian.....	5	.2	14	.1
Bohemian.....	25	.8	225	1.2	Russian.....	56	1.7	611	3.4
Bulgarian.....	8	.2	88	.5	Scandinavian.....			6	.....
Canadian.....	9	.3	31	.2	Scotch.....	44	1.4	113	.6
Danish.....	3	.1	23	.1	Servian.....			22	.1
English.....	69	2.1	319	1.8	Slavic.....	71	2.2	102	.6
Finnish.....			2		Swedish.....	96	3.0	469	2.6
French.....	28	.9	119	.7	Swiss.....	1		3	.....
Germany.....	245	7.7	1,543	8.6	Turkish.....	2		7	.....
Greek.....	43	1.3	83	.5	Welsh.....	9	.3	18	.1
Hungarian.....	48	1.5	297	1.6	Miscellaneous.....	18	.6	604	3.3
Irish.....	165	5.2	645	3.6	Not reported.....	90	2.8	1,109	6.1
Italian.....	307	9.6	1,352	7.5					
Lithuanian.....	86	2.7	383	2.1	Total.....	3,199	100.0	18,060	100.0
Macedonian.....	5	.2	27	.2					

This table requires no extended analysis. Of the 3,199 persons killed in Illinois industries, 1,431, or 44.7 per cent, were native-born Americans, while 307, or 9.6 per cent, were Italians; 245, or 7.7 per cent, were Germans; 184, or 5.7 per cent, were Poles; and 165, or 5.2 per cent, were Irish. Of the 18,060 nonfatally injured persons, 6,732, or 37.3 per cent, were native-born Americans; 2,173, or 12 per cent, were Poles; 1,543, or 8.6 per cent, were Germans; 1,352, or 7.5 per cent, were Italians; 834, or 4.6 per cent, were Austrians; 645, or 3.6 per cent, were Irish; and 611, or 3.4 per cent, were Russians. The percentage distribution varies, therefore, considerably for the two classes of accidents, due to causes which can be disclosed only by a specialized analysis, with a due regard to the numbers of various nativities employed in the industries of the State of Illinois, ascertainable only by means of a special inquiry. The details of this group are given in Tables 52 and 53.

The accident frequency, by month of occurrence, is disclosed in the next table. This table has not been corrected for the varying lengths of the different months, which, however, can easily be done if more refined methods of statistical analysis appear to be desirable. The

statistics in the consolidated table for all industries are materially disturbed by the Cherry Hill mine disaster, which occurred in the month of November, 1909. The additional details of this analysis are given in Tables 54 and 55.

TABLE 44.—INDUSTRIAL ACCIDENTS IN ILLINOIS, BY MONTH OF OCCURRENCE, JAN. 1, 1908, TO DEC. 31, 1912 (CASES UNDER WORKMEN'S COMPENSATION LAW, NOT INCLUDED).

Month.	Fatal accidents.		Nonfatal accidents.		Month.	Fatal accidents.		Nonfatal accidents.	
	Number killed.	Per cent of total.	Number injured.	Per cent of total.		Number killed.	Per cent of total.	Number injured.	Per cent of total.
January.....	345	11.9	1,728	10.2	August.....	192	6.6	1,416	8.4
February.....	250	8.7	1,630	9.6	September.....	223	7.6	1,388	8.2
March.....	211	7.3	1,699	10.0	October.....	252	8.7	1,527	9.0
April.....	148	5.1	1,227	7.2	November.....	517	17.7	1,459	8.6
May.....	144	5.0	1,135	6.7	December.....	256	8.9	1,292	7.6
June.....	166	5.7	1,174	6.9	Total.....	2,931	100.0	16,956	100.0
July.....	197	6.8	1,281	7.6					

The hour of the day is a factor of special importance in connection with the problem of fatigue. Investigations of this kind have usually been more or less inconclusive, and this would seem to apply to the following table of accidents in manufacturing industries of Illinois, by the hour of the day of their occurrence, during the three years 1910 to 1912. The hour of occurrence appears not to have been reported for other industries, but the present analysis includes 11,825 accidents, of which 364, or 3.08 per cent, were fatal.

TABLE 45.—ACCIDENTS IN MANUFACTURING INDUSTRIES IN ILLINOIS, BY HOUR OF OCCURRENCE, JAN. 1, 1910, TO DEC. 31, 1912.

Hour.	Fatal accidents.		Nonfatal accidents.		Total.	
	Number killed.	Per cent.	Number injured.	Per cent.	Accidents.	Per cent.
<b>A. M.</b>						
12 to 1.....	3	0.8	62	0.5	65	0.5
1 to 2.....	1	.3	101	.9	102	.9
2 to 3.....	9	2.5	130	1.1	139	1.2
3 to 4.....	8	2.2	116	1.0	124	1.0
4 to 5.....	1	.3	110	1.0	111	.9
5 to 6.....	6	1.6	104	.9	110	.9
6 to 7.....	7	1.9	148	1.3	155	1.3
7 to 8.....	20	5.5	596	5.2	616	5.2
8 to 9.....	20	5.5	826	7.2	846	7.2
9 to 10.....	33	9.1	1,008	8.8	1,041	8.8
10 to 11.....	33	9.1	1,169	10.2	1,202	10.2
11 to 12.....	30	8.2	1,182	10.4	1,212	10.2
<b>P. M.</b>						
12 to 1.....	14	3.8	337	2.9	351	3.0
1 to 2.....	31	8.5	745	6.5	776	6.6
2 to 3.....	37	10.2	986	8.6	1,023	8.7
3 to 4.....	25	6.9	1,137	9.9	1,162	9.8
4 to 5.....	29	8.0	1,084	9.5	1,113	9.4
5 to 6.....	20	5.5	627	5.5	647	5.5
6 to 7.....	7	1.9	188	1.6	195	1.7
7 to 8.....	9	2.5	192	1.7	201	1.7
8 to 9.....	5	1.4	164	1.4	169	1.4
9 to 10.....	3	.8	147	1.3	150	1.3
10 to 11.....	7	1.9	151	1.3	158	1.3
11 to 12.....	6	1.6	151	1.3	157	1.3
Total.....	364	100.0	11,461	100.0	11,825	100.0

According to the above table, the largest number of fatal accidents occurred between 2 and 3 o'clock in the afternoon, or 10.2 per cent of the total fatal accidents. The largest number of nonfatal accidents occurred between the hours of 11 and 12 in the morning, or 10.4 per cent of the total nonfatal accidents. There is naturally a reduction in the number of accidents, both fatal and nonfatal, during the noon hour. The table does not appear to warrant final conclusions regarding the possible relation of accident liability to fatigue, but a slight tendency of this kind would seem to be apparent; it would, however, hardly be possible to disclose so subtle a factor as fatigue in industry and its relation to accident liability by a crude and very general statistical analysis of the facts.

A summary statement of the fatal and nonfatal accidents in Illinois industries during the period 1907 to 1912, according to groups of industries, with a differentiation of nonfatal accidents according to the different legal requirements, is set forth in the following table. Workmen's compensation cases, for the eight months ending with December 31, 1912, are also included.

TABLE 46.—FATAL ACCIDENTS AND LOSS OF TIME CAUSED BY NONFATAL ACCIDENTS IN ILLINOIS, BY INDUSTRIES, JULY 1, 1907, TO DEC. 31, 1912.

[Data for nonfatal accidents cover only cases with time loss of 30 days and over, except in manufacturing for the years 1910, 1911, and 1912, where data cover time loss of 15 days and over, and in cases under workmen's compensation, May to Dec., 1912 (all industries), with time loss of 7 days and over.]

Industry.	Fatal accidents.	Nonfatal accidents with a time loss of—		
		7 days and over.	15 days and over.	30 days and over.
Manufacturing.....	549	4,441	7,619	1,303
Coal mining.....	1,114	388	.....	3,854
Contracting.....	124	544	.....	163
Stone quarrying.....	20	54	.....	76
Railroading:				
Elevated.....	22	.....	.....	5
Interurban.....	40	61	.....	55
Steam.....	1,343	1,168	.....	4,450
Street.....	44	58	.....	248
Underground.....	10	44	.....	62
Miscellaneous.....	116	1,972	.....	220
Total.....	3,382	8,730	7,619	10,441

This table emphasizes the predominating importance of coal mining and steam railroading as the principal dangerous industries in the State of Illinois, accounting for 2,457 fatal accidents and 9,860 nonfatal accidents, or a total of 12,317 accidents in all industries. The aggregate for the 10 groups of industries and employments shows that there were 30,172 accidents of all kinds, and that of this number 3,382, or 11.2 per cent, were fatal. The detailed analysis of these groups is given in Table 56.

The specific occupations of persons killed or injured in the 10 industrial groups of the State of Illinois for the period 1907 to 1912 are given in Table 57. The tabular analysis is of practical interest, but the data can not be conveniently summarized for the present purpose. There is a further disadvantage, that the facts can not be correlated to the numbers employed, according to occupation, as to which no precise information is at present available. In other words, specific accident rates by occupations can not be calculated except for the coal-mining industry, which has been discussed with reasonable fullness in Bulletin No. 90 of the United States Bureau of Labor Statistics, published in September, 1910.

The large variety of causes responsible for accidents in the Illinois industries is disclosed by a special analysis of the accidents in coal mining. The details are set forth in Table 47. These facts also can not be conveniently summarized, but the table is of unusual interest as illustrating the complexity of the problem of accident prevention. The analysis includes 1,114 fatal accidents and 4,242 nonfatal injuries.

TABLE 47.—CAUSES OF ACCIDENTS IN COAL MINING IN ILLINOIS, JULY 1, 1907, TO DEC. 31, 1912.

Cause.	Number killed.	Number injured.	Cause.	Number killed.	Number injured.
Adz or ax.....		8	Falling boiler, shaker, etc.....		16
Afterdamp.....	3		Falling box.....	1	
Apoplexy.....	1		Falling brick.....		1
Blood poisoning.....		2	Falling cage.....		37
Box.....		6	Falling cap piece.....	1	
Box, etc.....		5	Falling car.....		1
Brake.....	1		Falling casting.....		2
Cable.....	1		Falling clod.....	13	131
Cage, ascending or descending.....	2	8	Falling coal.....	123	849
Cage, cribbing, etc.....	7	17	Falling coupling.....		2
Car fell off cage.....	2		Falling crossbar.....		3
Car unloader.....	2		Falling door.....	1	3
Caught between objects.....	1	226	Falling drum.....		1
Caught in objects.....		17	Falling frog.....		1
Chain, box and tongs.....		8	Falling jackscrew.....	1	1
Coal and props.....	1		Falling objects.....		36
Coal conveyor.....		1	Falling pipe.....	3	1
Coal falling down shaft.....		2	Falling prop.....		27
Coal washer.....	1		Falling rail.....		7
Collision of men.....		1	Falling rock.....	140	602
Crank shaft and disk.....		1	Falling roof.....	1	9
Crowbar.....	1		Falling scaffold.....		2
Door, or parts of.....		7	Falling shed.....		1
Dragged by team.....		1	Falling sheet.....		1
Drainpipe.....		1	Falling slate.....	131	380
Drilling out shot.....		1	Falling timber.....		15
Drill press.....		1	Falling trestle.....		1
Drowned.....	1		Falling weight.....		1
Dump, boxing on.....		1	Falling wheel.....		2
Electric shock.....	13	5	Fan.....		1
Engine, or parts of.....	1	4	Fell.....	1	59
Explosion:			Fell against object.....		12
Boiler.....	1		Fell down shaft.....	24	10
Cartridge.....	2		Fell down stairway.....		2
Dynamite.....		2	Fell from building.....	2	
Firedamp.....		1	Fell from cage.....		1
Gas.....	60	86	Fell from car.....	3	15
Gasoline.....		1	Fell from dump.....		1
Powder.....	49	56	Fell from motor.....		2
Premature blast.....	7	11	Fell from platform.....		2
Shots.....	30	29	Fell from railroad cars.....	1	1
Not specified.....	6		Fell from scaffold.....		1
Falling bar.....		6	Fell into hole.....		1
Falling board.....		1	Fell into pit.....		5







TABLE 52.—NATIVITY OF PERSONS KILLED IN ILLINOIS INDUSTRIES, JULY 1, 1907, TO DEC. 31, 1912 (CASES UNDER WORKMEN'S COMPENSATION LAW, 1912, NOT INCLUDED)—Concluded.

Nativity.	Railroad- ing, street.		Railroad- ing, under- ground.		Stone quarrying.		Miscel- laneous.		Total.	
	Num- ber.	Per- cent.	Num- ber.	Per- cent.	Num- ber.	Per- cent.	Num- ber.	Per- cent.	Num- ber.	Per- cent.
American.....	18	40.9	5	62.5	4	23.5	36	43.9	1,431	44.7
Austrian.....	1	2.3			4	23.5	2	2.4	114	3.6
Belgian.....									12	.4
Bohemian.....					1	5.9			25	.8
Bulgarian.....									8	.2
Canadian.....									9	.3
Danish.....									3	.1
English.....	1	2.3					1	1.2	69	2.1
French.....									28	.9
German.....	6	13.7	1	12.5	2	11.7	11	13.5	245	7.7
Greek.....	2	4.5					1	1.2	43	1.3
Hungarian.....					1	5.9			48	1.5
Irish.....	11	25.0			1	5.9	2	2.4	165	5.2
Italian.....							2	2.4	307	9.6
Lithuanian.....			1	12.5			1	1.2	86	2.7
Mexican.....									7	.2
Norwegian.....									18	.6
Polish.....					1	5.9	18	22.0	184	5.7
Russian.....									56	1.7
Scotch.....									44	1.4
Slavic.....	1	2.3					1	1.2	71	2.2
Swedish.....	2	4.5	1	12.5	1	5.9	3	3.7	93	3.0
Welsh.....									9	.3
Miscellaneous.....					1	5.9	1	1.2	31	1.0
Not reported.....	2	4.5					3	3.7	90	2.8
Total.....	44	100.0	8	100.0	17	100.0	82	100.0	3,199	100.0

TABLE 53.—NATIVITY OF PERSONS NONFATALLY INJURED IN ILLINOIS INDUSTRIES, JULY 1, 1907, TO DEC. 31, 1912 (CASES UNDER WORKMEN'S COMPENSATION LAW, 1912, NOT INCLUDED).

Nativity.	Coal mining.		Contract- ing.		Manufac- turing.		Railroad- ing, elevated.		Railroad- ing, interurban.		Railroad- ing, steam.	
	Num- ber.	Per- cent.	Num- ber.	Per- cent.	Num- ber.	Per- cent.	Num- ber.	Per- cent.	Num- ber.	Per- cent.	Num- ber.	Per- cent.
American.....	1,321	34.3	40	23.8	2,224	24.9	3	60.0	48	87.3	2,884	64.8
Armenian.....					17	.2						
Austrian.....	110	2.9	1	.6	653	7.3					39	.9
Belgian.....	6	.2			4							
Bohemian.....	55	1.4	4	2.4	125	1.4					27	.6
Bulgarian.....					86	1.0						
Canadian.....	2	.1			19	.2					9	.2
Danish.....	1				12	.1					7	.2
English.....	175	4.5	2	1.2	82	.9	1	20.0			51	1.1
Finnish.....					2							
French.....	62	1.6	1	.6	32	.4					20	.5
German.....	343	8.9	14	8.3	817	9.2	1	20.0	3	5.5	231	6.5
Greek.....	1		2	1.2	37	.4					36	.8
Hungarian.....	28	.7	1	.6	229	2.6					37	.8
Irish.....	75	2.0	28	16.7	269	3.0			2	3.6	205	4.6
Italian.....	772	20.0	8	4.7	390	3.4					226	5.1
Lithuanian.....	228	5.9	4	2.4	125	1.4					23	.5
Macedonian.....					24	.3					3	.1
Mexican.....											2	
Norwegian.....	4	.1	2	1.2	38	.4					26	.6
Polish.....	172	4.5	21	14.3	1,738	19.5					176	4.0
Roumanian.....	1				10	.1					3	.1
Russian.....	145	3.8	1	.6	431	4.8			1	1.8	26	.6
Scandinavian.....					6							
Scotch.....	66	1.7	1	.6	30	.3					15	.3
Servian.....	3	.1			18	.2						
Slavic.....	70	1.8			24	.3					8	.2
Swedish.....	35	.9	11	6.5	329	3.7					79	1.8
Swiss.....	1				2							
Turkish.....					6	.1					1	
Welsh.....	13	.3			4						1	
Miscellaneous.....	82	2.1			435	4.9			1	1.8	79	1.8
Not reported.....	81	2.2	24	14.3	794	8.9					174	3.9
Total.....	3,854	100.0	168	100.0	8,922	100.0	5	100.0	55	100.0	4,450	100.0

TABLE 53.—NATIVITY OF PERSONS NONFATALLY INJURED IN ILLINOIS INDUSTRIES, JULY 1, 1907, TO DEC. 31, 1912 (CASES UNDER WORKMEN'S COMPENSATION LAW, 1912, NOT INCLUDED)—Concluded.

Nativity.	Railroading, street.		Railroading, under-ground.		Stone quar-rying.		Miscella-neous.		Total.	
	Num-ber.	Per-cent.	Num-ber.	Per-cent.	Num-ber.	Per-cent.	Num-ber.	Per-cent.	Num-ber.	Per-cent.
American .....	66	26.6	42	67.7	7	9.2	97	44.1	6,732	37.3
Armenian .....									17	.1
Austrian .....	16	6.5			13	17.1	2	.9	834	4.6
Belgian .....									10	.1
Bohemian .....	3	1.2			8	10.6	3	1.3	225	1.2
Bulgarian .....									88	.5
Canadian .....			1	1.6					31	.2
Danish .....	2	.8	1	1.6					23	.1
English .....	5	2.0					3	1.3	319	1.8
Finnish .....									2	
French .....	3	1.2					1	.5	119	.7
German .....	21	8.5	5	8.1	13	17.1	35	15.9	1,543	8.5
Greek .....	5	2.0			2	2.6			83	.5
Hungarian .....	1	.4			1	1.3			297	1.6
Irish .....	36	14.5	11	17.8			19	8.6	645	3.6
Italian .....	43	17.4			2	2.6			1,352	7.5
Lithuanian .....	2	.8					1	.5	383	2.1
Macedonian .....									27	.1
Mexican .....									2	
Norwegian .....	7	2.8							77	.4
Polish .....	14	5.7			19	25.0	30	13.6	2,173	12.0
Roumanian .....									14	.1
Russian .....	5	2.0	1	1.6			1	.5	611	3.4
Scandinavian .....									6	
Scotch .....							1	.5	113	.6
Servian .....	1	.4							22	.1
Slavic .....									102	.6
Swedish .....	10	4.0					5	2.2	469	2.6
Swiss .....									3	
Turkish .....									7	
Welsh .....									18	.1
Miscellaneous .....	5	2.0			1	1.3	1	.5	604	3.3
Not reported .....	3	1.2	1	1.6	10	13.2	20	9.1	1,100	6.1
Total .....	248	100.0	62	100.0	76	100.0	220	100.0	18,060	100.0

TABLE 54.—FATAL INDUSTRIAL ACCIDENTS IN ILLINOIS, BY MONTH OF OCCURRENCE, JAN. 1, 1908, TO DEC. 31, 1912 (CASES UNDER WORKMEN'S COMPENSATION LAW, 1912, NOT INCLUDED).

Month.	Coal mining.		Contracting.		Manufactur-ing.		Railroading, elevated.		Railroading, interurban.		Railroading, steam.	
	Num-ber killed.	Per-cent of total.	Num-ber killed.	Per-cent of total.	Num-ber killed.	Per-cent of total.	Num-ber killed.	Per-cent of total.	Num-ber killed.	Per-cent of total.	Num-ber killed.	Per-cent of total.
January .....	94	9.4	54	53.5	47	10.8	5	22.7	2	6.3	130	10.0
February .....	64	6.4	1	1.0	34	7.8	1	4.5		6.3	138	11.7
March .....	65	6.5	7	6.9	38	8.7	2	9.1			87	7.4
April .....	24	2.4	6	5.9	42	9.7	2	9.1	2	6.3	64	5.4
May .....	28	2.8	2	2.0	28	6.5	1	4.5	2	6.3	64	5.4
June .....	36	3.6	4	4.0	38	8.7	4	18.3	1	3.1	73	6.2
July .....	52	5.2	4	4.0	42	9.6			7	1.8	84	7.1
August .....	51	5.1	5	4.9	44	10.1			2	6.3	85	6.8
September .....	56	5.6	5	4.9	31	7.1	1	4.5	2	6.3	116	9.8
October .....	101	10.1	9	8.9	30	6.9	1	4.5	8	5.0	99	8.4
November .....	343	34.2	3	3.6	32	7.4	2	9.1	2	6.3	125	10.6
December .....	88	8.8	1	1.0	29	6.7	3	13.7	2	6.3	121	10.2
Total .....	1,002	100.0	101	100.0	435	100.0	22	100.0	32	100.0	1,181	100.0

TABLE 54.—FATAL INDUSTRIAL ACCIDENTS IN ILLINOIS, BY MONTH OF OCCURRENCE, JAN. 1, 1908, TO DEC. 31, 1912 (CASES UNDER WORKMEN'S COMPENSATION LAW, 1912, NOT INCLUDED)—Concluded.

Month.	Railroading, street.		Railroading, underground.		Stone quarrying.		Miscellaneous.		Total.	
	Number killed.	Per cent of total.	Number killed.	Per cent of total.	Number killed.	Per cent of total.	Number killed.	Per cent of total.	Number killed.	Per cent of total.
January.....	2	5.6	.....	.....	1	7.1	10	14.1	345	11.9
February.....	1	2.8	.....	.....	3	21.4	6	8.4	250	8.7
March.....	.....	.....	1	14.3	.....	.....	11	15.5	211	7.3
April.....	4	11.1	2	28.6	1	7.1	1	1.4	148	5.1
May.....	4	11.1	1	14.3	.....	.....	14	19.7	144	5.0
June.....	4	11.1	.....	.....	.....	.....	6	8.4	166	5.7
July.....	2	5.6	1	14.3	.....	.....	5	7.1	197	6.8
August.....	4	11.1	.....	.....	.....	.....	6	8.4	192	6.6
September.....	2	5.6	1	14.3	6	42.9	3	4.2	223	7.6
October.....	3	8.2	.....	.....	1	7.1	.....	.....	252	8.7
November.....	5	13.9	1	14.3	2	14.4	2	2.8	517	17.7
December.....	5	13.9	.....	.....	.....	.....	7	9.9	256	8.9
Total....	36	100.0	7	100.0	14	100.0	71	100.0	2,901	100.0

TABLE 55.—NONFATAL INDUSTRIAL ACCIDENTS IN ILLINOIS, BY MONTH OF OCCURRENCE, JAN. 1, 1908, TO DEC. 31, 1912 (CASES UNDER WORKMEN'S COMPENSATION LAW, 1912, NOT INCLUDED).

Month.	Coal mining.		Contracting.		Manufacturing.		Railroading, elevated.		Railroading, interurban.		Railroading, steam.	
	Number injured.	Per cent of total.	Number injured.	Per cent of total.	Number injured.	Per cent of total.	Number injured.	Per cent of total.	Number injured.	Per cent of total.	Number injured.	Per cent of total.
January.....	366	10.3	19	12.0	875	10.2	.....	.....	2	4.3	408	10.1
February.....	308	8.6	11	7.0	822	9.5	.....	.....	6	12.8	434	10.7
March.....	384	10.8	6	3.8	919	10.7	.....	.....	7	14.9	342	8.5
April.....	116	3.3	14	8.9	757	8.8	.....	.....	2	4.3	295	7.3
May.....	184	5.2	4	2.5	650	7.6	.....	.....	3	6.4	250	6.2
June.....	185	5.2	15	9.5	638	7.4	.....	.....	2	4.3	293	7.3
July.....	250	7.0	9	5.7	639	7.4	1	100.0	7	14.9	331	8.2
August.....	285	8.0	23	14.5	736	8.5	.....	.....	1	2.1	323	8.0
September.....	328	9.2	15	9.5	690	8.0	.....	.....	1	2.1	303	7.5
October.....	416	11.5	12	7.6	698	8.1	.....	.....	9	19.0	347	8.6
November.....	392	11.0	16	10.1	644	7.5	.....	.....	4	8.5	347	9.1
December.....	353	9.9	14	8.9	542	6.3	.....	.....	3	6.4	345	8.5
Total....	3,567	100.0	158	100.0	8,610	100.0	1	100.0	47	100.0	4,038	100.0

  

Month.	Railroading, street.		Railroading, underground.		Stone quarrying.		Miscellaneous.		Total.	
	Number injured.	Per cent of total.	Number injured.	Per cent of total.	Number injured.	Per cent of total.	Number injured.	Per cent of total.	Number injured.	Per cent of total.
January.....	19	8.4	7	13.5	6	8.7	26	13.8	1,728	10.2
February.....	18	8.0	5	9.6	9	13.0	17	9.0	1,630	9.6
March.....	19	8.4	7	13.5	3	4.3	12	6.4	1,699	10.0
April.....	16	7.1	10	19.2	4	5.8	13	6.9	1,227	7.2
May.....	22	9.7	4	7.7	8	11.6	15	5.0	1,131	6.7
June.....	23	10.2	3	5.8	2	3.0	13	6.9	1,174	6.9
July.....	24	10.6	1	1.9	4	5.8	15	8.0	1,281	7.6
August.....	23	10.2	2	3.8	10	14.5	13	6.9	1,416	8.4
September.....	23	10.2	3	5.8	4	5.8	21	11.2	1,388	8.2
October.....	18	8.0	2	3.8	6	8.7	19	10.1	1,527	9.0
November.....	11	4.8	5	9.6	9	13.0	11	5.9	1,459	8.6
December.....	10	4.4	3	5.8	4	5.8	18	9.6	1,292	7.6
Total....	226	100.0	52	100.0	69	100.0	188	100.0	16,956	100.0

TABLE 56.—FATAL ACCIDENTS AND LOSS OF TIME CAUSED BY NONFATAL ACCIDENTS IN ILLINOIS, BY INDUSTRIES, JULY 1, 1907, TO DEC. 31, 1912.

[Data for nonfatal accidents cover only cases with time loss of 30 days and over, except in manufacturing for the years 1910, 1911, and 1912, where data cover time loss of 15 days and over, and in cases under workmen's compensation, May to Dec., 1912 (all industries), with time loss of 7 days and over.]

Year.	Manufacturing.			Coal mining.			Contracting.					
	Fatal accidents.	Nonfatal accidents with loss of—			Fatal accidents.	Nonfatal accidents with loss of—			Fatal accidents.	Nonfatal accidents with loss of—		
		7 days and over.	15 days and over.	30 days and over.		7 days and over.	15 days and over.	30 days and over.		7 and under 15 days.	15 and under 30 days.	30 days and over.
1907 (6 months).....	37		302	100		287	6				10	
1908.....	52		505	189		997	7				41	
1909.....	63		496	442		793	69				11	
1910.....	120	2,707		114		463	6				9	
1911.....	120	2,791		151		697	8				83	
1912 {not under workmen's compensation law.....	80	2,121		106		617	11				14	
1912 {under workmen's compensation law.....	77	4,441		12	388		17	544				
Total (5½ years).....	549	4,441	7,619	1,303	1,114	388	3,854	124	544		168	
	Stone quarrying.			Railroading, elevated.			Railroading, interurban.					
1907 (6 months).....	3		7			4	3				8	
1908.....	4		24	6			6				6	
1909.....	3		24	3		1	5				8	
1910.....	1		12	2			10				10	
1911.....	5		7	4			9				12	
1912 {not under workmen's compensation law.....	1		2	7			2				11	
1912 {under workmen's compensation law.....	3	54					5	61				
Total (5½ years).....	20	54	76	22		5	40	61			55	
	Railroading, steam.			Railroading, street.			Railroading, underground.					
1907 (6 months).....	120		412	8		22	1				10	
1908.....	218		787	10		47	2				23	
1909.....	239		890	11		82	2				12	
1910.....	232		918	9		47	3				3	
1911.....	242		880	6		18					8	
1912 {not under workmen's compensation law.....	190		563			32					6	
1912 {under workmen's compensation law.....	33	1,168			58		2	44				
Total (5½ years).....	1,343	1,168	4,450	44	58	248	10	44			62	
	Miscellaneous industries.			Total.								
1907 (6 months).....	11		32	298		1,094						
1908.....	30		64	524		2,494						
1909.....	18		42	855		2,359						
1910.....	7		25	564	2,707	1,487						
1911.....	7		14	552	2,791	1,719						
1912 {not under workmen's compensation law.....	9		43	406	2,121	1,288						
1912 {under workmen's compensation law.....	34	1,972		183	8,730							
Total (5½ years).....	116	1,972	220	3,382	8,730	7,619	10,441					

TABLE 57.—OCCUPATIONS OF PERSONS KILLED OR INJURED IN ILLINOIS INDUSTRIES, JULY 1, 1907, TO DEC. 31, 1912.

	Number killed.	Number injured.		Number killed.	Number injured.
<i>Coal mining.</i>			<i>Coal mining—Concluded.</i>		
Agent.....		1	Water boiler.....		1
Bellman.....		1	Yardman.....		8
Bit carrier.....		1	Zinc worker.....		1
Blacksmith.....	1	11	Not reported.....	2	54
Boss.....		6			
Brakeman.....		1	Total.....	1,114	4,242
Brattice worker.....		8	<i>Contracting.</i>		
Brusher.....		12	Apprentice.....	1	3
Cager.....	10	105	Assembler.....		1
Car builder.....		1	Blacksmith.....		4
Car coupler.....		13	Bricklayer.....	1	14
Car piler.....		1	Bridge builder.....		1
Car pincher.....	1	9	Bridgeman.....	1	8
Carpenter.....	6	18	Cage man.....		1
Car trimmer.....	8	9	Carpenter.....	7	84
Car puller.....		1	Cement worker.....		4
Cartman.....		1	Chipper.....		1
Company man.....	1	14	Contractor.....	1	
Driver.....	157	924	Cook.....	1	
Dumper.....		2	Dock man.....		1
Electrician.....	2	10	Driver.....		2
Engineer.....	5	1	Electrician.....	1	2
Fire hunter.....		1	Engineer.....	3	3
Fireman.....	3	14	Fireman.....	1	2
Flagman.....	1	1	Fitter.....		6
Foreman.....	7	6	Foreman.....	5	23
Gripper.....	1	1	Handy man.....		1
Helmet man.....	1		Helper.....	2	51
Helper.....	1	45	Hoister.....		1
Inspector.....		2	Holder.....		3
Ironworker.....	1	2	Iron setter.....	1	
Jack man.....		2	Ironworker.....	4	31
Laborer.....	49	275	Joiner.....		1
Loaders.....	34	187	Laborer.....	3	389
Machine boss.....	1	1	Lineman.....	1	3
Machine helper.....	12	18	Loader.....	1	
Machine repairer.....		1	Machineman.....		3
Machine runner.....	25	140	Machinist.....		5
Machinist.....	1	3	Metal worker.....		2
Master mechanic.....		1	Molder.....		3
Mine examiner.....	4	9	Mucker.....	1	2
Mine manager.....	7	14	Painter.....	1	5
Miner.....	608	1,891	Plasterer.....	1	
Motorman.....	3	23	Reamer.....		3
Mule tender or feeder.....		5	Riveter.....	1	7
Operator.....	2		Roofer.....		3
Painter.....		1	Sawyer.....	1	1
Oiler.....		9	Shearman.....		1
Parting tender.....	1		Skinner.....		1
Property man.....	1		Steam fitter.....		3
Pillar man.....		1	Stone setter.....		1
Powder man.....		1	Superintendent.....	1	
Pump man.....	2	5	Teamster.....	1	5
Repair man.....		4	Tile setter.....		2
Roadman.....		5	Timekeeper.....	2	
Pusher.....		5	Tinner.....		1
Rock man.....	4	7	Toolman.....	1	
Shot firer.....	54	59	Trucker.....		5
Screen operator.....		2	Watchman.....		2
Sawyer.....		2	Water boy.....		1
Shift worker.....		4	Winch man.....		1
Shoveler.....		13	Not reported.....		15
Signalman.....		1			
Sinker.....	7		Total.....	124	712
Slate cleaner.....	1		<i>Stone quarrying.</i>		
Spragger.....	4	22	Blacksmith's helper.....		1
Stableman.....		3	Blaster.....		4
Superintendent.....	1		Brakeman.....		2
Switch tender.....	1	3	Carpenter.....		1
Teamster.....		4	Car repairer.....		3
Timberman.....	35	196	Car spotter.....	1	1
Topman.....	6	11	Contractor.....		6
Trackman.....	10	7	Craeman.....		2
Tracklayer.....	2	32	Crusher man.....		1
Trapper.....	18	53	Driller.....		6
Trip rider.....	10	39			
Watchman.....	1	4			
Weighman.....	2	4			
Washer.....		1			

TABLE 57.—OCCUPATIONS OF PERSONS KILLED OR INJURED IN ILLINOIS INDUSTRIES, JULY 1, 1907, TO DEC. 31, 1912—Continued.

	Number killed.	Number injured.		Number killed.	Number injured.
<i>Stone quarrying—Concluded.</i>			<i>Manufacturing—Continued.</i>		
Driver.....	2	9	Coke puller.....		1
Engineer.....	1	3	Collector.....		3
Feeder.....	2	2	Conductor.....		2
Fireman.....	2	2	Constructor.....	1	
Foreman.....	3	8	Conveyor man.....		1
Helper.....		1	Cook.....	1	6
Hooker.....	1		Cooper.....		4
Laborer.....	8	48	Core maker.....		44
Loader.....		9	Corning man.....	1	
Mechanic.....		1	Cotton card tender.....		1
Oiler.....	1		Craneman.....	14	33
Painter.....		1	Cross cutter.....		1
Quarry man.....	1	2	Cupola tender.....	3	11
Repair man.....		1	Cutter.....		2
Superintendent.....		2	Cut-off man.....		4
Switchman.....	1	3	Dauber.....		1
Teamster.....	1	6	Demonstrator.....		1
Not reported.....		5	Dial maker.....		1
Total.....	20	139	Die maker.....		3
<i>Manufacturing.</i>			Dipper.....		14
Actor.....	1		Detective.....		1
Alarm ringer.....	1		Die setter.....		1
Apprentice.....		102	Dismantling steam boxes.....		1
Asphalter.....	1		Draftsman.....	1	
Assembler.....		38	Driller.....	1	12
Baker.....		2	Drill-press man.....		1
Baler.....		1	Driver.....	7	63
Barn man.....	1	4	Dropper.....	1	3
Battery man.....		1	Dryer.....	1	
Beamster.....	4		Duster.....		1
Bear down.....		1	Dynamiter.....		1
Bench hand.....		45	Electrician.....	6	39
Blacksmith.....	63		Elevator man.....	4	32
Blaster.....	2		Enameler.....	1	3
Blocker.....		1	Engineer.....	10	89
Body builder, fitter.....		11	Errand boy.....	1	2
Boiler cleaner.....		5	Errand girl.....	1	7
Boiler maker.....	3	68	Feeder.....	1	1
Bolt maker, cutter.....	3	3	Feeding-box board machine.....		2
Bookkeeper.....	1		Feeding heeler.....		2
Bottle blower.....		1	Felt puller.....		3
Bottle labeler.....		1	Filler.....	1	
Bottler.....		8	Finisher.....	1	16
Bottle washer.....		1	Fireman.....	6	167
Box maker.....		2	Fitter.....	3	99
Braider.....		2	Flanger.....		1
Brewer.....		10	Fence maker.....		1
Bricklayer.....	1	20	Flue setter.....		1
Bridgeman.....	1	4	Forelady.....		1
Bueker.....	1	5	Foreman.....	15	184
Buffer.....		12	Forgeman.....		3
Builder.....	2	74	Foundry man.....		26
Bundler.....		1	Furnace tender.....		33
Butcher.....	1	7	Gagger.....	1	1
Cabinetmaker.....	1	22	Gas maker.....	1	18
Calker.....		38	Gas tester.....		1
Call boy.....		1	General worker.....		1
Candy maker.....		1	Glazier.....	1	2
Car builder.....		36	Glove cutter.....		1
Car cleaner.....		5	Gluer.....		2
Carpenter.....	14	234	Grinder.....	7	114
Car repairer.....	7	158	Hammerman.....	1	4
Chairman.....	1	114	Handler.....		1
Charger.....	2	30	Handy man.....	1	64
Chaser.....		1	Hat maker.....		26
Chauffeur.....		7	Heater.....		1,691
Checker.....		3	Helper.....	34	120
Chemist.....		2	Hooker.....		8
Chipper.....	1	130	Hostler.....		15
Cinder forker.....		2	Hot-bed man.....		1
Cinder snapper.....		2	Hustler.....		1
Clay miner.....	1		Inspector.....	7	64
Cleaner.....		6	Ironworker.....	3	37
Cleat.....		1	Janitor.....	2	13
Clerk.....	3	49	Janitress.....		3
Clipper.....		2	Jolner.....		6
			Keeper.....	2	3
			Kiln man.....		6

TABLE 57.—OCCUPATIONS OF PERSONS KILLED OR INJURED IN ILLINOIS INDUSTRIES, JULY 1, 1907, TO DEC. 31, 1912—Continued.

	Number killed.	Number injured.		Number killed.	Number injured.
<i>Manufacturing—Continued.</i>			<i>Manufacturing—Continued.</i>		
Labeler.....		5	Riveter.....		43
Laborer.....	137	3,887	Roadman.....		5
Ladle man.....		55	Roller.....	1	37
Lamp trimmer.....	1	2	Roofer.....		9
Lathe hand.....	1	4	Rougher.....	1	36
Leather cutter.....		1	Runner man.....		1
Leader.....		1	Runway man.....	1	
Lever man.....		1	Salesman.....		2
Lid man.....	1		Sailor.....	2	30
Lineman.....	8	32	Saw boy.....		1
Loader.....	2	30	Sawyer.....	1	178
Machine worker.....	14	1,554	Sampler.....		1
Machine girl.....		4	Scrap man.....	1	
Machinist.....	16	493	Screen tender.....	1	
Machinist's helper.....		5	Scrub woman.....		5
Maltster.....	1	3	Seamstress.....		10
Mangler.....		1	Shaper hand.....		5
Marble copier.....	1		Shaker.....		9
Marker.....		1	Snapper.....		1
Master mechanic.....	1	1	Shipper.....		1
Mattress maker.....		1	Shirk handler.....		1
Meat cutter.....		2	Slag man.....		1
Mechanic.....		27	Soap cutter.....		1
Melter.....		1	Solderer.....		1
Messenger.....	1	3	Soda dispenser.....		1
Metal worker.....	1	9	Sorter.....	1	3
Meter man.....		5	Spooler.....		1
Miller.....	3	7	Stamp.....		2
Millman.....		16	Stable boss.....		1
Millwright.....	5	37	Steam fitter.....	1	23
Miner.....	3	12	Stemmer.....		1
Molder.....	2	697	Sticker.....		1
Molder's helper.....		1	Stocker.....		1
Monkey man.....		1	Stock keeper.....		3
Mirror maker.....		1	Stocking wire.....		1
Motorman.....		7	Stove cleaner.....		1
Oiler.....	10	126	Stove man.....		7
Operator.....		7	Storekeeper.....	1	
Outlayer.....		1	Stripper.....		9
Packer.....	2	52	Superintendent.....	1	4
Paddler.....		1	Surveyor.....		1
Painter.....	7	60	Sweater.....		1
Penman.....		1	Sweeper.....		1
Paper-box maker.....		1	Switchboard operator.....	1	
Pattern maker.....		19	Shearman.....	2	19
Pattern filer.....		3	Spinner.....	1	43
Photographer.....		1	Stoker.....	1	26
Piano mover.....		1	Stonemason.....		1
Pickler.....		3	Straightener.....		8
Pipe fitter.....		20	Switchman.....	5	113
Pipeman.....	1		Table man.....		1
Pitman.....		5	Take-off man.....		1
Planer.....		5	Tailor man.....		2
Plater.....		1	Tapper.....		1
Platform man.....		1	Tea master.....	3	54
Plow maker.....		1	Telegrapher.....		4
Plumber.....		2	Temperer.....		1
President of company.....	1		Tending coal.....		1
Polisher.....		15	Test boy.....		1
Porter.....	2	9	Test carrier.....		1
Pourer.....		9	Timberman.....		1
Pressman.....		47	Timekeeper.....		1
Presser.....	1	9	Tinner.....		37
Printer.....		13	Throwing pipe.....		1
Puller.....		1	Tire bender.....		1
Puncher.....		6	Toolmaker.....		7
Pump man.....		3	Top charger.....		1
Punch-press man.....		3	Tool boy.....		1
Punch-press girl.....		1	Trackman.....	1	
Quarryman.....	2		Train tender.....		1
Rock cleaner.....		1	Trackwalker.....	1	
Rammer.....		52	Trimmer.....		11
Reamer.....		28	Trucker.....	2	259
Reeler.....		7	Tuner.....		1
Repair man.....	4	52	Turner.....		3
Rigger.....	8	48	Varnisher.....		1
Rivet heater.....		2	Vessel man.....	2	3
Rivet maker.....		2	Veneer puller.....		1

TABLE 57.—OCCUPATIONS OF PERSONS KILLED OR INJURED IN ILLINOIS INDUSTRIES, JULY 1, 1907, TO DEC. 31, 1912—Continued.

	Number killed.	Number injured.		Number killed.	Number injured.
<i>Manufacturing—Concluded.</i>			<i>Railroading, interurban—Con.</i>		
Veneer stacker .....		2	Timekeeper .....	1	
Watchman .....	3	43	Tinner .....		1
Water tender .....	1		Truckman .....		1
Water boy .....	2		Winder .....		2
Waterman .....		1	Not reported .....		1
Wagon maker .....		1			
Waiter .....		1	Total .....	40	116
Welder .....		11	<i>Railroading, steam.</i>		
Welt maker .....		1	Agent .....	5	5
Weigher .....	2	7	Apprentice .....	3	34
Wheeler .....		1	Baggageman .....	5	17
Wheelwright .....		1	Beit man .....	1	1
Wheel trimmer .....		1	Blacksmith .....	1	16
Window washer .....		2	Blacksmith's helper .....		4
Winder .....		1	Boiler maker .....	5	31
Wiper .....		4	Boiler washer .....		3
Wiro drawer .....	3	97	Bolt cutter .....		2
Wireman .....		2	Brakeman .....	236	762
Woodworker .....	1	17	Brick mason .....		1
Wrapper .....		3	Bridgeman .....	4	21
Wringer .....	1		Bridge tender .....	2	
Yardman .....		1	Cabinetmaker .....		3
Yardmaster .....	3	1	Call boy .....	1	2
Zinc drawer .....		1	Caller .....		7
Not reported .....	6	240	Car cleaner .....	4	18
Total .....	549	13,363	Car inspector .....	6	7
<i>Railroading, elevated.</i>			Carpenter .....	28	302
Car cleaner .....	1	1	Car repairer .....	24	166
Carpenter .....	2		Car sealer .....		2
Car repairer .....	1		Checker .....		4
Conductor .....	1	2	Clerk .....	8	52
Dynamo tender .....	1		Coal heaver .....		1
Electrician .....	2		Coal miner .....	3	
Guard .....	2		Collector .....		1
Helper .....	1		Conductor .....	37	219
Laborer .....	1	1	Cook .....	1	3
Switchman .....	1		Cooper .....		
Ticket agent .....	1		Coppersmith .....		1
Trackwalker .....	1		Craneman .....		1
Trackman .....	4		Custodian .....	3	
Trainman .....	2		Depot master .....		2
Watchman .....	1	1	Dispatcher .....		1
Total .....	22	5	Driver .....	1	3
<i>Railroading, interurban.</i>			Dumper .....		1
Agent .....	2	2	Electrician .....	2	6
Assistant train master .....	1		Elevator man .....		1
Auditor .....	1		Engine cleaner .....		2
Baggageman .....		1	Engine herder .....	1	
Blacksmith .....		3	Engineer .....	79	311
Brakeman .....	5	12	Feeder .....		1
Bridgeman .....		1	Filler .....		1
Car cleaner .....		1	Fire cleaner .....		2
Car inspector .....		1	Fireman .....	79	392
Carpenter .....		4	Flagman .....	19	29
Car repairer .....		2	Foreman .....	44	132
Civil engineer .....	1		Freight agent .....	1	
Conductor .....	3	18	Gateman .....	1	5
Electrician .....	1	3	Guard .....	1	1
Engineer .....	1	1	Handy man .....		14
Foreman .....	2	3	Heater .....		2
Helper .....	1	2	Halper .....	5	191
Inspector .....		2	Hostler .....	4	33
Laborer .....	4	21	Iceman .....		1
Land commissioner .....	1		Inspector .....	24	45
Lineman .....	8	10	Instructor .....		1
Machinist .....		6	Interpreter .....	1	
Master mechanic .....	1		Ironworker .....	1	6
Motorman .....	5	13	Janitor .....	5	3
Oiler .....	2	1	Laborer .....	343	1,171
Painter .....		3	Lamp man .....	3	2
Porter .....	1	1	Laundress .....		2
			Levelman .....		
			Level man .....	1	
			Lineman .....	8	11
			Machineman .....		25
			Machinist .....	6	166

TABLE 57.—OCCUPATIONS OF PERSONS KILLED OR INJURED IN ILLINOIS INDUSTRIES, JULY 1, 1907, TO DEC. 31, 1912—Continued.

	Number killed.	Number injured.		Number killed.	Number injured.
<i>Railroading, steam—Concl'd.</i>			<i>Railroading, street—Concl'd.</i>		
Machinist helper.....		6	Barn man.....		3
Mail boy.....	1		Boiler washer.....	1	
Mail handler.....		1	Brakeman.....		1
Master mechanic.....	1		Bricklayer.....	1	1
Mechanic.....		1	Cable puller.....		2
Messenger.....	1	1	Car cleaner.....		6
Messenger boy.....		1	Car coupler.....	2	
Millman.....		2	Car greaser.....		2
Millwright.....		1	Car repairer.....		4
Miner.....		5	Carpenter.....		10
Motorman.....	1	2	Clerk.....		1
Oilier.....	4	10	Conductor.....	10	45
Operator.....	1	5	Crane operator.....		1
Packer.....		3	Electrician.....		2
Painter.....	4	35	Engineer.....		1
Patrolman.....		2	Fireman.....		2
Pattern maker.....		2	Fireman's helper.....		1
Pipe fitter.....	1	9	Foreman.....	1	4
Pit cleaner.....	1		Helper.....		6
Pitman.....	2	1	Iron worker.....		1
Plumber.....		1	Laborer.....	5	123
Policeman.....		1	Lineman.....	7	14
Porter.....	1	5	Machineman.....		1
Press hand.....		1	Machine helper.....		1
Pump man.....	2	7	Machinist.....	1	
Pumper.....	1	1	Motorman.....	7	38
Pump repairer.....		2	Oilier.....	1	1
Repair man.....	10	45	Painter.....		3
Rivet heater.....		4	Paver.....		2
Roadmaster.....		2	Punch presser.....		1
Roofor.....		2	Repair man.....		6
Sawyer.....		1	Shed man.....		2
Sealer.....	1		Steam fitter's helper.....	1	
Seamstress.....	1		Switchman.....		1
Section man.....	1	8	Teamster.....		5
Sheet-iron worker.....		1	Truckman.....		4
Signalman.....	3	15	Track repairer.....		1
Station agent.....	1		Trimmer.....		1
Steam fitter.....		5	Trolley boy.....	1	
Stenographer.....	1	1	Trolleyman.....		2
Stevadore.....	1	1	Trolley repairer.....		1
Stock keeper.....	1	1	Trolley tender.....	1	
Stripper.....		5	Watchman.....	4	
Superintendent.....	1	1	Wireman.....		1
Supply man.....	1		Yardman.....		1
Switchman.....	212	901	Not reported.....		2
Switch tender.....	7	10			
Teamster.....		2	Total.....	44	306
Telegrapher.....	4	1	<i>Railroading, underground.</i>		
Tie inspector.....	1		Checker.....		1
Timekeeper.....		1	Civil engineer.....	1	
Tinner.....	1	8	Clerk.....		1
Tinner's helper.....		1	Coal dumper.....		1
Towerman.....	2	6	Conductor.....	1	13
Trackman.....	1	8	Elevator man.....	1	30
Trackwalker.....	8	3	Engineer.....		1
Train master.....	1	2	Freight clerk.....		1
Train service.....		1	Inspector.....		2
Trucker.....	4	154	Laborer.....	1	9
Waiter.....	2		Lineman.....		1
Warehouseman.....		1	Machinist.....		1
Watchman.....	22	19	Mail handler.....		2
Water service.....		5	Motorman.....	6	30
Weighman.....	1		Pump man.....		1
Wiper.....	2	9	Switchman.....		5
Wrecker.....	1		Switch tender.....		2
Wreck master.....		1	Trucker.....		5
Yard brakeman.....	1				
Yard clerk.....	1	1	Total.....	10	106
Yardmaster.....	10	18	<i>Miscellaneous.</i>		
Yardman.....	2		Addresser.....		1
Not reported.....	3	18	Agent.....		3
Total.....	1,343	5,618	Apprentice.....	1	11
<i>Railroading, street.</i>			Assembler.....		4
Airmen.....		1	Attendant.....		1
Ash man.....		1			

TABLE 57.—OCCUPATIONS OF PERSONS KILLED OR INJURED IN ILLINOIS INDUSTRIES, JULY 1, 1907, TO DEC. 31, 1912—Continued.

	Number killed.	Number injured.		Number killed.	Number injured.
<i>Miscellaneous—Continued.</i>			<i>Miscellaneous—Continued.</i>		
Baggageman.....		5	Knitter.....		1
Baker.....		4	Labeler.....		3
Barn man.....		10	Laborer.....	42	559
Bartender.....		2	Lather.....		1
Bell boy.....	1	2	Lineman.....	11	42
Belt man.....		1	Loader.....		27
Billposter.....		2	Machineman.....		5
Blacksmith.....		4	Machine worker.....		77
Boiler maker.....		4	Machinist.....		25
Bookkeeper.....		1	Matron.....		1
Bottle washer.....		3	Mechanic.....		6
Box maker.....		1	Messenger.....		9
Bricklayer.....		2	Metal worker.....		2
Bridgeman.....		3	Millman.....		1
Buffer.....		2	Millwright.....	1	8
Butcher.....		41	Molder.....		73
Cabinetmaker.....		3	Monitor.....		1
Cable man.....		1	Office boy.....		1
Calciminer.....		3	Oiler.....	3	11
Caller.....		1	Operator.....		14
Captain.....		1	Order filler.....		1
Car cleaner.....		1	Packer.....	1	15
Carpenter.....	2	61	Painter.....	2	37
Car repairer.....		3	Paper cutter.....		1
Cash girl.....		1	Pile driver.....		2
Cashier.....		1	Plater.....		1
Cement worker.....		1	Plumber.....		6
Charger.....		1	Polisher.....		3
Chauffeur.....		10	Porter.....		37
Checker.....	1	4	Presser.....		2
Chipper.....		11	Press feeder.....		1
Civil engineer.....	1		Pressman.....		12
Cleaner.....	1	2	Printer.....		2
Clerk.....	1	39	Proof reader.....		2
Climber.....	2		Pumper.....	1	4
Collector.....		2	Puncher.....		1
Conductor.....	1		Repair man.....		32
Constructor.....		1	Rigger.....	1	5
Cook.....		6	Riveter.....		6
Cooper.....		4	Roofer.....		3
Core maker.....		3	Sailor.....		1
Craneman.....		1	Salesman.....		3
Cupola tender.....		5	Sawyer.....		11
Cutter.....		7	Scrub woman.....		2
Deck hand.....	2	5	Sculptor.....		1
Dipper.....		1	Seamstress.....		1
Dishwasher.....		2	Shearer.....		1
Distiller.....		1	Shearman.....		1
Driller.....		6	Signalman.....		1
Driver.....	2	125	Smelter.....		1
Electrician.....	2	15	Solicitor.....		1
Elevator helper.....	1		Sorter.....		1
Elevator man.....	1	25	Stamper.....		1
Engineer.....	1	17	Steam fitter.....	1	8
Engine-room helper.....		1	Stereotyper.....		1
Errand boy.....		9	Sticker.....		1
Filer.....		1	Stock keeper.....		1
Finisher.....		3	Stock boy.....	1	
Fireman.....	1	13	Stonecutter.....		2
Fitter.....		1	Stonemason.....		1
Folder.....		1	Stripper.....		1
Foreman.....	2	30	Stuffer.....		1
Gas fitter.....		1	Superintendent.....	2	1
Glazier.....		7	Sweeper.....		1
Grinder.....		5	Switchman.....		3
Groundman.....		1	Tacker.....		1
Handy man.....		14	Tailor.....		1
Heater.....		1	Tallyman.....		1
Helper.....	1	190	Teamster.....	9	106
Hooker.....		2	Tinner.....		4
Hostler.....		3	Toolmaker.....		1
House mover.....		1	Trimmer.....		10
Iceman.....		4	Trucker.....		45
Inspector.....	1	5	Truckman.....		1
Installer.....		29	Typist.....		1
Ironer.....		3	Wagon boy.....		7
Ironworker.....	1	12	Wagon maker.....		2
Janitor.....	1	11	Waiter.....		5
Kitchen worker.....		1	Waitress.....		1

TABLE 57.—OCCUPATIONS OF PERSONS KILLED OR INJURED IN ILLINOIS INDUSTRIES, JULY 1, 1907, TO DEC. 31, 1912—Continued.

	Number killed.	Number injured.		Number killed.	Number injured.
<i>Miscellaneous—Continued.</i>			<i>Miscellaneous—Concluded.</i>		
Warehouseman.....		4	Wrapper.....		1
Washer.....		1	Wireman.....	1	
Watchman.....	7	12	Yardman.....	1	3
Weigher.....		1	Not reported.....	2	66
Window cleaner.....	2	4			
Window trimmer.....	1		Total.....	116	2,192
Wiper.....		1			

### INDUSTRIAL ACCIDENTS IN WISCONSIN.

The following is a brief analysis of the industrial accident experience of the State of Wisconsin, including 21,374 cases of injuries, and involving an estimated cost of compensation of \$1,936,849.95. There were 429 fatalities, or 1 death to every 50 injuries of all kinds, or 2.01 per cent of the total. The number of permanent injuries was 139, and the number of temporary injuries was 20,806, or 97.3 per cent of the whole. Disabilities of 7 days' duration or less are not included.

The compensation cost in this analysis is an estimate and not an exact statement. The Wisconsin workmen's compensation act being quasi elective, the experience thus far has been as follows: During the period ending June 30, 1912, only one-third of the accidents reported to the commission were under compensation. During the year ending June 30, 1913, the proportion of such accidents under compensation had increased to 45 per cent. According to an official statement dated June 6, 1914, the proportion of injuries under compensation at the present time is estimated at 98 per cent of the total number reported to the commission in conformity to law. Of the 21,374 accidents in the following tabulation, 13,981, or 65.4 per cent, were under compensation. The estimate of cost was arrived at by applying to all of the accidents classified as fatal, serious permanent, minor permanent, and temporary, the average cost of indemnity as ascertained for the accidents under compensation. The analysis is exceedingly instructive and brings out the main causes responsible for the more serious cases of injury in Wisconsin industries.

TABLE 58.—CAUSES OF INDUSTRIAL ACCIDENTS AND COST OF COMPENSATION IN WISCONSIN, SEPT. 1, 1911, TO APR. 1, 1914.

Cause.	Accidents.		Estimated cost of all accidents.		Fatal injuries.	Serious injuries.	
	Num-ber.	Per cent of total.	Amount.	Per cent of total.		Perma-nent.	Tem-porary.
Motors and engines.....	93	0.4	\$9,128.49	0.47	3	.....	90
Shafting.....	74	.4	15,851.03	.82	6	3	65
Pulleys.....	55	.3	6,780.91	.35	.....	3	52
Gears.....	252	1.2	55,313.16	2.86	2	10	240
Belts.....	213	1.1	23,358.47	1.21	5	4	204
Ropes and cables.....	79	.4	8,249.19	.43	2	1	76
Chains and sprockets.....	101	.5	5,512.58	.29	.....	.....	191
Barkors.....	50	.2	2,739.00	.14	.....	.....	50
Boring machines.....	55	.3	3,001.90	.15	.....	.....	55
Calenders—Paper stacks, winding machines, etc.....	164	.8	12,888.49	.67	2	1	161
Conveyors.....	95	.4	11,800.17	.61	4	1	90
Edgers.....	18	.1	982.44	.05	.....	.....	18
Emery wheels (and polishing).....	280	1.3	21,888.47	1.13	4	1	275
Corn shredders.....	67	.3	33,968.12	1.75	1	23	63
Feed and ensilage cutters.....	55	.3	9,290.25	.48	.....	5	50
Jointers.....	178	.8	10,974.91	.57	.....	1	177
Lathes.....	134	.6	8,573.39	.44	.....	1	133
Planers.....	111	.5	8,577.72	.44	.....	2	109
Presses.....	578	2.7	35,325.25	1.82	.....	3	575
Rolls, feed.....	223	1.1	16,029.53	.83	1	2	220
Sanders.....	42	.2	14,120.61	.73	.....	.....	42
Saws.....	948	4.2	59,283.72	3.06	6	9	933
Set screws.....	35	.2	1,910.30	.10	.....	.....	35
Shapers.....	63	.3	4,698.21	.24	.....	1	62
Staying and ending machines.....	80	.4	4,366.40	.22	.....	.....	80
Sticklers.....	14	.1	764.12	.04	.....	.....	14
Veneer clippers.....	19	.1	1,037.02	.06	.....	.....	19
Drills, well and diamond.....	38	.2	3,412.89	.18	1	.....	37
Power shears.....	60	.3	3,274.80	.16	.....	.....	60
Riveters.....	30	.1	1,637.40	.08	.....	.....	30
Power hammer.....	44	.2	3,743.37	.19	1	.....	43
Milling machines.....	57	.3	3,111.06	.16	.....	.....	57
Unhairing machines.....	17	.1	927.86	.05	.....	.....	17
Concrete mixers.....	7	.1	1,720.91	.09	1	.....	6
Sole cutters.....	15	.1	818.70	.04	.....	.....	15
All other machinery.....	736	3.2	62,060.35	3.20	6	11	719
Elevators.....	228	1.1	41,661.40	2.15	19	3	296
Cranes and derricks.....	162	.8	16,637.42	.86	3	3	156
Boiler explosions.....	13	.1	3,387.24	.17	2	.....	11
Other explosions.....	178	.8	34,747.49	1.79	14	5	159
Escaping steam.....	77	.4	9,558.06	.49	4	.....	73
Electricity.....	175	.8	49,717.00	2.56	30	.....	145
Hot metals.....	837	4.3	45,688.46	2.35	.....	.....	837
Nonmetal burns.....	362	1.3	25,113.36	1.30	4	.....	358
Hit by flying nails, chips, etc.....	623	2.9	71,772.62	3.70	1	29	593
Hit by hoisted or moved objects.....	1,121	5.3	94,397.07	4.87	23	2	1,096
Hit by vehicles, cars, trucks, etc.....	583	2.7	78,452.35	4.05	32	3	545
Hit by objects falling from piles.....	1,412	6.5	135,823.00	7.02	42	2	1,353
Hit by falling trees or parts of trees.....	260	1.2	59,971.37	3.09	34	1	225
Hit by broken machine parts.....	211	1.1	23,249.31	1.20	5	4	212
All other hits.....	874	4.0	87,450.39	4.51	28	1	845
Falls down stairs.....	123	.5	8,052.19	.42	1	.....	122
Falls from ladders.....	208	1.2	22,660.54	1.17	6	.....	202
Falls from scaffolds.....	374	1.8	59,089.21	3.05	27	2	345
Falls from buildings.....	93	.4	17,125.59	.88	9	.....	84
Falls into excavations.....	87	.4	15,459.56	.80	8	.....	79
Falls from wagons, cars, etc.....	599	2.7	51,138.77	2.64	15	.....	554
Falls from boxes, chairs, etc.....	55	.3	3,091.90	.15	.....	.....	55
Slipping or stumbling.....	1,073	5.1	63,919.74	3.30	4	.....	1,069
Falls into vats, pits, holes, etc.....	96	.4	13,272.78	.69	6	.....	93
Falls from piles, poles, trees.....	120	.6	18,599.25	.96	9	.....	111
Falls from tramways and trestles.....	37	.2	6,036.01	.31	3	.....	34
Falls from runways and loading plat-forms.....	93	.4	22,480.99	1.16	13	.....	80
Other falls.....	197	.9	28,157.31	1.45	13	.....	184
Lifting heavy objects.....	416	1.9	22,705.28	1.17	.....	.....	416
Dropping objects while lifting.....	1,233	5.7	69,895.66	3.67	1	1	1,231

TABLE 53.—CAUSES OF INDUSTRIAL ACCIDENTS AND COST OF COMPENSATION IN WISCONSIN, SEPT. 1, 1911, TO APR. 1, 1914—Concluded.

Cause.	Accidents.		Estimated cost of all accidents.		Fatal injuries.	Serious injuries.	
	Number.	Per cent of total.	Amount.	Per cent of total.		Permanent.	Temporary.
All other accidents while handling objects.....	991	4.7	\$51,427.63	2.66	1	.....	990
Teaming and trucking.....	349	1.6	25,742.67	1.33	5	.....	344
Animals—Bites and kicks.....	188	.9	12,938.74	.67	2	.....	186
Tools and hand apparatus.....	1,403	6.6	77,914.59	4.02	1	.....	1,402
Stepping or kneeling on nails or sharp objects.....	900	4.2	51,799.70	2.67	2	.....	888
Other causes.....	472	2.2	44,451.78	2.30	14	1	457
Causes not stated.....	41	.2	6,254.33	.32	3	.....	38
<b>Total.....</b>	<b>21,374</b>	<b>100.0</b>	<b>1,936,849.95</b>	<b>100.00</b>	<b>429</b>	<b>139</b>	<b>20,806</b>
CLASSIFICATION BY GROUPS.							
Machinery.....	5,080	23.8	467,108.19	24.11	45	82	4,953
Hoisting apparatus.....	390	1.9	58,298.82	3.01	22	6	362
Explosions and burns.....	1,642	7.7	168,206.61	8.65	54	5	1,583
Hits.....	5,084	23.7	551,121.11	28.44	165	42	4,877
Falls.....	3,185	14.9	328,984.84	16.98	114	2	3,069
Handling objects.....	2,640	12.3	144,028.57	7.50	2	1	2,637
Other causes.....	3,353	15.7	219,101.81	11.31	27	1	3,325
<b>Total.....</b>	<b>21,374</b>	<b>100.0</b>	<b>1,936,849.95</b>	<b>100.00</b>	<b>429</b>	<b>139</b>	<b>20,806</b>

#### SPECIAL CAUSES OF INDUSTRIAL ACCIDENTS IN WISCONSIN.

In the State of Wisconsin, under the direction of the industrial commission, special efforts have been made to improve the statistics of industrial accidents, both on the basis of a better guaranty of accuracy and completeness in the original reports and by more practically useful methods of tabulation of results. Under date of July 20, 1912, the commission published an analysis of 5,241 accidents, by causes, of which 112, or 2.14 per cent, were fatalities. The principal cause of accidents was collapse, falls, or hit by objects, numbering 1,102, or 21.03 per cent of the total. The next most important cause was accidents in connection with the loading or unloading of heavy objects, numbering 600, or 11.45 per cent of the accidents due to all causes. Accidents due to falls of all kinds numbered 684, or 13.05 per cent of the aggregate. These three groups of causes, therefore, accounted for 2,386 accidents, or 45.53 per cent of the aggregate, for the year ending June 30, 1912. The details of this interesting study are given in the table following.

TABLE 59.—CAUSES OF INDUSTRIAL ACCIDENTS IN WISCONSIN, JULY 1, 1911, TO JUNE 30, 1912.

Cause.	All injuries.		Fatal injuries.	
	Number.	Per cent of total.	Number.	Per cent fatal injuries were of all injuries.
Motors—Engines.....	12	0.23		
Shafting.....	24	.46	3	12.5
Gears.....	67	1.28	1	1.5
Belts.....	62	1.18	2	3.2
Pulleys.....	29	.55		
Ropes and cables.....	35	.67		
Chains and sprockets.....	29	.55		
Barkers.....	13	.25		
Boring machines.....	14	.27		
Calenders—Paper machines.....	59	1.13	1	1.7
Conveyors.....	32	.61	2	6.3
Drills.....	14	.27	1	7.1
Emery wheels.....	75	1.43	3	4.0
Corn shredders.....	49	.94	1	2.0
Feed cutters.....	32	.61	2	6.3
Corn huskers.....	14	.27		
Jointers.....	51	.97		
Lathes.....	49	.94		
Planers.....	29	.55		
Presses.....	175	3.34		
Rolls.....	55	1.05		
Sanders.....	14	.27		
Saws.....	247	4.71		
Set screws.....	12	.23		
Shapers.....	16	.31		
Staying and ending machines.....	22	.41		
Miscellaneous machines.....	308	5.88	5	1.6
Elevators.....	39	.74	2	5.1
Hoists.....	26	.50		
Cranes.....	30	.57	1	3.3
Boiler explosions.....	11	.20	2	18.2
Escape of steam from pipes.....	22	.41	2	9.1
Electricity.....	36	.69	6	16.7
Explosions or explosives.....	39	.74	2	5.1
Inflammable, hot or corrosive substances.....	293	5.59		
Collapse, fall or hit by objects.....	1,102	21.03	40	3.6
Falls from stairs.....	29	.55		
Falls from ladders.....	78	1.49	1	1.3
Falls from scaffolds.....	128	2.44	8	6.3
Falls from buildings.....	38	.73	5	13.2
Falls down elevator shafts.....	15	.29	2	13.3
Falls into excavations.....	59	1.13	4	6.8
Miscellaneous falls.....	337	6.43	2	.6
Loading or handling heavy objects.....	600	11.45	1	.2
Teaming, draying or hauling.....	182	3.47	5	2.7
Animals—Bite, kick, etc.....	42	.80	1	2.4
Tools, hand apparatus.....	384	7.33	1	.3
Miscellaneous causes.....	192	3.66	5	2.6
Causes not specified.....	21	.40	1	4.8
Total.....	5,241	100.00	112	2.1

## ACCIDENTS DUE TO FALLS.

A special analysis of 1,387 accidents caused by falls of workmen, according to cause and degree of disability, was published under date of June 20, 1913, in Shop Bulletin No. 4 of the Industrial Commission of Wisconsin, as follows:

TABLE 60.—ACCIDENTS CAUSED BY FALLS OF WORKMEN, WISCONSIN, SEPT. 1, 1911, TO MAR. 1, 1913.

Nature of fall.	Deaths.	Loss of fin- gers.	Internal inju- ries.	Frac- tures.	Sprains.	Lac- era- tions.	Bruises.	Burns.	In- jured eyes.	Total.	
										Num- ber.	Per cent.
Down stairs.....				19	15	5	13			52	3.7
From ladders.....	2		1	50	42	5	38	3		141	10.2
From scaffolds, tram- ways, trestles, etc.....	21		8	104	61	30	68			292	21.1
Down elevator shafts.....	4		2	8	6		8			28	2.0
Into vats, bins, holes, and trenches.....	6		2	28	25	3	22	18		105	7.6
From piles, poles, ma- chines, boxes, etc.....	6		5	41	25	11	39			127	9.2
From buildings.....	7			17	12	3	6			45	3.2
From wagons, cars, and other vehicles.....	2		9	76	50	14	53			204	14.7
Slipping, stumbling, and jumping.....		2	3	82	147	39	99	20	1	393	28.3
Total.....	48	2	30	425	384	110	346	41	1	1,387	100.0

The total number of accidents causing disability of more than seven days reported to the Industrial Commission of Wisconsin during the period September 1, 1911, to March 1, 1913, was 10,517. Of this number 1,387, or 13.2 per cent, were caused by the falls of the workmen, and most of these accidents, as shown by the above table, were of a serious nature, 48 having resulted in death, 425 in fractured bones, and 30 in serious internal injuries. The industrial commission estimates that the total loss in wages suffered by the injured workmen on account of these accidents amounted to approximately \$70,000. The commission points out that under the provisions of the compensation law, which provides for compensation at 65 per cent of the wage loss and additional thereto medical aid in case of temporary disability, and a maximum compensation of \$3,000 in fatal cases, this class of accidents alone would have cost employers over \$175,000.

In discussing the 52 accidents caused by workmen falling down stairs, the commission points out that in two cases the stairs broke while objects were being taken down; in three cases the stairs were icy; in one case the injured person caught his heel in an iron stairway. Emphasizing the required precaution against accidents of this kind, the commission refers to the orders and rules relating to stairways, which require that "All stairways must be equipped with handrails, and the rails must be kept smooth and free from nails and splinters.

Where the stairway is not built next to a wall or partition, rails must be provided for both sides." It is further pointed out that—

Many of the accidents due to falls downstairs might have been prevented had the stairs been equipped with rails in compliance with the above order. It is also very important to provide proper lighting for all stairways and landings, especially when these are inclosed. All stairways should be kept in good repair and at all times be clean and free from objects to prevent people from stumbling and slipping while going up and down. Rubber mats or other nonslippery substance nailed to stairs will help to prevent these accidents.

With regard to the 141 accidents caused by falls from ladders, most of which were of a serious nature, and two of which resulted fatally, it is stated in the bulletin referred to that—

All ladders used in working on transmission apparatus should be equipped with safety hooks or other effective means at the top, to prevent slipping sideways. Order 15 of the commission requires that all permanent elevated platforms in frequent use must be equipped with a permanent stairway or stationary ladder. All ladders other than stepladders, used to gain access to elevated platforms not frequently used, must also be provided with safety hooks at the top. All stepladders used should have the legs securely bound together to prevent spreading. Great care should be taken in placing ladders. One man set a ladder upon three beer cases. It slipped and he received a bad sprain. In several cases the ladders were not placed at a proper slant and tipped backward. Eight accidents were due to defective ladders; the rounds pulled out or broke, or the ladder collapsed under the weight of the man. All ladders should be kept in good repair; broken parts replaced—not patched. In one case the man was on a defective ladder which had been reenforced. It broke again and the man fell, fracturing his ribs.

There were 292 accidents due to falls from scaffolds, tramways, trestles, runways, and platforms, including 21 deaths, or 7.2 per cent of the total. The commission expresses the important conclusion that "practically all of these accidents might have been avoided." They observe further that—

The greatest danger to men working on trestles and tramways is caused by the lack of proper walks and rails. Thirty-five men were injured for want of proper walks. In one case the tramway had a walk but it did not extend far enough and an employe stepped off and was killed. Several men were knocked from tramways by cable cars. One of the largest steel plants in the country provides that "all trestles shall be equipped with walks, the outer edge of which shall be at least 6 feet from the rail. Where practical, the floor of this walk shall extend to within at least 4 inches of the end of the ties. Each walk shall be equipped with a substantial metal railing and toe board. Where there is a driveway or passageway under the trestle it shall be completely planked over at that point between the rails and between the tracks." All tramways and trestles should be rigidly inspected

and kept in the best of repair. Two men were drowned when a bridge they were dismantling collapsed. In another case three men were hurt by the collapse of a trestle. Runways and oilers' platforms should be equipped with a sound railing and toe board. Permanent stairways or stationary ladders should lead up to these platforms. Loading platforms and gang planks leading from warehouses to cars and trucks should be made of selected material of sufficient strength. They should be made of sufficient width and should be attached securely to prevent slipping. Several men were injured by the collapse of loading platforms under the weight of trucks. In constructing these platforms care should be taken to make them of sufficient width. One man was killed by falling off a runway leading from a warehouse. He was carrying a bundle of shingles and stepped off the edge, striking on his head. A railing would have prevented this accident. Several men were severely injured by falling from gangplanks while pushing wheelbarrows. Planks only 12 inches wide too often are used for runways, especially in construction work.

Of the 28 accidents due to falls down elevator shafts, 4 resulted in death, 2 in serious internal injury, and 8 in bad fractures. It is held that all but three of these accidents might have been prevented had the elevators and shaftways been safeguarded in compliance with the commission's orders. The order relating to gates on freight elevators reads in part that: "All freight elevators must be equipped at each landing with self-closing gates." It is stated that 11 accidents occurred because no gates at all were provided, and in several of these cases the men were walking backward pulling trucks, and fell down the shaft with serious results. Defective gates at elevator landings were the cause of seven accidents, of which three were fatal. The rule of the commission requires that—

Gates must not be less than  $5\frac{1}{2}$  feet in height, except at the top landing, where such gate must be not less than  $3\frac{1}{2}$  feet in height. The bottom rail on all gates must be not more than 12 inches from the floor. All gates or doors for entrances to freight elevators must be of sufficient strength to withstand a lateral pressure at the center of not less than 250 pounds. Freight elevators already installed, if equipped with doors instead of gates, which doors are made of solid wood or metal or of wire, glass, grill work, or screen of proper strength—as provided in order 402—will be permitted if such doors are equipped with self-closing locks which can not be opened from the outside except by means of a key.

The commission therefore concludes that had the elevator shafts on which the seven accidents occurred been equipped in compliance with this order, three men would not have been killed and the others would not have been seriously injured.

There were 105 accidents due to falls into vats, bins, pits, trenches, holes, and trapdoors. Of this number 6, or 5.7 per cent, were fatal, while 2 men were injured internally, and 28 received fractured bones. Of the total, 35 were due to falls into vats in tanneries and veneer

factories. Several men were injured when planks over the vats broke or slipped aside. It is stated that—

Others were walking near the vats and slipped on the floor, falling in. While pulling out logs and hides, several men slipped in. The most serious accidents occurred in veneer plants. One man was scalded to death by falling into a vat, and 18 others were seriously burned.

It is therefore suggested by the commission that—

All veneer vats must be guarded by rails or fences in order to prevent men from slipping into them. Planks over the vats should be made of sound material, which will not give way under the weight of a man. These planks should be secured firmly to prevent their slipping to the side. All parts of vats not in actual use should be securely covered. In removing logs and hides, men should be provided with suitable poles or other effective tools for use in floating logs and drawing hides to the edge of the tanks. All work should be done from the edge of the vat and never from planks placed across. Several bad accidents might have been prevented had this practice been followed.

Among other suggestive accidents, mention is made of two men who were smothered in wheat bins. Repair pits in car barns were the cause of 10 serious accidents, one of which resulted fatally. It is therefore suggested that warning signs should be placed near pits, and wherever possible temporary movable railings should be used. The same conclusion is made to apply to the 30 accidents caused by workmen running into holes and open trapdoors. It is held that "Trapdoors should be constructed in such a way that three sides are guarded at all times. Traps should never be without some form of guard, pits about boilers and machines should be covered up securely at the close of the day's work. In working about ore and coal pockets on docks several men fell in and were seriously injured."

Similar accidents occurred to men employed about boats and vessels, two being fatally injured by falling into the hatches, which suggest the necessity for better means of protection. Eleven accidents were caused by persons falling down embankments, with regard to which it is said that the majority could have been prevented if proper railings had been provided.

There were 127 accidents due to falls from piles, poles, machines, boxes, chairs, and benches, of which 6, or 4.7 per cent, proved fatal. In commenting upon this class of accidents the commission states that—

Most of these were due to falls from piles of lumber, pulp, coal, castings, and other things. All piles should be made perfectly stable, especially if men work upon them. Men should be careful not to stand upon boards extending from lumber piles. One man was standing on a plank near the top of a lumber pile, when it broke the fall

killed him. Several men fell from lumber piles while pulling wood up to be piled. Several others fell while climbing up. One man was working on a coal pile when the coal began to roll and he fell.

With special reference to men working as linemen, or in any other capacity requiring work on poles, the commission suggests the enforcement of a rule requiring the use of life belts. Referring to two fatalities caused by falls from poles, it is pointed out that had the deceased worn life belts they probably would not have been killed, at least in consequence of falls, though, of course, the fatalities might have been due to the severity of electric shock.

Falls from buildings caused 45 accidents, of which 7, or 16 per cent, resulted in death, 17 caused broken bones, and 12 serious sprains. Of the total, 13 occurred as the result of the collapse of buildings in course of demolition. In one case a roof collapsed and 10 men were injured. The prevention of such accidents depends on the carefulness of the men and proper supervision of the work by competent foremen. With regard to this class of accidents the commission points out that—

In working on roofs of buildings the greatest care should be used by workmen. Two men were working on the roof of a barn, when they slipped and fell off. Both were killed. One man was leaning over to catch a mason's line when he lost his balance and was killed. Another man fell from a steel girder while reaching for tools and was killed. Ladders used in roof work should be provided with proper hooks at the top. Braces should be nailed down properly to prevent giving way. Men should exercise the greatest care in and about buildings where there is any danger of falling.

Falls from wagons, cars, trucks, and other vehicles caused 204 accidents, with only 2 deaths. The details of this experience are briefly summarized in the statement that—

For the most part these accidents are caused by the carelessness and inexperience of teamsters and men working about wagons and trucks. In 30 cases the accidents were due to horses. They either ran away or started suddenly, throwing men from the wagons. In one case the horses shied and ran away, throwing the man from the wagon, killing him. Several bad accidents were caused by the sudden starting of horses. Twelve men were jolted from wagons and cars by collisions with other vehicles and cars, and 37 men were injured by being jolted from wagons, because of the skidding of the wheels against tracks and curbs and other objects and driving over uneven roads. One man was driving into a barn up a curb, when he was jolted off. Several men were thrown from logging sleighs when they skidded on the ice roads. Such roads should be well sanded on grades to prevent skidding.

As regards the causes of and personal responsibility for accidents of this kind, it is pointed out that—

Too little care is taken by men getting on and off from wagons. One man fell from a sleigh pole while reaching for the reins. He was

dragged under the sleigh for half a mile and badly injured. The ordinary delivery man jumps onto the hub of the wheel while the wagon is moving. Twenty-one men were injured because of this careless habit. One conductor jumped from a moving car, landed against a post, and was killed. Even while getting on and off from vehicles which are not moving, too little care is used. Men slip from the footstep and sprain an ankle or fracture a bone. In all, 22 accidents were caused in this way. In loading and unloading wagons and cars proper loading platforms should be provided. Twenty-seven men were injured by falls while loading and unloading. In handing down objects they lose their balance or slip, and a broken bone results. Carelessness on tower wagons used in linework caused three accidents. The men remained in the tower while the wagon was being moved and fell out. The tower should have been lowered in each case. Several men were intoxicated and fell. In a few cases loads shifted, throwing men off. Loads should always be securely bound when there is any danger of shifting.

Slipping, stumbling, and jumping caused 393 accidents, with no fatalities. In the opinion of the commission a large proportion of these accidents could have been prevented if the order of the commission requiring that all passageways must be kept smooth and in good repair and free from nails or obstructions over which persons may stumble and fall, had been complied with. It therefore suggests that—

All slippery floors about machinery should be covered with rubber mats or other equally effective means to prevent slipping, as required by order 201. Had this order been complied with many of the above accidents would not have occurred. Many accidents have been reported where men were caught in machinery, because they slipped while operating the machines. Men should be cautioned about jumping from low objects. Fifteen serious accidents were caused by this practice.

The foregoing facts and conclusions regarding this very important group of industrial accidents are especially significant. They are emphasized in practically every case by carefully drawn suggestions or rules which make it apparent that a considerable proportion of these accidents could have been prevented by conformity to more intelligent conceptions of shop management and a higher sense of responsibility on the part of both employer and employee. The analysis brings forcibly to public attention the preventable causes and conditions of numerous industrial accidents, which in the aggregate entail a considerable economic loss. The suggestions by the commission prove that the prevention of such accidents is not a matter of serious expense, but quite frequently is rather a question of carefulness and attention on the part of both the employer and the employee.

ACCIDENTS DUE TO OBJECTS STRIKING WORKMEN.<sup>1</sup>

A second large group of industrial accidents considered in detail by the Industrial Commission of Wisconsin is regarding injuries caused by objects striking workmen, with observations as to their prevention. The number of such accidents considered was 2,659, of which 86 were fatal, and 107 were cases of permanent disablement. The commission estimates that in less than two years 65,000 working days were lost on account of this class of accidents, and it estimates the cost of the same under the present compensation laws at about \$400,000. It says that "Mechanical safeguards would have prevented but a small proportion of these accidents. They must be avoided, if at all, through the cooperation of employer and employee, which is only made possible to any great extent by better shop organization." The details of the analysis are as follows:

TABLE 61.—ACCIDENTS CAUSED BY OBJECTS STRIKING WORKMEN, WISCONSIN, SEPT. 1, 1911, TO MAR. 1, 1913.

Nature of injury.	Accidents causing—				Total.
	Death.	Loss of arms, legs, feet, or eyes.	Loss of toes and fingers; impaired sight.	Temporary disability.	
Objects falling—					
From piles, rollways, stopes, and trenches.....	21	.....	8	467	496
From vehicles.....	12	2	7	386	407
From cranes and derricks.....	23	2	23	517	565
From buildings, trestles, scaffolds, and hoppers..	8	.....	1	101	110
From racks, machines, and benches.....	4	2	15	357	378
From conveyors, slides, and chutes.....	.....	.....	2	107	109
Struck by falling trees.....	18	1	.....	119	138
Struck by windows, doors, counterweights.....	.....	.....	5	105	110
Struck by nails, chips, and other small objects....	.....	32	7	307	346
Total.....	86	39	68	2,466	2,659

The first large subgroup of this class of accidents is with regard to objects falling from piles, rollways, stopes, and trenches. There were 496 of these accidents, of which 21, or 4.2 per cent, were fatal. The commission points out that too little care is taken in the construction of piles of various kinds, and bad practices in removing objects from piles were also responsible for many accidents which, by better supervision of the work by competent foremen, could have been avoided. Among other details mention is made of 59 men being injured by logs rolling from piles, 19 of the accidents being caused by the breaking of rollways while the men were employed near thereto. Ten men were caught in the log roll. Twenty-six accidents, with 5 fatalities, occurred to men working about sand, coal, and gravel piles, with regard to which it is pointed out that—

Foremen should see that men never follow the dangerous practice of undermining frozen piles. When working at the bottom of coal,

<sup>1</sup> Industrial Commission of Wisconsin, Shop Bulletin No. 6.

ore, and stone piles, or on raises, drifts, or stopes at mines, great care should be exercised to avoid rolling lumps of coal and rock. Men barring ore and rock from stopes should signal workers below. When piles become too steep, or large chunks overhang, they should be barred to a safe angle before work is continued.

There were 20 accidents in connection with the caving in of trenches, including 2 fatalities; and 42 accidents caused by the fall of ore or rock from the roofs and walls of mines, with 9 fatalities, in connection with which it is stated that—

In excavating for the laying of gas, water, and sewer pipes, trenches should always be shored up to prevent caving in. In all, 20 men were injured, 2 fatally, due to this cause. Lack of proper roof and wall supports in Wisconsin mines has been the cause of 42 accidents, of which 9 were fatal. Walls and ceilings of mines should be tested for loose slabs and pieces of ore and rock at frequent and regular intervals and all loose pieces removed. Proper braces and supports should be used in shafts. Competent foremen should personally oversee all testing for loose material, especially after blasts.

Objects falling from trucks and vehicles caused 407 accidents, with 12 deaths. Perhaps the most serious risk is in connection with the unloading of logs from cars, wagons, and sleighs, there having been 74 accidents of this kind, suggesting the urgency of better safety precautions and the adoption of the recommendation by the commission that—

The common method of unloading logs from cars when the sapling stake is used as a binder, is to notch the stake and then cut the binding wire. For this purpose a long handled ax or nippers are used. The workmen must make a quick getaway as the stake breaks the minute the wire is cut. The cutting of the wire is one of the most dangerous parts of the work as this is done in front of the logs. The use of the bunk and chain is equally, if not more, dangerous. The fit-hook must first be driven out in front of the load to a certain height before it can be tripped from the other side. Expert judgment is required not to drive the hook out too far before the trip chain is used. The only way of avoiding these accidents is by the use of an automatic "safety car stake," which can be tripped from the side opposite to that from which the unloading is done. Several large lumber companies in the State have equipped cars with these stakes at their own expense, and report that no accidents have occurred since the stakes were used.

Objects falling from cranes and hoists caused 565 accidents, with 23 fatalities, or 4.1 per cent. The transfer or moving of objects by cranes, derricks, and hoists, as pointed out by the commission, involves great danger to workmen engaged in this class of work. In addition to the 23 deaths there were 25 accidents requiring amputation. The observations of the commission in connection with this class of accidents are in part as follows:

The selection of chains, rope slings, hooks, and other parts of hoists is of the utmost importance. In all, 90 accidents were caused when

chains and hooks broke under the strain of a load or rope slings tore. Chains and hooks should be of standard quality and should never be used in lifting more than a designated weight. One large manufacturing company has not had any accidents caused by breaking chains, since it required all requisitions for chains to be signed by the safety inspector. He purchases only the very best quality. The use of chains, however, should be avoided where possible. Companies having had long experience in accident prevention have discarded chains where possible and have substituted wire cables and ropes. The most rigid inspection of chains sometimes fails to disclose the weak link, while a weak spot in a cable or rope is always readily detected by broken strands. When rope slings become worn, they should be discarded entirely.

Objects falling from buildings, trestles, scaffolds, and hoppers were responsible for 110 accidents, of which 8, or 7.3 per cent, resulted fatally. In connection with the tearing down of buildings, 23 persons were caught by unexpected falls of walls, roofs, or pillars. It was suggested by the commission that the work of razing buildings should be under the close supervision of competent foremen, and that workmen should be instructed to avoid taking chances as far as possible. Thirty-one men were injured by tools and other objects falling from buildings, and it was recommended that temporary floors should be constructed in new buildings to prevent tools falling through the open spaces and striking men working below. It was further suggested that—

All scaffolds should be constructed with toe boards as well as rails to keep tools and materials from falling off. Trestles leading over roadways should always be boarded over completely so that objects falling from passing loads can not fall through to the ground beneath the trestle. All chutes and hoppers should be substantially constructed. Two men were killed and 7 severely injured when they were struck by chutes which had broken.

Objects tipping over or falling from racks, machines, and benches caused 378 accidents, with 4 deaths, or 1.1 per cent. For the purpose of preventing accidents of this kind it is pointed out that—

Most accidents caused by objects falling from racks, machines, and benches, or tipping over, can be prevented by more care on the part of the workmen and better supervision by foremen. Objects falling from racks, hooks, and shelves caused 18 accidents. All racks and hooks should be substantially constructed and objects liable to fall or tip over should be blocked or hooked firmly. Seventy men were hurt by objects falling from machines. In most cases the men were working on the objects when they fell from the rests. Whenever large jobs are placed on machines having small rests, extensions should be used to prevent the jobs from slipping off.

It is further suggested that—

When working on jobs lying on benches, the same precautions should be taken to block them properly as when the jobs are on the

machine. When jobs are placed on horses or blocked up, it is important to see that horses and blocks are of sufficient strength to hold the jobs. Jacks should never be used when working on large heavy objects, but such objects should be blocked up with horses. In one case a painter had a three-ton pushcart jacked up to paint the bottom, when it tipped over, and crushed him to death. Proper blocking would have prevented this accident. In another case a heavy machine was being moved on rollers when the rollers ran from the plank, tipping the machine over and crushing the man. Whenever objects are moved on rollers, care should be taken that fingers and toes are kept from under such objects.

Finally, it is recommended by the commission that—

Where practicable, ladders, doors, tools, etc., should be placed on racks or piles instead of being leaned against walls or machines. Jobs lying on floors should be blocked, especially if they are of irregular shape, such as castings, rough stones, etc. Thirty men were hurt, one fatally, when struck by objects knocked over by other objects. In one case a crane raised a heavy flywheel from a rack in which several flywheels stood. Some chippers were working on a wheel leaning against the rack. As the wheel in the crane was raised it struck an adjoining wheel, causing the entire line of wheels to tip over. The one on the end crushed a chipper, killing him. The company has now built a pit to hold these flywheels. This will prevent a similar accident. The accident clearly shows the need of safely blocking all materials about plants. When manhole covers are removed, they should be laid to one side to prevent their falling over. Several serious accidents were caused in this way.

Objects falling from conveyors, slides, and chutes caused 109 accidents, with no deaths. The accident risk in connection therewith is quite considerable, and 51 men were injured by objects falling from the ends and sides of conveyors, with more or less serious results. It is therefore recommended by the commission that—

Where possible, these conveyors should be inclosed entirely, especially at all turning points. All live rolls should also be guarded to protect the men from being caught and to prevent objects from falling off. The greatest care should be exercised by men to keep from being caught between objects on conveyors. While releasing or straightening parts there is always danger of having fingers or hands crushed. Sides used for loading should be equipped with side boards to prevent parts from falling off. Several men were hurt when flour bags, which were being loaded, fell from the side of wooden slides.

Falling trees caused 138 accidents, with 18 deaths, or 13 per cent. Fifty-nine of these accidents, with 9 deaths, were due to trees kicking back, and 41 accidents, with 3 deaths, were caused by the fall of limbs from trees. The number of men employed in logging operations during the winter months in Wisconsin is estimated by the commission at 17,000, which in the summer months is reduced to 5,000. It is therefore held that the men employed in the woods, as a rule, are

not sufficiently skilled in the work which they perform, and it is suggested that employers should bear this fact in mind and see to it that each new man is carefully instructed as to the dangers of his occupation. Many logging accidents no doubt could be prevented if such instructions were given the new employees. The commission suggests that—

The men should be required to have sharp calks in their shoes to help them make a quick getaway when the butt suddenly jumps back on the stump. The springboards on which fellers work when cutting a tree above a pitch pocket should be strongly built. Nine men were killed when trees unexpectedly kicked back or fell in the wrong direction. Whenever a tree is ready to fall, the sawyer should give sufficient warning to buckers or swampers working close to where felling is being done. If possible, swampers should follow the fellers at a sufficient distance to be out of danger of trees. In 38 cases, 6 of which were fatal, men were struck by trees felled by other men, or by branches knocked down by falling trees.

There were 110 accidents, with no deaths, caused by workmen being struck by windows, doors, counterweights, etc., and objects falling down shafts. In no case where accidents were caused by falling windows were the windows provided with sash cords, but simply propped up with sticks. Sliding doors, it is suggested, should be properly secured to prevent falling from hangers, since several accidents were due to the falling of doors of box cars when being opened. As regards counterweights of all kinds, it is recommended that they should always be inclosed, and with special reference to counterweights on elevators, the order of the commission is that—

Where counterweight runways are located in the elevator shaftway, the outside must be entirely inclosed with a solid guard. The runways must be entirely inclosed on the inside with a solid guard to a height of 8 feet from the bottom of the pit and 10 feet down from the top limit of travel of the car. Where counterweight runways are located outside of the elevator shaftway they must be entirely inclosed on all sides with a solid guard.

There were 346 accidents, with no deaths, caused by chips, nails, and other small objects, with 32 cases involving the loss of one eye, 7 resulting in impaired sight, and 217 resulting in the eyes being more or less seriously injured. Of all injuries caused by chips, nails, and other small objects, over 70 per cent affect the eyes of the workmen. Of this large number and proportion it is estimated that at least three-fourths could easily be avoided by the wearing of suitable goggles. As the result of an active propaganda for the prevention of accidents of this kind, following an extended discussion of such eye injuries in one of the shop bulletins of the commission, many Wisconsin plants, within the last year, have required the use of goggles and eliminated such accidents almost entirely. The com-

mission, in its bulletin, quotes from a letter received from a large manufacturing company, as follows—

We take great pleasure in sending you two photographs. One shows 12 pairs of glasses placed in a box. This box we have placed conspicuously in our iron-bed foundry as an object lesson. The other shows 16 pairs. In no instance was an eye even slightly injured by flying glass where the lens was broken by a flying chip. The 16 pairs were all broken in service and in addition to these we have others. We might say that we gathered up 12 pairs over a period of only 10 days. In addition, the writer has on his desk one of the side guards removed from a pair of goggles. This guard has a pellet of iron about the size of a small pea firmly embedded upon the wire mesh, showing where molten metal struck, and instead of entering the eye, lodged in the side guard.

#### ACCIDENTS DUE TO JOINTERS.<sup>1</sup>

A third group of industrial accidents discussed in some detail by the Wisconsin Industrial Commission was injuries caused by jointers in woodworking occupations during a period of 15 months. There were 77 such accidents, as shown in detail in the table below:

TABLE 62.—ACCIDENTS CAUSED BY JOINTERS IN WISCONSIN DURING 15 MONTHS.

Type of machine.	All accidents.	Total fin-gers cut off.	Hand cut off.	Fingers cut off.				Lacerations or abrasions.
				Four.	Three.	Two.	One.	
Unguarded.....	53	59	1	4	2	9	19	18
Guarded only with movable slide.....	22	12				2	8	12
Guarded with safety head.....	2							2
Total.....	77	71	1	4	2	11	27	32

The observations of the commission on this class of accidents are, in part, as follows:

Of all the hazards of the woodworking industry, none is so great as the old-fashioned square-head jointer or buzz planer. The annual harvest of fingers and hands in this State alone is appalling. Four out of every one hundred accidents in this industry occur on jointers. No other machine on which any number of accidents occurred, with the exception of corn shredders and feed cutters, has caused so many permanent disabilities in proportion to the number of accidents. Of the 77 accidents reported, 44, or 57 per cent, resulted in the loss of one or more fingers. In 1 case the operator had his entire hand removed. In all, a total of 71 fingers or parts of fingers, and one hand, were cut off by these machines. In 4 cases 4 fingers were cut off; in 2 cases, 3 fingers; in 11 cases, 2 fingers, and in 27 cases, 1 finger. All but 2 of these accidents occurred on the square-headed jointer. In the 2 instances reported, in which the machines were equipped with safety cylinder heads, the injured person merely suffered a slight abrasion at the tips of his fingers. Germany has long since prohibited the use of this old type of "head."

<sup>1</sup> Industrial Commission of Wisconsin, Shop Bulletin No. 1.

Reference is made to an order of the industrial commission aiming at the prevention of accidents of this kind, which reads that: "All hand jointers must be equipped with safety cylinder heads and a guard must be placed over the knives to protect the hands of the operator." The commission observes that if this order had been complied with very few of the accidents referred to would have occurred, and that at least 44 persons, they say, would have the use of their fingers instead of being maimed for life. The cost of installing the required safety device would average about \$50. According to the compensation payable in certain States for the loss of fingers or hands, it is pointed out, the amount of money which employers would have had to pay for the injuries sustained on jointers would have paid for the installation of new "heads" on over 300 jointers. The table shows that 53 of the accidents occurred on machines without any guard or safety device, and in 22 cases the machine had merely the movable wing, but even this guard without a safety head furnishes partial protection to the workmen. The efforts of the commission to reduce this class of accidents to the minimum have been remarkably successful.

#### ACCIDENTS DUE TO BURNS.<sup>1</sup>

Still another subject of considerable importance is metal burns and their prevention. The statistical facts of this group of accidents have not been reported on in full detail. The hazard is naturally typical of hot-metal-working industries, particularly foundries, where there is a considerable risk of serious burns from sparks and splashes of molten metal. The records of the Industrial Commission of Wisconsin show that up to April 20, 1913, there have been 311 accidents of this kind resulting in the disablement of the employee for more than seven days on account of serious burns from molten metal. The total number of working days lost was 5,700, which on the basis of a \$3 wage, would amount to a wage loss of \$17,000, excluding accidents resulting in less than eight days' disablement. Among other details of interest and importance the commission points out that—

Of the 311 accidents reported, 62, or 20 per cent, occurred while metal was being poured into molds; 53, or 17 per cent, while molten metal was being carried in hand ladles; 32, or 11 per cent, because of stumbling and obstructed passageways; 30, or 10 per cent, while ladles were being filled at the cupola. Metal explosions caused 19 accidents; 18 were caused by metal running out of molds, and in 12 cases the ladle was defective and the hot metal broke through. The remaining accidents were due to various other causes; men carrying ladles bumped into each other, spilling the metal; on tapping the cupola the sparks of metal burned men standing near; ladles and crucibles fell from crane hooks and tongs, splashing the contents in all

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<sup>1</sup> Industrial Commission of Wisconsin, Shop Bulletin No. 3.

directions; ladle trucks jumped the tracks, tipping over and spilling the metal, etc. In over 70 per cent of these accidents described above the injured persons had one or both feet seriously burned. Forty-three cases resulted in injured eyes, one of which caused permanent impairment of sight; 19 cases resulted in burns to the legs, and 26 to other parts of the body.

As a safety protection against accidents of this kind the commission suggests, on the basis of experience, the adoption of more suitable clothing for molders and helpers. It therefore recommends that—

All men engaged in handling molten metal should be dressed in hard cloth (jean) pants and congress or gaiter shoes. These shoes shed the metal, but in case some should enter the shoe, it can be removed quickly. Some employers also suggest the wearing of leggings to shed the metal. In one of the largest foundries in the State accidents were reduced 85 per cent by having the men wear congress shoes. Several other large foundry departments have installed as a part of their regular foundry store stock a suitable shoe which is retailed by the company to its men at cost price. This shoe finds general favor with foundry workers, especially because of its low price. In addition to the special shoes and pants, all molders should be supplied with glasses to protect their eyes from sparks and splashes. All hand ladles should be equipped with a hand shield. This will protect the molder's hand from the excessive heat, and will also guard his hand from possible splashes of metal.

Great care should be used in filling the ladles. In catching the metal the only correct and safe way is to cut the stream in toward the furnace. This is less liable to cause the metal to splatter outward and burn a man's feet. Ladles should always be properly lined—never higher than the ladle shell—and dried before using. In 12 cases serious burns resulted because the ladle was not properly lined, and consequently the metal burned through and ran on the injured person's feet. Molding sand should be properly tempered. Several serious explosions occurred because the molds were too damp. All meshes and gangways in a foundry should be smooth and kept free from obstructions. Several bad accidents were caused by men stumbling over and running into objects piled along the gangways. Too much care can not be exercised in the handling of molten metal. Much depends on the carefulness of the men, but by the wearing of proper clothes and shoes a large percentage of the more serious burns can be prevented.

In concluding their observations on metal burns and their prevention, the commission quotes the experience of a large company located at Beloit, which in December, 1911, adopted the plan of selling congress shoes to foundrymen at cost. The plan was popular with the men from the start, and soon resulted in every molder wearing shoes adapted to his work. At the end of six months the record of accidents showed a decrease of 85 per cent in burns in this particular foundry, and since the adoption of the plan the company has not had a serious burn to feet in its establishment.

EYE INJURIES.<sup>1</sup>

Eye injuries are of much more serious importance than is generally assumed. They occasionally result in the permanent incapacity of a thoroughly competent workman earning substantial wages and providing for the full support of his family. Subsequent to the accident such a man not infrequently becomes a burden to society and an object of pity to his fellow workmen. During the period September 1, 1911, to January 1, 1913, there were 366 eye accidents reported to the Wisconsin commission, including 24 cases in which the sight of one eye was completely lost; in 7 cases the sight was permanently impaired; and in the remaining 335 cases the injured person was disabled for at least 8 days. Approximately 1 out of every 25 accidents in Wisconsin results in an injury to the eye. The details of this class of accidents are given in the table below:

TABLE 63.—ACCIDENTAL EYE INJURIES IN WISCONSIN, SEPT. 1, 1911, TO JAN. 1, 1913.

Cause.	Loss of one eye.	Impaired sight.	Temporary injury.	Total.
Acids.....			5	5
Belts.....	1		2	3
Chipping.....	11	4	107	122
Electricity.....			6	6
Emery wheels.....			50	50
Explosions.....			10	10
Flying nails.....	4		11	15
Machine chips.....	4	1	44	49
Molten metals.....			41	41
Power drills.....			9	9
Riveting.....	1		8	9
Miscellaneous.....	3	2	42	47
Total.....	24	7	335	366

The commission points out that the large majority of these accidents can be easily prevented. In the experience of the American steel foundries the adoption of the required protective devices reduced the frequency of eye accidents to chippers, during three years, about 80 per cent. As regards men employed in chipping by hand, the commission recommends that—

All employees engaged in this occupation should be furnished with goggles, and they should be required to wear them. Chipping tools should also be kept properly dressed. The cut on another page [not reproduced] shows a large number of eyeglasses and goggles which were broken by the impact of chips of steel. In all probability most of these cases would have resulted in serious injury to the eye of the workmen who wore them.

There were 15 accidents to eyes caused by flying nails, of which 4 involved the complete loss of the sight of one eye. In the experience of one large concern these accidents were practically eliminated by corrugating or scoring the heads of hammers, which also served the purpose of protecting the hand. Another class of operators much exposed to eye accidents are the men who work on emery or other

<sup>1</sup> Industrial Commission of Wisconsin, Shop Bulletin No. 2.

grinding or polishing wheels. Such accidents can easily be prevented by proper safety precautions. Molders also, as elsewhere pointed out, are constantly exposed to the risk of eye injuries from splashes and sparks of molten metal. The use of safety goggles would have prevented a large number of the accidents reported.

There is the additional liability of serious injury to the eye by intense heat at blast furnaces. The use of eye and face shields provided with colored glass lenses should be enforced at all furnaces for the adequate and certain protection of the employees.

#### THE DANGER OF SMALL INFECTIONS.<sup>1</sup>

A large number of minor accidents result in infection, which often can be prevented only by the earliest possible qualified treatment. Of the accidents reported to the commission during the two years ending with September 1, 1913, 721, or 4.8 per cent, resulted in infection of the injured member. The accidents themselves were, with few exceptions, trivial, and would have resulted in but a very few days' disability each if properly treated. On account of neglect or indifference, over 12,500 working days were lost, or an average of 17 days per case. In five cases the injuries terminated fatally, and in four others the injured member had to be amputated to save the patient's life. The commission estimates that the compensation and medical aid in the 721 cases referred to under the present workmen's compensation law of Wisconsin would have cost employers about \$40,000. They refer to the experience of several large Wisconsin manufacturing companies in preventing infection by the proper handling of all accidents, no matter how slight, and the consequent practical elimination of serious results. The details of the 721 accidents, in tabular form, are given below:

TABLE 64.—CAUSES OF ACCIDENTS RESULTING IN INFECTION, WISCONSIN, SEPT. 1, 1911, TO SEPT. 1, 1913.

Cause.	Fatal injuries.	Amputations.	Infected—				Total.
			Cuts and punctures.	Bruises.	Burns.	Eyes.	
Nails in floor.....	1		31				32
Scratched on sharp objects.....	2		129				131
Cut on sheet metals.....			57				57
Handling scrap and castings.....			27				27
Slivers from handling objects.....		1	92				93
Hot or corrosive substances.....					53	4	57
Tools.....		1	60	27			88
Flying chips.....			14	4		34	48
Machinery.....	1		40	12		7	52
Bumping into objects.....			11	4			23
Dropping objects.....		1	12	16			29
Objects falling.....	1	1	17	25			44
Falling and slipping.....			11	13			24
Animals.....			2	2			4
Not known.....			8	3		1	12
Total.....	5	4	511	102	53	46	721

<sup>1</sup> Industrial Commission of Wisconsin, Shop Bulletin No. 5.

In the discussion of this table the commission points out that one of the greatest sources of infection is nail punctures, and that the wounds are usually deep and therefore difficult to clean in an anti-septic manner without qualified assistance. They suggest that the men should be cautioned always to wear shoes with good soles, and they refer to the case of a man who died from an infection caused by stepping on a tack. In continuation of their observations the commission points out that—

It is also important that all nails and sharp projections be removed from walls where there is danger of persons scratching themselves. Scratches of this kind caused 131 of the accidents resulting in infection. In two cases the injury proved fatal. The deceased scratched themselves on sharp projections and neglected to attend to the wound. Several bad infection cases were caused when men scratched themselves on nails while unpacking boxes and barrels. They had neglected to remove all projecting nails. This is a common practice, and ought to be stopped. While handling sheet metal, 57 men received injuries resulting in infection. The sharp edges of the metal make the danger of cuts very great. All men engaged in the occupation of handling sheet metal should wear gloves where it is practicable. Lumber handlers, casting cleaners, and men employed at handling scrap and other rough objects, should be required to wear gloves. A special glove is used in the International Harvester Works and other large plants, and has been found very successful in preventing cuts and lacerations. Ninety-three men alone were laid up for more than seven days each as the result of running slivers into their fingers. The wearing of gloves would have prevented most of these injuries.

In continuation of their observations on the causes of infection from accidents and its prevention, the commission states that in connection with the use of tools there were 88 cases of infection, and that hammers glancing off caused 12 of these cases. It therefore recommends that, on all rough work, hammers with corrugated heads should be used; and it further suggests that all shovels, picks, and other tools should have smooth handles and should be free from slivers. Recognizing the importance of immediate and qualified treatment, the commission concludes its recommendations as follows:

Many of the larger plants in the State have a plant hospital with a doctor or nurse in constant attendance for the treatment of injuries. Where this is not the case, a separate room should be set aside, if possible, where injuries can be treated. In small plants a corner of a room may be used. In every plant a "first-aid" kit should be kept. This should contain the necessary medicines and appliances for first-aid treatment, and should be in charge of some foreman or superintendent. About the plant should be posted notices to the effect that all injuries, no matter how slight, must be reported at once and be given proper treatment. The main difficulty in first-aid work is to get the men to have all injuries treated immediately.

Wounds heal very fast if they are clean. "Clean" means clean from germs as well as dirt. The best way to prevent blood poison

is: Clean the wound at once with a good disinfectant. Be sure to wash into the wound itself. Don't be afraid of bleeding, as the bandage will stop that. In no case should men be allowed to keep on working with an unbandaged injured member. All foremen should be responsible for the reporting of injuries by men under them.

It is a common practice in many plants to allow workmen or foremen to remove foreign matter from eyes. This is a bad practice and ought to be prohibited. One large steel company testifies that 250 men have lost their eyesight by permitting other workmen to remove foreign bodies from their eyes. The loss of sight in these cases resulted from perforation of the cornea; the transmission of infection by finger nails, or other means, resulting in corneal ulcers, forming large scars. The experience of this one company teaches that workmen should be instructed never to allow anyone but a doctor to remove a particle from the eye.

#### ACCIDENTS DUE TO CORN SHREDDERS, HUSKERS AND FEED CUTTERS.<sup>1</sup>

The last group of industrial accidents considered in detail by the Industrial Commission of Wisconsin is farm accidents on corn shredders and huskers and feed cutters. During the year 1911, 94 farmers in the State of Wisconsin were seriously injured on corn shredders, corn huskers, and feed cutters, resulting in 4 deaths, in 6 cases the loss of an arm, and in 21 cases the loss of a hand. The commission estimates the economic loss resulting from these and other injuries within the group at \$307,000. Special information was secured in regard to the nature, cause, and possible prevention, of 19 accidents reported on in detail. The investigation convinced the commission that all of the old-style machines could and should be equipped with self-feeds and safety levers. The details of corn husker and shredder accidents are given in the table following.

<sup>1</sup> The subject of accidents on the farm is of much greater importance than generally assumed. The exposure to the accident risk is practically continuous on the farm, and modern machinery as well as the increasing use of blasting in connection with the removal of stumps, etc., has introduced new dangers, which, as a rule, are inadequately provided for by proper safety precautions. Farm accidents are less likely to be accurately reported than accidents in industry. The following is an interesting illustration of the risks in agriculture not generally recognized:

"A recent fatal accident in Ohio calls attention to a danger to farmers which can not be too widely circulated. Since 1875, when the first American silo was built by Dr. Manly Miles, this method of preserving forage for live stock has been generally adopted. Although the Department of Agriculture has frequently called attention to the danger of carbon dioxid gas accumulating in silos under certain conditions, no fatalities have been reported heretofore. On the morning of September 19, four workmen of the farm of the Athens (Ohio) State Hospital, ascended the ladder on the outside of a silo to an open door about 12 feet from the top and jumped down one after another on to the silage, the top of which was about 6 feet below the door. About five minutes after, two other workmen following them found them unconscious. Although a large force of workmen were immediately summoned and the bodies of the four men removed at once through a lower door, the physicians of the hospital who were at once on the ground were unable to resuscitate any of the four men. Evidently the carbon dioxid gas had accumulated during the night, filling the silo up to the level of the door and forming a layer of carbon dioxid gas 6 feet deep. Such accidents might easily be repeated on any modern farm. Agricultural journals should call the attention of the farmers to this danger and should urge that silos be carefully ventilated before being entered."—[Press bulletin, American Medical Association, Oct. 31, 1914. This editorial was based upon facts originally reported in the Monthly Bulletin, Ohio State Board of Health, Oct. 9, 1914, p. 1436.]

TABLE 65.—ACCIDENTS CAUSED BY CORN HUSKERS AND SHREDDERS IN WISCONSIN, 1911.

Part of machine.	Fatal injuries.	Loss of—			Fracture of—			Lacerations.	Bruises.	Total.
		Arm.	Hand.	Fingers.	Skull.	Fingers.	Thumb.			
Chain.....				1				1		2
Cutter.....			1						1	2
Hood.....	1									1
Delivery pipe.....								1		1
Gears.....			2	6				1		9
Husker.....			1							1
Iron throw-off.....					1					1
Rolls.....		6	9	11				3		29
Blower.....							1			1
Not given.....			3	7		1		1		12
<b>Total.....</b>	<b>1</b>	<b>6</b>	<b>16</b>	<b>25</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>7</b>	<b>1</b>	<b>59</b>

According to the table there were 59 accidents, including 1 fatality. Accidents at rolls numbered 29, or 49.2 per cent of the total, including 6 accidents involving the loss of an arm. Information regarding feed, ensilage, and silo cutter accidents is given in the table following:

TABLE 66.—ACCIDENTS CAUSED BY FEED, ENSILAGE, AND SILO CUTTERS IN WISCONSIN, 1911.

Part of machine.	Fatal injuries.	Loss of—		Fractures of fingers.	Lacerations.	Total.
		Hand.	Fingers.			
Blowers.....		1				1
Burrs.....					1	1
Gears.....	1	1	3		3	8
Knives.....		1	4		4	9
Pulleys.....	1					1
Rolls.....			1			1
Not given.....	1	2	4	1	6	14
<b>Total.....</b>	<b>3</b>	<b>5</b>	<b>12</b>	<b>1</b>	<b>14</b>	<b>35</b>

On the basis of the statistical data and the special investigations following, the commission recommends the adoption of the following eight rules:

1. Never use the hands to unclog the rolls—use a stick or stop the machine. Eight men were caught in the rolls because they tried to unclog them with their hands.
2. Every husker should be equipped with a self-feed—either an apron or gravity self-feed—so the feeder will not have to stand within reach of the rolls. Fifteen arms and hands were lost because self-feeds had not been provided.
3. Every husker and shredder on which it is possible for the feeder to get caught in the rolls should be provided with a safety lever so attached that the feeder's body will strike it if his hands are caught in the rolls. Efficient safety levers would have prevented eight accidents.
4. It is always dangerous for the feeder to cut bands while standing within reach of the snapping rolls, especially if the knife is tied to the wrist.
5. The footboard should always be kept free from ice or snow. Two hands were lost because the feeders slipped on icy footboards.

6. Every gear can be covered so as to make it impossible for fingers to get caught. Don't buy a machine with uncovered gears. Nine men are one-handed because of exposed gears.

7. Every sprocket should be covered at the point where the chain runs onto it. Hands and fingers are liable to injury at this point.

8. Belts are dangerous and should be guarded, especially at the point where they run onto the pulley. Hundreds of workers in the various industries can testify to this statement.

### **INDUSTRIAL ACCIDENTS IN THE MINERAL INDUSTRIES.**

Mining is probably one of the best illustrations of an industry subject to an inherent accident liability, or of conditions giving rise to bodily injuries largely beyond the control of either the employer or the employee. At the same time no industry better emphasizes the possibilities of rational and even drastic methods of accident prevention, particularly in the direction of minor casualties and of accidents resulting in the loss of a single life. It requires only to be pointed out that the average fatality rate in coal mining in the United States during the five years ending with 1912 was 3.71 per 1,000, in comparison with a rate of 1.36 for the United Kingdom, 1.02 for Belgium, 2.25 for Prussia, and 1.15 for Austria. The excessive frequency of fatal accidents in the mineral industries of the United States can not be attributed to inherently more dangerous conditions, for, on the contrary, there are strong reasons for believing that these conditions are often decidedly less satisfactory in certain foreign countries where mining has been carried on for a longer period of time than in this country, or where, on the average, lower depths have been reached, or where the geological formations involve more serious technical problems than in this country. The necessity for a national interest in the problem of accident prevention in the mineral industries is best emphasized in the program of the First National Mine Safety Demonstration, under the auspices of the United States Bureau of Mines, the American National Red Cross, and the Pittsburgh Coal Operators' Association, held in Pittsburgh, October 30-31, 1911. A full report regarding this remarkable national gathering has been published by the Bureau of Mines, with an instructive chapter on the explosion at the experimental mine for the purpose of visualizing to those present the supreme importance of guarding against the extreme danger of coal-dust explosions, by the use of permissible explosives on the one hand and by recognized methods of mechanical prevention on the other. Since the organization of the Bureau of Mines, in 1910, an increasing amount of attention has been given to the subject of accident prevention on the basis of educational efforts among employees and the development of first-aid organizations in cooperation with the mine-rescue crews of the Bureau of Mines and the use of mine-rescue breathing apparatus, of which a large number have since been installed in coal and metal mines throughout the

United States. Mention may be made of a primer on explosives for coal miners, a report on safety and efficiency in mine tunneling, a technical paper on training with mine-rescue breathing apparatus, a series of circulars on accidents from mine-car locomotives, accidents from falls of roof and coal, electrical accidents in mines, safety electrical switches, inflammable gases in mine air, mine fires, etc., as concrete illustrations of the practical nature of the efforts made on the part of the Bureau of Mines to reach the miner as well as the mine owner in an effort to eliminate the causes and control the conditions responsible for a considerable loss of life and physical injury in the mineral industries of the United States at the present time.

The following discussion of accidents in mining is limited to the essentials of a national safety problem of direct importance to more than one million persons employed in the mineral industries, and to their dependents. For several years bulletins have been published annually by the United States Bureau of Mines on accidents in coal mines, metal mines, and quarries, of which the following is a brief summary for the year 1912:

TABLE 67.—FATAL ACCIDENTS IN THE MINES AND QUARRIES OF THE UNITED STATES DURING 1912.

[Source: Metal-mine Accidents in the United States, 1912, Bureau of Mines.]

Kind of mine.	Number employed.	Number killed.	
		Total.	Per 1,000 employed.
Metal mines.....	169,199	661	3.91
Coal mines.....	722,062	2,360	3.27
Quarries.....	113,105	213	1.88
Total.....	1,004,966	3,234	3.22

The important fact is disclosed by this comparison that 3,234 men were killed in and about mines and quarries during the year 1912, or, on the basis of the number employed, the fatality rate was 3.22 per 1,000. The rate was highest for metal mines, or 3.91 per 1,000, in comparison with a rate of only 1.53 for Great Britain, 1.51 for Germany, and 1.76 for Japan.

The rate for the Transvaal, however, is still higher, or 4.14 per 1,000, largely, no doubt, in consequence of the fact that the mining industries in that country are carried on under physical and labor conditions quite similar to those of the United States. As observed by Mr. Albert H. Fay, in his report<sup>1</sup> on metal-mining accidents in the United States for the calendar year 1912—

Both countries are comparatively new; English is spoken in both; and both employ much foreign labor. The Transvaal field employs

<sup>1</sup> Technical Paper 61, Bureau of Mines, Washington, 1913.

more than 150,000 Kaffirs, who come from the uncivilized or the grazing and agricultural districts of Africa. They can neither speak nor understand the language of their superiors, they know nothing about machinery, and they do not realize the dangers of mining. A large percentage of the miners of the United States come from the agricultural districts of southern Europe. They do not understand the language of the country, they have practically no knowledge of machinery, and do not realize the dangers of electricity, explosives, etc. Some may pretend, often with disastrous results, to understand orders given by their superiors.

The validity of the comparative method in international mine accident statistics has been seriously called into question. Few industries are more liable to abnormal conditions of employment, as best illustrated in the statement that the average number of days' work in American coal mines during 1912 was only 225 (for metal mines the average number of days' work was 287). Since the accident rate, as elsewhere discussed, to be strictly comparable should be reduced to a standard working year of 300 days' labor of 10 hours each, it is self-evident that the true hazard in mining can be disclosed only by corrected fatality and injury rates calculated on a basis of standard conditions of employment. The subject is fully discussed by Mr. Fay in Technical Paper 61 of the United States Bureau of Mines, in which it is pointed out that gross errors are likely to occur in the calculation of fatality rates on the basis of the average number employed, without reference to the actual days of employment during the year. The practical importance of such a correction is brought out in the following comparison for the year 1912, derived from the report of the United States Bureau of Mines on metal-mine accidents for that year:

TABLE 68.—COMPARISON OF FATALITY RATES IN COAL AND METAL MINING ON THE BASIS OF THE AVERAGE NUMBER OF MEN EMPLOYED, AND THE EQUIVALENT OF 300-DAY WORKERS, DURING 1912.

[Source: Metal-mine Accidents in the United States, 1912, Bureau of Mines.]

Basis of figures.	Number employed.	Number killed.	
		Total.	Per 1,000 employed.
Metal mines:			
Average number employed.....	169,199	661	3.91
Number of 300-day workers.....	161,661	661	4.09
Coal mines:			
Average number employed.....	722,662	2,360	3.27
Number of 300-day workers.....	541,776	2,360	4.36

It is shown by this comparison that the fatality rates are substantially changed when reduced to a standard basis of 300-day workers. For both classes of miners the rates are increased, but the increase in fatality rate is decidedly greater in the case of persons employed in coal mining, for whereas the fatality rate in metal mines

during 1912 was 3.91 per 1,000 employed, and for coal mines 3.27, or 0.64 less per 1,000; on the corrected basis of calculation the respective rates are shown to be 4.09 per 1,000 for metal miners, against 4.36 for coal miners, or 0.27 more per 1,000. This change is the result of the important fact that metal miners worked on an average 287 days during 1912, as compared with only 225 days for coal miners. They were, therefore, during the year, exposed to the risk of mining 62 days longer than were the coal miners, and in fairness to the industry it is only proper, aside from the general requirements for scientific exactitude, that the rates should be calculated on a standard basis of 300 working days.

The following table will further illustrate the practical importance of making statistical corrections for the actual working time. The figures for 1896 to 1911 are derived from the report by Mr. Frederick W. Horton on Coal-mine Accidents in the United States and Foreign Countries, published by the United States Bureau of Mines, in 1913, and the figures for 1912 and 1913 are taken from the Monthly Statement of Coal-mine Fatalities in the United States, December, 1913, U. S. Bureau of Mines:

TABLE 69.—FATAL ACCIDENTS IN COAL MINING IN THE UNITED STATES, 1896 TO 1913.

Year.	Number employed.	Days worked.	Number killed.	Fatality rates.	
				Per 1,000 employed.	Per 1,000 employed 300 days per annum.
1896.....	383,258	185	1,089	2.84	4.61
1897.....	385,846	179	975	2.53	4.23
1898.....	391,841	190	1,064	2.72	4.29
1899.....	396,624	214	1,216	3.07	4.30
1900.....	432,453	212	1,492	3.45	4.88
1901.....	476,655	216	1,549	3.25	4.51
1902.....	510,437	197	1,895	3.71	5.65
1903.....	547,431	220	1,752	3.20	4.36
1904.....	573,373	202	2,004	3.50	5.19
1905.....	615,628	212	2,232	3.63	5.13
1906.....	631,086	209	2,116	3.35	4.81
1907.....	655,418	231	3,197	4.88	6.33
1908.....	672,794	195	2,449	3.64	5.60
1909.....	666,523	225	2,668	4.00	5.34
1910.....	725,030	220	2,840	3.92	5.34
1911.....	728,348	220	2,719	3.73	5.09
1912.....	722,662	225	2,360	3.27	4.36
1913.....	<sup>2</sup> 728,355	.....	2,785	3.82	4.70

<sup>1</sup> Estimated; no official figures available.

<sup>2</sup> Estimated. Subject to revision.

The necessity for correction on account of working time becomes essential in an international comparison, for which unfortunately the required data for such correction are often wanting. It has been pointed out by Mr. Horton that it would manifestly be unfair to make a comparison of the coal-mining industries in Belgium and in the United States on the average number employed. First, because

in Belgium the coal mines are operated about 80 days more per annum than in the United States; and second, because the American coal miner produces about five times as much coal in a day, and on account of his greater speed of work he is naturally subjected to a greater personal risk. The second factor, however, can not be taken into account in the calculation of fatality rates, but the difference in operating methods is referred to as an additional illustration of the need for extreme caution in comparing international accident statistics without regard to special conditions affecting the employment. Granting these objections to the noncritical use of crude data, it may safely be assumed, however, that in a general way the rates based on the average number employed, when calculated by uniform and trustworthy methods, measure approximately the occupation hazard; and in this connection it may be stated that in comparison with the average fatality rate in the coal-mining industry of the United States for the 10-year period 1901 to 1910 of 3.74 per 1,000 employed, the corresponding rate for Japan was 2.92, for Germany 2.11, for New South Wales 1.74, for France 1.69, for Great Britain 1.36, for Austria 1.04, and for Belgium 1.02. When correction is made for the differences in working time, it is shown by the calculations of Mr. Horton that the fatality rate in coal mining for the decade ending with 1910 was for the United States 5.26 per 1,000 employed, on the basis of a year of 300 working days, against only 1.76 for France and 1.04 for Belgium. Mr. Horton points out in this connection, however, that the average production of short tons per man per day was 3.01 for the United States, 0.76 for France, and 0.62 for Belgium, but it would seem to be a wrongful use of the statistical method to employ this factor of production in a calculation of fatality rates, or, in other words, determine the relative frequency of accidents on the basis of equal daily production per man employed. In this country coal-mining machinery is much more extensively used than in foreign countries, but how far this factor in precise correlation to the daily amount of coal produced per man affects the fatality rate can not be determined.

The causes of coal-mining accidents are numerous and varied. The table following exhibits in full detail the causes of 2,360 fatal accidents in American coal mines during 1912, together with the percentage distribution, which is generally more useful for practical purposes in connection with efforts in the direction of mine safety than the corresponding rate per 10,000 employed. For the purpose of an exact comparison, however, as regards the underlying causes responsible for mine fatalities, the rate per 10,000 employed, even without correction for working time, is to be preferred.

TABLE 70.—CAUSES OF FATAL COAL-MINING ACCIDENTS IN THE UNITED STATES, 1912.

Cause of accident.	Number killed. <sup>1</sup>	Per cent of total. <sup>1</sup>	Rate per 10 000 employed. <sup>2</sup>
UNDERGROUND ACCIDENTS.			
Falls of roof (coal, rock, etc.).....	972	41.19	16.17
Falls of coal (other than roof coal).....	179	7.58	2.98
Mine cars and locomotives.....	362	15.34	6.02
Gas explosions and burning gas.....	164	6.95	2.73
Coal-dust explosions.....	30	1.27	.50
Explosions of coal dust and gas together.....	107	4.53	1.78
Explosives (includes premature blasts, explosion of misfires, suffocation by gases from explosives, etc.).....	133	5.64	2.21
Suffocation from mine gases.....	10	.42	.17
Electricity (shocks, or burns).....	76	3.22	1.26
Animals.....	7	.30	.12
Mining machines.....	10	.42	.17
Machines other than locomotives and mining machines.....	4	.17	.07
Mine fires (burned, suffocated, etc.).....	11	.47	.18
Other causes.....	54	2.29	.90
Total.....	2,119	89.79	35.25
SHAFT ACCIDENTS.			
Falling down shafts or slopes.....	25	1.19	.47
Objects falling down shafts or slopes.....	5	.22	.08
Breaking of cables, chains, etc.....	2	.08	.03
Overwinding.....	2	.08	.03
Other causes.....	17	.72	.28
Total.....	54	2.29	.90
SURFACE ACCIDENTS.			
Mine cars and mine locomotives.....	68	2.88	5.55
Electricity (shocks, or burns).....	9	.38	.74
Machinery.....	30	1.27	2.45
Boiler explosions.....	1	.04	.08
Railway cars and locomotives.....	14	.59	1.14
Other causes.....	65	2.76	5.31
Total.....	187	7.92	15.27
Grand total.....	2,360	100.00	32.66

<sup>1</sup> Source: Coal-mine Accidents in the United States, 1896-1912, United States Bureau of Mines.

<sup>2</sup> Computed.

Of all the fatalities in coal mining, 89.79 per cent occurred underground. Of the total, 41.19 per cent were caused by falls of roof (coal, rock, etc.), and 7.58 per cent additional by falls of coal other than roof coal. The next most important cause of mine accidents was mine cars and locomotives, responsible for 15.34 per cent of the total, followed by gas explosions and burning gas, accountable for 6.95 per cent. Coal-dust explosions during the year accounted for only 1.27 per cent of the accidents from all causes, and explosions of coal dust and gas combined, but exclusive of coal-dust explosions separately considered, account for 4.53 per cent. Probably no industry is so subject to exceptional hazards as coal mining unless it be the manufacture of explosives, with regard to which trustworthy American data are not available at the present time. The considerable range in the fatality rate in coal mining, as determined by the occurrence of gas or dust explosions of exceptional violence, is well shown by the following table on coal-mine disasters in the United States since 1869 in which 100 or more persons lost their lives.

TABLE 71.—COAL-MINE DISASTERS IN THE UNITED STATES IN WHICH 100 OR MORE MEN WERE KILLED, 1869 TO 1914.

[Source: Figures for 1869 to 1911 from Coal-mine Accidents in the United States, 1896-1912, Bureau of Mines; for 1913 and 1914 from Coal-mine Fatalities in the United States, April, 1914, Bureau of Mines.]

Date.	Location of mine.	Nature of accident.	Number killed.
Sept. 6, 1869.....	Plymouth, Pa.....	Mine fire.....	179
Mar. 13, 1884.....	Pocahontas, Va.....	Mine explosion.....	112
Jan. 27, 1891.....	Mount Pleasant, Pa.....	do.....	109
Jan. 7, 1892.....	Krebs, Okla.....	do.....	100
May 1, 1900.....	Scotfield, Utah.....	Powder and mine explosion.....	200
May 19, 1902.....	Coal Creek, Tenn.....	Mine explosion.....	184
July 10, 1902.....	Johnstown, Pa.....	do.....	112
June 30, 1903.....	Hanna, Wyo.....	Mine explosion and fire.....	169
Jan. 25, 1904.....	Cheswick, Pa.....	Mine explosion.....	179
Feb. 20, 1905.....	Virginia City, Ala.....	do.....	108
Dec. 6, 1907.....	Monongah, W. Va.....	do.....	361
Dec. 19, 1907.....	Jacobs Creek, Pa.....	do.....	239
Nov. 28, 1908.....	Marianna, Pa.....	do.....	154
Nov. 13, 1909.....	Cherry, Ill.....	Mine fire.....	256
Apr. 8, 1911.....	Littleton, Ala.....	Mine explosion.....	128
Oct. 22, 1913.....	Dawson, N. Mex.....	do.....	263
Apr. 28, 1914.....	Eccles, W. Va.....	do.....	180

Statistics of metal-mine accidents have been collected by the United States Bureau of Mines for comparatively recent years only. For certain States the data are available for longer periods, but they are of rather limited usefulness for comparative purposes. The table following exhibits the facts for the two years 1911 and 1912 as returned in the special report of the United States Bureau of Mines on metal-mine accidents for the calendar year 1912:

TABLE 72.—FATALITY RATES IN METAL (AND MISCELLANEOUS MINERAL) MINES OF THE UNITED STATES ON THE BASIS OF THE AVERAGE NUMBER OF MEN EMPLOYED, AND THE EQUIVALENT OF 300-DAY WORKERS, 1911 AND 1912.

[Source: Metal-mine Accidents in the United States, 1912, Bureau of Mines.]

Basis of figures.	1911			1912		
	Number employed.	Number killed.		Number employed.	Number killed.	
		Total.	Per 1,000 employed.		Total.	Per 1,000 employed.
Average number employed.....	165,979	695	4.19	169,199	661	3.91
Number of 300-day workers.....	156,088	695	4.45	161,661	661	4.09

The returns for metal mines include the statistics of the seriously and the slightly injured. For the year 1912 the fatality rate of accidents occurring underground (including shaft accidents) was 4.74 per 1,000, and above ground 2.35, or for both classes of employees combined, 3.91. The number seriously injured was 31.32 per 1,000 underground, 17.84 per 1,000 on the surface, and 26.61 for both classes of employees combined. The numbers slightly injured were 194.56 per 1,000 underground, 81.48 per 1,000 on the surface, and 155.04 for both classes combined.

With reference to the definition of the term "serious and slight injuries," it is stated in the bulletins referred to that a serious accident was considered to be one disabling a man and keeping him from work for "20 days or more." This class of injuries includes broken arms and legs, the loss of an eye or eyes, and severe cuts and bruises. A slight injury is considered as one involving loss of time of "not less than 1 day nor more than 20 days." Under this group of injuries are classified cuts, sprains, mashed fingers, bruises, slight burns, effect of powder smoke, etc. It is observed, however, that any slight injury may become infected, and thus result in a serious accident, as previously defined. In an interesting discussion of the technical difficulties regarding the required scientific methods of classification according to the degree of injury, it is pointed out by Mr. A. H. Fay<sup>1</sup> that—

In the tabulation of the serious and slight injuries, it has been found advisable to change the grouping slightly from that used in 1911. This change is due to the irregular manner in which these classes of injuries are reported. In some States there is no law whatever requiring a record of injuries or a report to any industrial or insurance board, commissioner of labor, or inspector, whereas in other States strict laws govern this feature. In those States where there are such laws the majority of the mining companies keep excellent records from which reports for the Bureau of Mines are compiled, and it is in these States that the injury ratio in many cases is very high. Unless all States report on the same basis, just comparisons can not be made.

In making comparisons of serious and slight injuries in the various States, it is necessary to take into account some of the features of the law governing the report of such injuries. One State may report fatal and serious injuries only, but without defining a "serious injury," and require no reports for slight injuries. One State may require reports of all fatalities and injuries incapacitating the employee for one week; others may specify the reporting of accidents causing disabilities ranging from 1 to 14 days. Thus one State may report, perhaps, only 25 per cent as many injuries as some other States in which the mining industry is of no greater magnitude. At first glance it would appear that mining is much safer in the former State than in any of the latter, but this, however, is a wrong conclusion. The major difference is largely a matter of recording and reporting the serious and slight injuries.

The table following shows the causes of fatal, serious, and slight accidents in metal (and miscellaneous mineral) mines in the United States during the calendar year 1912, together with the percentage distribution of such accidents and the rate per 10,000 employed.

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<sup>1</sup>Technical Paper 40, Bureau of Mines, 1913.

TABLE 73.—NUMBER AND PER CENT OF MEN KILLED AND INJURED IN AND ABOUT METAL (AND MISCELLANEOUS MINERAL) MINES IN THE UNITED STATES AND RATE PER 10,000 EMPLOYED, BY CAUSES, 1912.

Cause.	Fatally injured.			Seriously injured.			Slightly injured.		
	Number. <sup>1</sup>	Per cent of total. <sup>1</sup>	Rate per 10,000 employed. <sup>2</sup>	Number. <sup>1</sup>	Per cent of total. <sup>1</sup>	Rate per 10,000 employed. <sup>2</sup>	Number. <sup>1</sup>	Per cent of total. <sup>1</sup>	Rate per 10,000 employed. <sup>2</sup>
<b>UNDERGROUND ACCIDENTS.</b>									
Fall of rock or ore from roof or wall.	212	32.10	19.26	1,102	24.48	100.13	5,882	22.42	534.46
Rock or ore while loading at working face.....	2	.30	.18	261	5.80	23.72	2,873	10.95	261.04
Timber or hand tools.....	6	.90	.54	313	6.95	28.44	2,543	9.70	231.06
Explosives.....	73	11.04	6.63	153	3.40	13.90	246	.94	22.35
Hauling accidents.....	35	5.29	3.18	579	12.86	52.61	2,732	10.41	248.24
Falling down chute, winze, raise, or slope.....	43	6.50	3.91	201	4.46	18.26	740	2.82	67.24
Run of ore from chute or pocket.....	10	1.51	.91	113	2.51	10.27	928	3.54	84.32
Drilling accidents.....	2	.30	.18	203	4.51	18.45	1,410	5.38	128.12
Electricity.....	19	2.87	1.73	7	.16	.64	32	.12	2.91
Machinery (not including locomotives or drills).....	2	.30	.18	51	1.13	4.63	420	1.60	38.16
Mine fires.....	1	.15	.09	1	.02	.09	11	.04	.99
Suffocation from natural gases.....	4	.61	.36	5	.11	.45	30	.11	2.73
Inrush of water.....	5	.76	.45	3	.07	.27	7	.03	.64
Stepping on nail.....				9	.20	.82	232	.89	21.08
Other causes.....	8	1.21	.73	269	5.97	24.44	2,723	10.38	247.42
Total.....	422	63.84	38.34	3,270	72.63	297.12	20,809	79.33	1,890.76
<b>SHAFT ACCIDENTS.</b>									
Falling down shafts.....	40	6.05	3.64	35	.78	3.18	69	.26	6.27
Objects falling down shafts.....	12	1.82	1.09	50	1.11	4.54	228	.87	20.72
Breaking of cables.....	2	.30	.18	3	.07	.27	3	.01	.27
Overwinding.....							5	.02	.45
Skip or cage.....	37	5.60	3.36	71	1.57	6.45	174	.66	15.81
Other causes.....	9	1.36	.82	18	.40	1.64	125	.48	11.36
Total.....	100	15.13	9.09	177	3.93	16.08	604	2.30	54.88
<b>SURFACE ACCIDENTS.</b>									
Mine cars or mine locomotives.....	6	.91	1.01	32	.71	5.41	138	.53	23.33
Railway cars and locomotives.....	5	.76	.85	27	.60	4.56	52	.20	8.79
Run or fall of ore in or from ore bins.....	2	.30	.34	19	.42	3.21	101	.38	17.08
Electricity.....	5	.76	.85	4	.09	.68	25	.09	4.23
Machinery.....	11	1.66	1.86	104	2.31	17.58	369	1.41	62.39
Other causes.....	30	4.54	5.07	279	6.20	47.17	1,525	5.81	257.85
Total.....	59	8.93	9.98	465	10.33	78.61	2,210	8.42	373.67
<b>SURFACE (WHERE SURFACE MINING IS DONE).</b>									
Falls or slides of rock or ore.....	16	2.42	2.71	124	2.75	20.97	433	1.65	73.21
Explosives.....	21	3.17	3.55	54	1.20	9.13	120	.46	20.29
Haulage accidents.....	20	3.03	3.38	77	1.71	13.02	301	1.15	50.89
Steam shovels.....	4	.61	.68	70	1.55	11.84	238	.91	40.24
Falls of persons.....	3	.45	.51	46	1.02	7.78	285	1.08	48.19
Falls of derricks, booms, etc.....	2	.30	.34	13	.29	2.19	35	.13	5.92
Run or fall of ore in or from ore bins.....				1	.02	.17	8	.03	1.35
Machinery (other than locomotives or steam shovels).....	6	.91	1.01	25	.56	4.23	147	.56	24.86
Electricity.....	1	.15	.17	6	.14	1.01	7	.03	1.18
Hand tools.....				45	1.00	7.61	330	1.26	55.79
Other causes.....	7	1.06	1.18	129	2.87	21.81	705	2.69	119.20
Total.....	80	12.10	13.53	590	13.11	99.76	2,609	9.95	441.13
Grand total.....	661	100.00	39.06	4,502	100.00	266.08	26,232	100.00	1,550.36

<sup>1</sup> Source: Metal-mine Accidents in the United States, 1912, Bureau of Mines.

<sup>2</sup> Computed.

This analysis is of unusual interest in that as far as known a corresponding statement has not heretofore been published for the American metal-mining industry considered as a whole. The analysis includes 661 deaths, 4,502 serious injuries, and 26,232 slight injuries.

Statistics of accidents in quarries have been compiled by the United States Bureau of Mines<sup>1</sup> for only the three years 1911 to 1913. The table following will show the number employed, the number killed, and the rate per 1,000 employed for each of the three years and for the three years combined:

TABLE 74.—NUMBER OF MEN EMPLOYED AND NUMBER KILLED IN AND ABOUT ALL QUARRIES IN THE UNITED STATES, 1911, 1912, AND 1913.

Year.	Number employed.	Number killed.	
		Total.	Per 1,000 employed.
1911.....	110,954	188	1.69
1912.....	113,105	213	1.88
1913.....	106,278	183	1.72
Average, 3 years.....	110,112	195	1.77

According to this table the average fatality rate per 1,000 employed was 1.77, which compares with a rate for the corresponding period of 3.58 for coal mines and 3.86 for metal mines. The average number of days worked in quarries during 1913 was 246. If the required correction is made for differences in working time, it appears that the fatality rate per 1,000 of 300-day workers for the year 1913 was 2.10 for quarries, 3.72 for metal mines, and 4.70 for coal mines.

The returns are available for quarries regarding serious and minor accidents, and for the year 1913 the results are briefly summarized as follows: The fatality rate per 1,000 employed inside the quarries was 1.84, and outside, 1.43, or for both groups combined, 1.72. The serious-injury rate was 10.85 per 1,000 employed inside, 8.87 outside, and 10.28 for both groups of employees combined. The slight-injury rate was 71.62 per 1,000 employed inside, 40.40 for persons outside, and 62.55 for both groups combined. The rates varied considerably according to the kind of quarry, in much the same manner as material variations are met with in metal mining according to the product mined. The statistical bulletins of the United States Bureau of Mines should be consulted for additional details.

The causes of accidents in quarries are less varied than in coal and metal mining. They are briefly summarized in the table following, according to the degree of injury—whether fatal, serious, or slight. This table is based upon 183 fatal accidents, 1,092 serious injuries, and 6,647 minor accidents.

<sup>1</sup> Technical Paper 92, Bureau of Mines.

TABLE 75.—NUMBER AND PER CENT OF MEN KILLED AND INJURED IN AND ABOUT QUARRIES IN THE UNITED STATES AND RATE PER 10,000 EMPLOYED, BY CAUSES, 1913.

Cause.	Fatally injured.			Seriously injured.			Slightly injured.		
	Number. <sup>1</sup>	Per cent of total. <sup>1</sup>	Rate per 10,000 employed. <sup>2</sup>	Number. <sup>1</sup>	Per cent of total. <sup>1</sup>	Rate per 10,000 employed. <sup>2</sup>	Number. <sup>1</sup>	Per cent of total. <sup>1</sup>	Rate per 10,000 employed. <sup>2</sup>
<b>IN QUARRY.</b>									
Falls or slides of rock or overburden.....	27	14.76	3.58	139	12.73	18.44	741	11.15	98.29
Rock while loading at working face.....	11	6.01	1.46	150	13.74	19.90	1,113	16.74	147.64
Timber or hand tools.....	3	1.64	.40	36	3.30	4.78	483	7.27	64.07
Explosives.....	42	22.95	5.57	74	6.78	9.82	233	3.51	30.91
Haulage accidents.....	20	10.93	2.65	119	10.90	15.79	653	9.82	86.62
Falling into quarry from surface, benches, or face.....	10	5.46	1.33	38	3.48	5.04	99	1.49	13.13
Falling from hoists, derricks, ladders, etc.....	3	1.64	.40	27	2.47	3.58	63	.95	8.36
Drilling accidents (by machine or hand drills).....	3	1.64	.40	47	4.30	6.23	322	4.84	42.71
Electricity (shocks or burns).....	2	1.09	.27	.....	.....	.....	14	.21	1.86
Machinery (pumps, hoisting and haulage machinery, not including locomotives or drills).....	8	4.37	1.06	57	5.22	7.56	252	3.79	33.43
Flying pieces of rock from sledging.....	2	1.09	.27	31	2.84	4.11	592	8.91	78.53
Stepping on nail.....	1	.55	.13	3	.27	.40	48	.72	6.37
Other causes.....	7	3.83	.93	97	8.88	12.87	786	11.82	104.26
<b>Total.....</b>	<b>139</b>	<b>75.96</b>	<b>18.44</b>	<b>818</b>	<b>74.91</b>	<b>108.51</b>	<b>5,399</b>	<b>81.22</b>	<b>716.17</b>
<b>OUTSIDE OF QUARRY.</b>									
Quarry cars or locomotives.....	4	2.19	1.29	33	3.48	12.30	116	1.74	37.55
Railway cars or locomotives.....	8	4.37	2.59	17	1.56	5.50	40	.60	12.95
Machinery.....	12	6.55	3.89	67	6.13	21.69	160	2.41	51.80
Explosives.....	2	1.09	.65	6	.55	1.94	19	.29	6.15
Falls of persons.....	4	2.19	1.30	29	2.66	9.39	100	1.50	32.37
Boiler explosions.....	.....	.....	.....	3	.27	.97	1	.02	.32
Timber or hand tools.....	.....	.....	.....	24	2.20	7.77	352	5.30	113.95
Electricity (shocks or burns).....	3	1.64	.97	5	.46	1.62	7	.11	2.27
Stepping on nail.....	.....	.....	.....	5	.46	1.62	20	.30	6.47
Horse or mule.....	1	.55	.32	14	1.28	4.53	82	1.23	26.54
Other causes.....	10	5.46	3.24	66	6.04	21.37	351	5.23	113.63
<b>Total.....</b>	<b>44</b>	<b>24.04</b>	<b>14.25</b>	<b>274</b>	<b>25.09</b>	<b>88.70</b>	<b>1,248</b>	<b>18.78</b>	<b>404.00</b>
<b>Grand total.....</b>	<b>183</b>	<b>100.00</b>	<b>17.22</b>	<b>1,092</b>	<b>100.00</b>	<b>102.75</b>	<b>6,647</b>	<b>100.00</b>	<b>625.45</b>

<sup>1</sup> Source: Quarry Accidents in the United States, 1912, Bureau of Mines.

<sup>2</sup> Computed.

Combining the available information for all of the mineral industries of the United States, the facts are briefly set forth in the table following, which has also been derived from Technical Paper No. 92 of the United States Bureau of Mines, on Quarry Accidents in the United States, for the calendar year 1913:

TABLE 76.—NUMBER OF MEN EMPLOYED AND NUMBER KILLED IN AND ABOUT ALL MINES AND QUARRIES IN THE UNITED STATES, 1911, 1912, AND 1913.

Year.	Number employed.	Number killed.	
		Total.	Per 1,000 employed.
1911.....	1,005,281	3,602	3.58
1912.....	1,004,966	3,234	3.22
1913.....	1,047,010	3,651	3.49
Average, 3 years.....	1,019,086	3,496	3.43

According to this table the average number of persons employed in the mines and quarries of the United States during the three years ending with 1913 was 1,019,086, the average number of persons killed each year was 3,496, and the fatality rate was 3.43 per 1,000. This rate would be somewhat increased if reduced to a standard working year of 300 days. The number of persons seriously and the number slightly injured are not obtainable at the present time for the coal-mining industry, and there are reasons for believing that, in the light of available information in States with workmen's compensation laws applicable to mines, the number of serious injuries will be found to be considerably in excess of the number at present reported to the State mining departments.<sup>1</sup> The same conclusion applies to the existing returns regarding the number of persons made dependents on account of fatalities in the mining industry, for which, under existing conditions in most of the mining States, only inadequate provision is made, largely on the basis of the voluntary action of the employers. The possibilities of reducing the excessive fatality and injury rates common to the mining industry at the present time are well brought out by the statistics of causes, which indicate the direction in which specialized effort can unquestionably produce far-reaching and extremely desirable results.

### **OCCUPATIONAL MORTALITY STATISTICS OF THE PRUDENTIAL INSURANCE COMPANY OF AMERICA.**

On the occasion of the Fifteenth International Congress on Hygiene and Demography The Prudential Insurance Co. of America gave publicity to a considerable amount of new information regarding the mortality from accident in more or less dangerous trades. The data were derived from the company's extensive industrial experience, subsequently brought down to date for the period 1907 to 1912, and exhibited in a modified form and illustrated by numerous charts on the occasion of the first International Exposition of Safety and Sanitation, held in the city of New York. The original data were fully discussed in a paper on industrial accidents and trade diseases, read on the occasion of the Fifteenth International Congress on Hygiene and Demography, and in a separate publication issued by the company in explanation of its exhibit, with particular reference to its utility in connection with investigations into the more important aspects of the problem of industrial hygiene. The earlier experience data of the company were also quite fully discussed in Bulletin No. 78

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<sup>1</sup> In Great Britain, of the mine and quarry accidents compensated under the workmen's compensation act, the ratio of fatal to nonfatal accidents for the period 1909 to 1913 was one fatal accident to each 120 disablements resulting in compensation for one week and over. These figures do not include industrial diseases compensated under the British act.

of the United States Bureau of Labor Statistics, on Industrial Accidents, published in September, 1908. The data, however, are of only limited utility for the present purpose in that they are not correlated to the exposure to risk. The published information consists of an analysis of the causes of death in different occupations, the proportionate mortality from accidents (both occupational and nonoccupational) being calculated in the form of a percentage of such deaths of the mortality due to all causes, by divisional periods of life. This method is open to the criticism that the results are impaired by the possible exceptionally common or exceptionally rare occurrence of other causes, and that they therefore do not in all cases warrant definite conclusions regarding the true incidence of fatal accidents in particular industries, or specified occupations, as the case may be.

For personal accident and workmen's compensation insurance purposes the data are unquestionably of only limited value. An occupation may exhibit a high proportionate mortality from accidents, but it does not necessarily follow that the rate per 1,000 exposed to risk would, for that reason, be in excess of the normal. The proportionate mortality warrants only conclusions regarding *the relative importance of specified causes of mortality*, and to that extent the method visualizes the facts as they require to be known and understood for the larger purposes of public health administration and industrial hygiene. In other words, if it is shown that a given group of employments is subject to a proportionate mortality from accidents of say 23.5 per cent, as is true for quarrymen, whereas in the aggregate experience with all occupations the corresponding mortality figure is only 9.4 per cent, it is obvious that accidents in the occupation referred to are *relatively* of exceptional importance as a cause of death, although it does not necessarily follow that the rate of frequency, on the basis of the exposure to risk, is in excess of the normal. The proportionate mortality is therefore often more useful in connection with occupational investigations to determine the underlying causes of an excessive death rate than in inquiries for the purpose of determining the true rate of frequency in proportion to the number employed.

The statistics of the Prudential are unique in that they afford at the present time the only measurable basis of accident occurrence in a large number of specified occupations typical of American industries. The only corresponding effort to disclose the facts for the registration area of the United States is limited to the two-year period 1908 and 1909, published in the census mortality reports in 1909 and 1910.<sup>1</sup> The census publication, however, is much more limited

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<sup>1</sup> Fully discussed on pages 20 to 31 of this Bulletin.

in scope and includes only groups of occupations, against groups and specified occupations available through the experience data of the Prudential. There is the additional advantage of the insurance company's experience in that the same is derived from a typical body of industrial policy holders for the period 1907 to 1912, and including every section and all the representative industries of the United States. The tables exhibit in each case for particular groups of occupations or specified employments, (1) the number of deaths from all causes, by six divisional periods of life; (2) the corresponding number of accidents; (3) the percentage of such accidents of the mortality from all causes in each age group in the specified occupation; and (4) the standard accident mortality percentage for all occupied males. The accident figures are inclusive of all accidents and do not represent accidents due to industrial or occupational causes only. They require, therefore, to be used with caution in that they do not warrant the inference that the proportion of deaths from accidents in any given industry or occupation is entirely chargeable as an occupational risk. It may be safely asserted, however, that any marked departure from the normal average for all occupations marks invariably an excess in mortality strictly chargeable against the industry as an inherent occupational hazard. For some industries or occupations the numbers are relatively small, but the facts are given as far as available to facilitate the most complete study of the subject. As an illustration of the method adopted, a brief reference may be made to coal miners; there were 2,719 deaths during the period 1907 to 1912, of which 631 were due to accidents, or 23.2 per cent of the mortality from all causes. The corresponding average proportion for all occupied males was 9.4 per cent. The excess becomes much more marked when the percentages are compared for the separate divisional periods of life: At ages 15 to 24, out of every 100 deaths from all causes of coal miners, 56.9 were deaths caused by accidents, against 20.7 for all occupied males; at ages 25 to 34 the respective figures were 42.3 and 12.8; at ages 35 to 44 they were 34.3 and 10.2; at ages 45 to 54 they were 20.4 and 8.9. The excess in the mortality figures for coal miners continues throughout life, for at ages 55 to 64 the accident percentage for coal miners was 12.9, against 6.4 for all occupations; whereas at ages 65 and over the respective percentages were 5.1 and 4.1. The analysis, therefore, proves conclusively that throughout every year of the working period of life the mortality of coal miners includes a relatively much higher proportion of deaths from accidents than is found to prevail among all occupied males. The facts are therefore, quite conclusive of the need of a nation-wide effort to bring about a material reduction of the accident frequency in mines. The same conclusion, as shown by the tables following, applies to numerous other occupations. Since the standard mortality figures for all occupied males include all the dangerous occupa-

tions, the differences disclosed by the comparative method fails to bring out fully the true excess of accident frequency in dangerous trades.

TABLE 77.—PROPORTIONATE MORTALITY OF MALES FROM ACCIDENTS, BY OCCUPATIONS AND AGE GROUPS, 1907 TO 1912.

Age group.	Farm laborers.				Lumbermen.			
	Deaths from—		Per cent of deaths due to accidents.		Deaths from—		Per cent of deaths due to accidents.	
	All causes.	Accidents.	In specified occupation.	Among occupied males.	All causes.	Accidents.	In specified occupation.	Among occupied males.
15 to 24 years.....	47	10	21.3	20.7	4	4	100.0	20.7
25 to 34 years.....	21	4	19.0	12.8	9	3	33.3	12.8
35 to 44 years.....	14	2	14.3	10.2	20	7	35.0	10.2
45 to 54 years.....	22	5	22.7	8.9	12	2	16.7	8.9
55 to 64 years.....	47	11	23.4	6.4	28	4	14.3	6.4
65 years and over.....	44	5	11.4	4.1	33	1	3.0	4.1
Total.....	195	37	18.5	9.4	106	21	19.8	9.4
	Fishermen (not including oystermen).				Coal mines—Breaker hands.			
15 to 24 years.....	5	3	60.0	20.7	24	7	29.2	20.7
25 to 34 years.....	24	7	29.2	12.8	4	.....	.....	12.8
35 to 44 years.....	23	7	30.4	10.2	1	.....	.....	10.2
45 to 54 years.....	33	5	15.2	8.9	6	1	16.7	8.9
55 to 64 years.....	45	5	11.1	6.4	10	2	20.0	6.4
65 years and over.....	57	2	3.5	4.1	3	.....	.....	4.1
Total.....	187	29	15.5	9.4	48	10	20.8	9.4
	Coal mines—Drivers.				Coal mines—Foremen.			
15 to 24 years.....	21	18	85.7	20.7	.....	.....	.....	20.7
25 to 34 years.....	5	4	80.0	12.8	4	2	50.0	12.8
35 to 44 years.....	2	1	50.0	10.2	10	5	50.0	10.2
45 to 54 years.....	.....	.....	.....	8.9	22	4	18.2	8.9
55 to 64 years.....	.....	.....	.....	6.4	14	1	7.1	6.4
65 years and over.....	.....	.....	.....	4.1	6	2	33.3	4.1
Total.....	28	23	82.1	9.4	56	14	25.0	9.4
	Coal mines—Laborers.				Coal miners.			
15 to 24 years.....	11	7	63.6	20.7	267	152	56.9	20.7
25 to 34 years.....	12	6	50.0	12.8	281	119	42.3	12.8
35 to 44 years.....	6	.....	.....	10.2	341	117	34.3	10.2
45 to 54 years.....	10	1	10.0	8.9	623	127	20.4	8.9
55 to 64 years.....	9	1	11.1	6.4	699	90	12.9	6.4
65 years and over.....	4	1	25.0	4.1	508	26	5.1	4.1
Total.....	52	16	30.8	9.4	2,719	631	23.2	9.4
	Lead and zinc miners.				Miners (other than coal or lead and zinc).			
15 to 24 years.....	15	9	60.0	20.7	12	4	33.3	20.7
25 to 34 years.....	27	5	18.5	12.8	18	13	72.2	12.8
35 to 44 years.....	24	3	12.5	10.2	13	5	38.5	10.2
45 to 54 years.....	14	4	28.6	8.9	16	2	12.5	8.9
55 to 64 years.....	7	1	14.3	6.4	30	2	6.7	6.4
65 years and over.....	2	.....	.....	4.1	30	4	13.3	4.1
Total.....	89	22	24.7	9.4	119	30	25.2	9.4

TABLE 77.—PROPORTIONATE MORTALITY OF MALES FROM ACCIDENTS, BY OCCUPATIONS AND AGE GROUPS, 1907 TO 1912—Continued.

Age group.	Quarrymen.				Powder makers.			
	Deaths from—		Per cent of deaths due to accidents.		Deaths from—		Per cent of deaths due to accidents.	
	All causes.	Acci- dents.	In speci- fied oc- cupation.	Among occupied males.	All causes.	Acci- dents.	In speci- fied oc- cupation.	Among occupied males.
15 to 24 years.....	7	6	85.7	20.7	9	6	66.7	20.7
25 to 34 years.....	8	5	62.5	12.8	6	5	83.3	12.8
35 to 44 years.....	16	3	18.8	10.2	3	2	66.7	10.2
45 to 54 years.....	19	4	21.1	8.9	3	2	66.7	8.9
55 to 64 years.....	29	5	17.2	6.4	3	3	100.0	6.4
65 years and over.....	23	1	4.3	4.1	1	.....	.....	4.1
Total.....	102	24	23.5	9.4	25	18	72.0	9.4
	Brickyard workers.				Car builders and repairers.			
15 to 24 years.....	11	2	18.2	20.7	23	13	56.5	20.7
25 to 34 years.....	10	2	20.0	12.8	35	12	34.3	12.8
35 to 44 years.....	18	4	22.2	10.2	21	3	14.3	10.2
45 to 54 years.....	28	6	21.4	8.9	33	4	12.1	8.9
55 to 64 years.....	30	5	16.7	6.4	24	5	20.8	6.4
65 years and over.....	35	1	2.9	4.1	20	3	15.0	4.1
Total.....	132	20	15.2	9.4	156	40	25.6	9.4
	Boiler makers.				Foundrymen—Chippers.			
15 to 24 years.....	55	18	32.7	20.7	3	1	33.3	20.7
25 to 34 years.....	89	19	21.3	12.8	2	1	50.0	12.8
35 to 44 years.....	123	16	13.0	10.2	6	.....	.....	10.2
45 to 54 years.....	102	12	11.8	8.9	14	5	35.7	8.9
55 to 64 years.....	80	2	2.5	6.4	9	1	11.1	6.4
65 years and over.....	71	1	1.4	4.1	5	.....	.....	4.1
Total.....	520	68	13.1	9.4	39	8	20.5	9.4
	Puddlers.				Structural iron—Riggers.			
15 to 24 years.....	1	.....	.....	20.7	5	2	40.0	20.7
25 to 34 years.....	13	1	7.7	12.8	15	5	33.3	12.8
35 to 44 years.....	20	3	15.0	10.2	35	10	28.6	10.2
45 to 54 years.....	32	5	15.6	8.9	29	5	17.2	8.9
55 to 64 years.....	40	4	10.0	6.4	21	2	9.5	6.4
65 years and over.....	34	4	11.8	4.1	10	1	10.0	4.1
Total.....	140	17	12.1	9.4	115	25	21.7	9.4
	Iron and steel mills—Cranemen.				Iron and steel mills—Miscellaneous workers.			
15 to 24 years.....	44	15	34.1	20.7	168	43	25.6	20.7
25 to 34 years.....	24	8	33.3	12.8	259	67	25.9	12.8
35 to 44 years.....	9	2	22.2	10.2	303	48	15.8	10.2
45 to 54 years.....	3	1	33.3	8.9	244	25	10.2	8.9
55 to 64 years.....	2	1	50.0	6.4	203	16	7.9	6.4
65 years and over.....	1	.....	.....	4.1	164	8	4.9	4.1
Total.....	83	27	32.5	9.4	1,341	207	15.4	9.4

TABLE 77.—PROPORTIONATE MORTALITY OF MALES FROM ACCIDENTS, BY OCCUPATIONS AND AGE GROUPS, 1907 TO 1912—Continued.

Age group.	Printing and publishing—Engravers.				Printing and publishing—Pressmen and press feeders.			
	Deaths from—		Per cent of deaths due to accidents.		Deaths from—		Per cent of deaths due to accidents.	
	All causes.	Accidents.	In specified occupation.	Among occupied males.	All causes.	Accidents.	In specified occupation.	Among occupied males.
15 to 24 years.....	8	2	25.0	20.7	75	14	18.7	20.7
25 to 34 years.....	16	4	25.0	12.8	62	5	8.1	12.8
35 to 44 years.....	3	1	33.3	10.2	56	5	8.9	10.2
45 to 54 years.....	3	.....	.....	8.9	16	6	37.5	8.9
55 to 64 years.....	1	.....	.....	6.4	8	.....	.....	6.4
65 years and over.....	3	.....	.....	4.1	7	.....	.....	4.1
Total.....	34	7	20.6	9.4	224	30	13.5	9.4
	Electric light and power—Linemen.				Electric light and power—Power-house employees.			
15 to 24 years.....	72	49	68.1	20.7	13	1	7.7	20.7
25 to 34 years.....	138	76	55.2	12.8	9	6	66.7	12.8
35 to 44 years.....	76	26	34.3	10.2	8	1	12.5	10.2
45 to 54 years.....	34	13	38.3	8.9	2	.....	.....	8.9
55 to 64 years.....	12	1	8.3	6.4	2	2	100.0	6.4
65 years and over.....	2	1	50.0	4.1	1	.....	.....	4.1
Total.....	334	166	49.6	9.4	35	10	28.6	9.4
	Roofers.				Slaters.			
15 to 24 years.....	14	5	35.7	20.7	7	5	71.4	20.7
25 to 34 years.....	58	5	8.6	12.8	9	5	55.6	12.8
35 to 44 years.....	77	10	13.0	10.2	18	6	33.3	10.2
45 to 54 years.....	60	10	16.7	8.9	15	3	20.0	8.9
55 to 64 years.....	34	1	2.9	6.4	15	2	13.3	6.4
65 years and over.....	29	.....	.....	4.1	8	1	12.5	4.1
Total.....	272	31	11.4	9.4	72	22	30.6	9.4
	Engineers (not specified).				Firemen (not specified).			
15 to 24 years.....	78	34	43.6	20.7	74	34	45.9	20.7
25 to 34 years.....	224	48	21.4	12.8	177	42	23.7	12.8
35 to 44 years.....	333	74	22.2	10.2	228	36	15.8	10.2
45 to 54 years.....	453	47	10.4	8.9	210	33	15.7	8.9
55 to 64 years.....	552	43	7.8	6.4	161	5	3.1	6.4
65 years and over.....	459	22	4.8	4.1	71	4	5.6	4.1
Total.....	2,099	268	12.8	9.4	921	154	16.7	9.4
	Machine operators (industry not specified.)				Millwrights.			
15 to 24 years.....	35	9	25.7	20.7	5	1	20.0	20.7
25 to 34 years.....	24	4	16.7	12.8	6	1	16.7	12.8
35 to 44 years.....	14	3	21.4	10.2	17	5	29.4	10.2
45 to 54 years.....	12	1	8.3	8.9	14	1	7.1	8.9
55 to 64 years.....	8	.....	.....	6.4	26	2	7.7	6.4
65 years and over.....	13	2	15.4	4.1	38	3	7.9	4.1
Total.....	106	19	17.9	9.4	106	13	12.3	9.4

TABLE 77.—PROPORTIONATE MORTALITY OF MALES FROM ACCIDENTS, BY OCCUPATIONS AND AGE GROUPS, 1907 TO 1912—Continued.

Age group.	Boatmen.				Sea captains.			
	Deaths from—		Per cent of deaths due to accidents.		Deaths from—		Per cent of deaths due to accidents.	
	All causes.	Accidents.	In specified occupation.	Among occupied males.	All causes.	Accidents.	In specified occupation.	Among occupied males.
15 to 24 years.....	26	10	38.5	20.7	11	9	81.8	20.7
25 to 34 years.....	44	10	22.7	12.8	14	5	35.7	12.8
35 to 44 years.....	69	14	20.3	10.2	32	12	37.5	10.2
45 to 54 years.....	80	17	21.3	8.9	33	6	18.2	8.9
55 to 64 years.....	82	11	13.4	6.4	60	11	18.3	6.4
65 years and over.....	129	7	5.4	4.1	63	3	4.8	4.1
Total.....	430	69	16.0	9.4	213	46	21.6	9.4
	Deckhands.				Engineers, boat.			
15 to 24 years.....	19	14	73.7	20.7	5	3	60.0	20.7
25 to 34 years.....	21	5	23.8	12.8	8	3	37.5	12.8
35 to 44 years.....	17	1	5.9	10.2	4	1	25.0	10.2
45 to 54 years.....	12	1	8.3	8.9	14	3	21.4	8.9
55 to 64 years.....	11	1	9.1	6.4	13	3	23.1	6.4
65 years and over.....	3	.....	.....	4.1	8	1	12.5	4.1
Total.....	83	22	26.5	9.4	52	11	21.2	9.4
	Longshoremen, stevedores, etc.				Sailors, merchant shipping.			
15 to 24 years.....	11	3	27.3	20.7	69	29	42.0	20.7
25 to 34 years.....	93	18	19.4	12.8	47	11	23.4	12.8
35 to 44 years.....	159	22	13.8	10.2	29	10	34.5	10.2
45 to 54 years.....	104	9	8.7	8.9	41	3	7.3	8.9
55 to 64 years.....	83	4	4.8	6.4	53	2	3.8	6.4
65 years and over.....	41	1	2.4	4.1	85	3	3.5	4.1
Total.....	491	57	11.6	9.4	324	58	17.9	9.4
	Stokers, steamship..				Chauffeurs.			
15 to 24 years.....	3	2	66.7	20.7	89	21	23.6	20.7
25 to 34 years.....	12	5	41.7	12.8	91	13	14.3	12.8
35 to 44 years.....	7	5	71.4	10.2	28	3	10.7	10.2
45 to 54 years.....	6	.....	.....	8.9	11	.....	.....	8.9
55 to 64 years.....	5	1	20.0	6.4	3	.....	.....	6.4
65 years and over.....	.....	.....	.....	4.1	.....	.....	.....	4.1
Total.....	33	13	39.4	9.4	222	37	16.7	9.4
	Draymen, teamsters, etc.				Street-car conductors.			
15 to 24 years.....	936	201	21.5	20.7	140	24	17.1	20.7
25 to 34 years.....	2,189	272	12.4	12.8	213	28	13.1	12.8
35 to 44 years.....	2,175	251	11.5	10.2	129	21	16.3	10.2
45 to 54 years.....	1,581	195	12.3	8.9	88	12	13.6	8.9
55 to 64 years.....	1,097	110	10.0	6.4	68	8	11.8	6.4
65 years and over.....	821	42	5.1	4.1	25	2	8.0	4.1
Total.....	8,799	1,071	12.2	9.4	663	95	14.3	9.4
	Street-car motormen.				Railroad brakemen.			
15 to 24 years.....	45	11	24.4	20.7	314	242	77.1	20.7
25 to 34 years.....	124	33	26.6	12.8	296	188	63.5	12.8
35 to 44 years.....	116	13	11.2	10.2	134	52	38.8	10.2
45 to 54 years.....	78	4	5.1	8.9	45	19	42.2	8.9
55 to 64 years.....	45	2	4.4	6.4	25	7	25.0	6.4
65 years and over.....	17	.....	.....	4.1	8	.....	.....	4.1
Total.....	425	63	14.8	9.4	825	508	61.6	9.4

TABLE 77.—PROPORTIONATE MORTALITY OF MALES FROM ACCIDENTS, BY OCCUPATIONS AND AGE GROUPS, 1907 TO 1912—Continued.

Age group.	Railroad conductors.				Locomotive engineers.			
	Deaths from—		Per cent of deaths due to accidents.		Deaths from—		Per cent of deaths due to accidents.	
	All causes.	Accidents.	In specified occupation.	Among occupied males.	All causes.	Accidents.	In specified occupation.	Among occupied males.
15 to 24 years.....	4	1	25.0	20.7	4	2	50.0	20.7
25 to 34 years.....	33	10	30.3	12.8	34	18	53.0	12.8
35 to 44 years.....	27	7	25.9	10.2	28	14	50.0	10.2
45 to 54 years.....	26	7	26.9	8.9	33	4	12.1	8.9
55 to 64 years.....	18	2	11.1	6.4	30	3	10.0	6.4
65 years and over.....	6	.....	.....	4.1	31	1	3.2	4.1
Total.....	114	27	23.7	9.4	160	42	26.2	9.4
	Locomotive firemen.				Railroad foremen (track, etc.).			
15 to 24 years.....	91	42	46.1	20.7	8	3	37.5	20.7
25 to 34 years.....	91	44	48.3	12.8	11	4	36.4	12.8
35 to 44 years.....	18	7	38.9	10.2	38	12	31.6	10.2
45 to 54 years.....	9	1	11.1	8.9	37	8	21.6	8.9
55 to 64 years.....	3	.....	.....	6.4	48	9	18.8	6.4
65 years and over.....	6	1	16.7	4.1	32	1	3.1	4.1
Total.....	218	95	43.6	9.4	174	37	21.2	9.4
	Railroad freight handlers.				Car inspectors.			
15 to 24 years.....	12	6	50.0	20.7	17	12	70.6	20.7
25 to 34 years.....	29	3	10.3	12.8	34	14	41.2	12.8
35 to 44 years.....	21	2	9.5	10.2	34	6	17.7	10.2
45 to 54 years.....	22	4	18.2	8.9	34	7	20.6	8.9
55 to 64 years.....	18	.....	.....	6.4	29	4	13.8	6.4
65 years and over.....	8	1	12.5	4.1	24	2	8.3	4.1
Total.....	110	16	14.5	9.4	172	45	26.2	9.4
	Railroad section hands.				Railroad switchmen.			
15 to 24 years.....	17	8	47.1	20.7	94	65	69.2	20.7
25 to 34 years.....	15	8	53.3	12.8	142	68	67.9	12.8
35 to 44 years.....	22	11	50.0	10.2	143	43	30.1	10.2
45 to 54 years.....	39	13	33.3	8.9	147	32	21.8	8.9
55 to 64 years.....	61	22	36.0	6.4	268	35	13.1	6.4
65 years and over.....	22	2	9.1	4.1	276	21	7.6	4.1
Total.....	176	64	36.4	9.4	1,070	264	24.7	9.4
	Railroad men (other than those specified, but not including agents or clerks).				Telegraph and telephone linemen.			
15 to 24 years.....	104	53	51.0	20.7	8	2	25.0	20.7
25 to 34 years.....	150	62	41.3	12.8	24	8	33.3	12.8
35 to 44 years.....	132	35	26.5	10.2	4	1	25.0	10.2
45 to 54 years.....	125	28	22.4	8.9	3	.....	.....	8.9
55 to 64 years.....	134	25	18.7	6.4	1	.....	.....	6.4
65 years and over.....	131	5	3.8	4.1	.....	.....	.....	4.1
Total.....	776	208	26.8	9.4	40	11	27.5	9.4
	Delivery men.				Messengers and office boys.			
15 to 24 years.....	41	9	22.0	20.7	368	80	21.7	20.7
25 to 34 years.....	46	6	13.0	12.8	13	1	7.7	12.8
35 to 44 years.....	39	7	17.9	10.2	6	1	16.7	10.2
45 to 54 years.....	35	3	8.6	8.9	12	1	8.3	8.9
55 to 64 years.....	21	1	4.8	6.4	9	1	11.1	6.4
65 years and over.....	15	2	13.3	4.1	20	.....	.....	4.1
Total.....	197	28	14.2	9.4	428	84	19.6	9.4

TABLE 77.—PROPORTIONATE MORTALITY OF MALES FROM ACCIDENTS, BY OCCUPATIONS AND AGE GROUPS, 1907 TO 1912—Concluded.

Age group.	City firemen.				Sailors—U. S. Navy.			
	Deaths from—		Per cent of deaths due to accidents.		Deaths from—		Per cent of deaths due to accidents.	
	All causes.	Accidents.	In specified occupation.	Among occupied males.	All causes.	Accidents.	In specified occupation.	Among occupied males.
15 to 24 years.....	3	1	33.3	20.7	27	14	51.9	20.7
25 to 34 years.....	30	12	49.0	12.8	9	3	33.3	12.8
35 to 44 years.....	31	11	35.5	10.2	3	.....	.....	10.2
45 to 54 years.....	18	3	16.7	8.9	4	.....	.....	8.9
55 to 64 years.....	13	2	15.4	6.4	3	.....	.....	6.4
65 years and over.....	3	.....	.....	4.1	10	.....	.....	4.1
Total.....	98	29	29.6	9.4	56	17	30.4	9.4
	Soldiers—U. S. Army.				Electricians.			
15 to 24 years.....	67	20	29.9	20.7	241	53	22.0	20.7
25 to 34 years.....	65	11	16.9	12.8	265	53	20.0	12.8
35 to 44 years.....	31	2	6.4	10.2	160	28	17.5	10.2
45 to 54 years.....	15	1	6.7	8.9	63	7	11.1	8.9
55 to 64 years.....	30	2	6.7	6.4	38	2	5.3	6.4
65 years and over.....	72	1	1.4	4.1	5	.....	.....	4.1
Total.....	280	37	13.2	9.4	772	143	18.5	9.4
	Engineers and surveyors.				Showmen.			
15 to 24 years.....	14	2	14.3	20.7	15	9	60.0	20.7
25 to 34 years.....	32	5	15.6	12.8	20	6	30.0	12.8
35 to 44 years.....	18	1	5.6	10.2	19	.....	.....	10.2
45 to 54 years.....	15	5	33.3	8.9	15	1	6.7	8.9
55 to 64 years.....	8	.....	.....	6.4	9	.....	.....	6.4
65 years and over.....	22	3	13.6	4.1	9	1	11.1	4.1
Total.....	109	16	14.7	9.4	87	17	19.5	9.4
	Elevator tenders.				Stewards.			
15 to 24 years.....	77	14	18.2	20.7	6	3	50.0	20.7
25 to 34 years.....	53	4	7.5	12.8	20	3	15.0	12.8
35 to 44 years.....	40	6	15.0	10.2	30	5	16.7	10.2
45 to 54 years.....	42	5	11.9	8.9	26	5	19.2	8.9
55 to 64 years.....	38	3	7.9	6.4	26	1	3.8	6.4
65 years and over.....	28	2	7.1	4.1	22	1	4.5	4.1
Total.....	278	34	12.2	9.4	130	18	13.8	9.4

### INDUSTRIAL ACCIDENT STATISTICS OF THE UNITED KINGDOM.

The industrial accident statistics of the United Kingdom are exceptionally instructive and fairly applicable to American conditions. The experience under the workmen's compensation act of 1906 is reflected in the statistical data for recent years, emphasizing with at least approximate accuracy the relative accident hazard in the more important groups of industries. The workmen's compensation statistics are more trustworthy and conclusive than the returns of factory inspectors or certifying surgeons, except as regards the

degree of injury sustained. Accidents involving a disability of less than one week are not included in the statistics of the workmen's compensation act.

The returns of accidents compensated under the workmen's compensation act are given, first, for the shipping industry, differentiating steam and sailing vessels; second, for factories, differentiating (a) cotton, (b) wool, worsted, and shoddy, (c) other textiles, (d) wood, (e) metals, (f) shipbuilding and engineering, (g) other metal work, (h) paper and printing, (i) china and earthenware, (j) miscellaneous industries; third, for docks; fourth, for mines; fifth, for quarries; sixth, for construction work; seventh, for railways, differentiating the clerical staff and other railway service. The total number of employees within the operation of the act in 1912 was 7,411,005, among whom the number of accidents compensated were 3,544 fatal accidents, equivalent to a rate of 0.48 per 1,000; and 417,694 non-fatal accidents, equivalent to a rate of 56.36 per 1,000. The corresponding rates for the previous year were 0.55 for fatal and 56.57 for nonfatal injuries. The highest fatality rate was experienced among employees on sailing vessels, or 4.13 per 1,000, followed by a rate of 1.86 for steam vessels, 1.42 for dock laborers, and 1.15 for mines, including both coal and metal mines. The average rate for railway employees, excluding the clerical staff, was 0.95 per 1,000, and for all factory employees the rate was only 0.20 per 1,000.

The highest disability rate, excluding fatal accidents, occurred among persons employed in mining, or 154.64 per 1,000, followed by dock laborers, with 107.02, and engine and ship building with a rate of 92.79. In the railway service, excluding the clerical staff, the nonfatal accident rate was 62.97 per 1,000, and in all factory industries combined the rate was 35.90. The details for the several groups are given in Table 78.

The financial statistics of the operation of the workmen's compensation act for the year 1912 are given in full, for the separate industries considered, in Table 79. The average compensation for fatal cases during 1912 was \$765, against \$751 paid during 1911. The average compensation paid for nonfatal cases was \$29, against \$28 paid during the previous year. The highest compensation was paid in the case of fatal accidents on steam vessels, or \$879, the lowest average amount being paid in the case of fatal accidents in miscellaneous or nonspecified textiles, or \$551. The highest compensation for nonfatal accidents was also paid in the case of persons employed and injured on steam vessels, or \$67, the lowest average compensation paid being \$25 in the case of miscellaneous or nonspecified textiles, metallic industries, and miscellaneous metal workers. The aggregate amount paid out on account of fatal accidents during the year 1912 was \$2,711,224, against \$2,995,097 in 1911. The amount paid out on

account of nonfatal injuries was \$12,181,803 in 1912, against \$11,452,286 in 1911.

The British workmen's compensation act of 1906 includes a provision for compensation on account of scheduled industrial diseases. The original act scheduled only six industrial diseases, but on the recommendation of a departmental committee, the Home Secretary, by order, added 16 more diseases to the list in 1907, two more diseases in 1908, and one more disease (writer's cramp) in 1913. The principal diseases on account of which compensation is required are anthrax, lead poisoning, mercury poisoning, phosphorus poisoning, arsenic poisoning, ankylostomiasis, poisoning by nitro- and amido-derivatives of benzene, poisoning by carbon bisulphide, poisoning by nitrous fumes, chrome ulceration, eczematous ulceration of the skin, epitheliomatous cancer, chimney-sweep's cancer, nystagmus, glanders, compressed-air illness, cataract in glassworkers, and telegrapher's cramp. The term "industrial disease" does not occur in the original act, the same being referred to as "disease due to the nature of the employment." In the sense of this definition, compensation was paid during the year 1912 on account of 55 fatal cases of industrial disease, and 6,712 nonfatal cases. The corresponding rates for 1911 were 33 deaths and 5,737 nonfatal cases. The fatality rate on account of industrial diseases in 1912 was only 0.01 per 1,000. The highest rate was experienced in the manufacture of china and earthenware, or 0.21 per 1,000. The mortality in this group was largely the result of lead poisoning. The nonfatal injury rate on account of industrial diseases was 0.91 per 1,000, the highest rate having been experienced in mining, or 5.48 per 1,000, largely on account of nystagmus. The next highest rate was experienced in the manufacture of china and earthenware, largely, as previously said, on account of lead poisoning. The details for the several industries are given in Table 80.

The financial statistics of the operation of the act, with reference to industrial diseases, are given in detail in Table 81. The aggregate amount paid out on account of fatal cases of industrial disease during 1912 was \$48,602, against \$22,887 paid out during the previous year. The amount paid out on account of nonfatal industrial diseases during 1912 was \$505,133, against \$403,720 paid out during 1911. The average amount paid out on account of fatalities during 1912 was \$884, and on account of nonfatal injuries caused by industrial diseases, \$75. The corresponding figures for 1911 were \$694 and \$70, respectively. Of the 55 fatal cases of industrial disease in 1912, 44 were cases of lead poisoning, 9 were cases of anthrax, 1 was a case of chrome ulceration, and 1 a case of nystagmus.

The four tables which follow (Nos. 78, 79, 80, and 81) were compiled from "Statistics of compensation and of proceedings under the workmen's compensation act of 1906, and the employers' liability act of

1880, for the year 1912." Disablements of less than one week's duration are not compensated under the British act.

TABLE 78.—ACCIDENT RATES ACCORDING TO ACCIDENTS COMPENSATED UNDER THE WORKMEN'S COMPENSATION ACT OF THE UNITED KINGDOM, 1912, BY INDUSTRIES.<sup>1</sup>

Industry.	Employees.	Accidents resulting in—			
		Death.		Disablement.	
		Number.	Rates per 1,000.	Number.	Rates per 1,000.
<b>Shipping:</b>					
Steam vessels.....	236,004	439	1.86	7,668	32.49
Sailing vessels.....	18,394	76	4.13	633	34.41
Total.....	254,398	515	2.02	8,301	32.63
<b>Factories:</b>					
Cotton.....	612,985	54	.09	13,252	21.62
Wool, worsted, and shoddy.....	280,573	15	.05	3,271	11.66
Other textiles.....	248,669	10	.04	3,275	13.17
Wood.....	135,257	39	.29	5,478	40.50
Metal (extracting, etc.).....	437,160	168	.38	34,323	78.51
Engine and ship building.....	348,212	210	.60	32,310	92.79
Other metal work.....	801,814	148	.18	39,722	49.54
Paper and printing.....	322,447	22	.07	4,679	14.51
China and earthenware.....	72,834	7	.10	1,143	15.69
Miscellaneous.....	1,990,480	364	.18	51,027	25.64
Total.....	5,250,431	1,037	.20	188,480	35.90
Docks.....	158,598	225	1.42	16,973	107.02
Mines.....	1,086,113	1,246	1.15	167,969	154.44
Quarries.....	84,703	64	.76	5,440	64.22
Constructional work.....	115,218	85	.74	6,111	53.04
<b>Railways:</b>					
Clerical staff.....	74,575	3	.04	62	.83
Other railroad servants.....	396,969	369	.95	24,368	62.97
Total.....	461,544	372	.81	24,430	52.93
Grand total, 1912.....	7,411,005	3,544	.48	417,694	56.36
Grand total, 1911.....	7,305,997	3,988	.55	413,294	56.57

<sup>1</sup> The following abstract is from the Statistics of Compensation and the Proceedings under the Workmen's Compensation Act of 1906 and the Employers' Liability Act of 1880 for the year 1913, recently issued:

"According to the returns, compensation was paid under the act in the 7 industries during 1913 in respect of 3,748 cases of death and 476,920 cases of disablement, and that the gross total of compensation amounted to £3,361,650 [\$16,359,470]. The corresponding figures for the previous four years are shown in the following table:

Year.	Fatal cases.	Nonfatal cases.	Total compensation.
1909.....	3,341	332,612	£2,274,238 [\$11,067,579]
1910.....	3,510	378,340	2,700,325 [13,141,132]
1911.....	4,021	419,031	3,056,404 [14,873,990]
1912.....	3,599	424,406	3,174,101 [15,446,763]
1913.....	3,748	476,920	3,361,650 [16,359,470]

"The gross total of the persons employed in the 7 industries, according to the returns, was 7,509,353, and the annual charge per person employed works out for each of the industries as follows: Shipping, 15s. 2d. [\$3.69]; factories, 5s. [\$1.22]; docks, £1 4s. [\$5.85]; mines, £1 4s. 3d. [\$5.91]; quarries, 10s. 2d. [\$2.47]; constructional work, 13s. 3d. [\$3.22]; railway, 8s. 5d. [\$2.05]. For all the industries taken together the charge per person employed was 8s. 11d. [\$2.17]."

The differences in the figures for 1911 and 1912 with those given in the text-table are probably the result of clerical corrections and of changes due to the consideration of subsequent reports.

TABLE 79.—AVERAGE AMOUNT PAID PER CASE OF FATAL ACCIDENT AND PER CASE OF DISABLEMENT FROM ACCIDENT, UNDER THE WORKMEN'S COMPENSATION ACT OF THE UNITED KINGDOM, 1912, BY INDUSTRIES.

Industry.	Fatal industrial accidents.			Disablement from industrial accidents.		
	Number.	Total amount paid.	Average amount paid.	Number.	Total amount paid.	Average amount paid.
Shipping:						
Steam vessels.....	439	\$385,821	\$879	7,668	\$510,977	\$67
Sailing vessels.....	76	45,521	599	633	37,448	59
Total.....	515	431,342	838	8,301	548,425	66
Factories:						
Cotton.....	54	31,024	575	13,252	419,215	32
Wool, worsted, and shoddy	15	9,913	661	3,271	116,942	36
Other textiles.....	10	5,509	551	3,275	32,278	25
Wood.....	39	23,875	612	5,478	252,596	46
Metals (extracting, etc.)..	168	127,634	760	34,323	872,899	25
Engine and ship building..	210	158,439	754	32,310	992,153	31
Other metal work.....	148	103,564	700	39,722	999,073	25
Paper and printing.....	22	13,582	617	4,679	177,564	38
China and earthenware....	7	4,224	603	1,143	32,177	28
Miscellaneous.....	364	265,545	730	51,027	1,572,639	31
Total.....	1,037	743,309	717	188,480	5,517,536	29
Docks.....	225	175,223	779	16,973	649,955	38
Mines.....	1,246	984,819	790	167,959	4,365,688	26
Quarries.....	64	42,168	659	5,440	190,489	35
Constructional work.....	85	60,593	713	6,111	264,047	43
Railways:						
Clerical staff.....	3	2,273	758	62	1,757	28
Other railroad servants....	369	271,497	736	24,368	643,906	26
Total.....	372	273,770	736	24,430	645,663	26
Grand total, 1912.....	3,544	2,711,224	765	417,694	12,181,803	29
Grand total, 1911.....	3,988	2,995,097	751	413,294	11,452,286	28

TABLE 80.—DEATH RATES AND DISABLEMENT RATES FROM INDUSTRIAL DISEASES ACCORDING TO EXPERIENCE UNDER THE WORKMEN'S COMPENSATION ACT OF THE UNITED KINGDOM, 1912, BY INDUSTRIES.

Industry.	Employees.	Diseases resulting in—			
		Death.		Disablement.	
		Number.	Rate per 1,000.	Number.	Rate per 1,000.
<b>Shipping:</b>					
Steam vessels.....	236,004				
Sailing vessels.....	18,394				
Total.....	254,398				
<b>Factories:</b>					
Cotton.....	612,985			4	0.01
Wool, worsted, and shoddy.....	280,573	5	0.02	37	.13
Other textiles.....	248,669	1		4	.02
Wood.....	135,257			10	.07
Metals (extracting, etc.).....	437,160	5	.01	84	.19
Engine and ship building.....	348,212	3	.01	45	.13
Other metal work.....	801,814	9	.01	123	.15
Paper and printing.....	322,447			18	.06
China and earthenware.....	72,834	15	.21	144	1.98
Miscellaneous.....	1,990,480	11	.01	264	.13
Total.....	5,250,431	49	.01	733	.14
Docks.....	158,598	2	.01	7	.04
Mines.....	1,086,113	2		5,949	5.48
Quarries.....	84,703			2	.02
Constructional work.....	115,218			3	.03
<b>Railways:</b>					
Clerical staff.....	74,575			1	.01
Other railroad servants.....	386,969	2	.01	17	.04
Total.....	461,544	2		18	.04
Grand total, 1912.....	7,411,005	155	.01	6,712	.91
Grand total, 1911.....	7,305,997	33		5,737	.79

<sup>1</sup> Including 44 cases of lead poisoning, 9 cases of anthrax, 1 case of chrome ulceration, and 1 case of nystagmus.

TABLE 81.—AVERAGE AMOUNT PAID PER CASE OF DEATH AND PER CASE OF DISABLEMENT FROM INDUSTRIAL DISEASES UNDER THE WORKMEN'S COMPENSATION ACT OF THE UNITED KINGDOM, 1912, BY INDUSTRIES.

Industry.	Deaths from industrial diseases.			Disablement from industrial diseases.		
	Number.	Total amount paid.	Average amount paid.	Number.	Total amount paid.	Average amount paid.
Shipping:						
Steam vessels.....						
Sailing vessels.....						
Total.....						
Factories:						
Cotton.....				4	\$204	\$51
Wool, worsted, and shoddy.....	5	\$4,229	\$846	37	1,163	31
Other textiles.....	1	316	316	4	83	21
Wood.....				10	1,105	111
Metals (extracting, etc.).....	5	5,227	1,045	84	18,512	220
Engine and ship building.....	3	2,278	759	45	3,986	89
Other metal work.....	9	6,706	745	123	11,991	97
Paper and printing.....				18	1,314	73
China and earthenware.....	15	15,169	1,011	144	20,746	144
Miscellaneous.....	11	10,244	931	264	24,678	93
Total.....	49	44,168	901	733	83,782	114
Docks.....	2	83	42	7	603	86
Mines.....	2	2,136	1,068	5,949	417,697	70
Quarries.....				2	24	12
Constructional work.....				3	467	156
Railways:						
Clerical staff.....				1	224	224
Other railroad servants.....	2	2,214	1,107	17	2,336	137
Total.....	2	2,214	1,107	18	2,560	142
Grand total, 1912.....	55	48,602	884	6,712	505,133	75
Grand total, 1911.....	33	22,887	694	5,737	403,720	70

### RATE OF MORTALITY FROM ACCIDENTS, BY OCCUPATIONS, IN ENGLAND AND WALES.

The most useful and conclusive occupational mortality statistics are those published at decennial intervals as a supplement to the annual report of the registrar general for England and Wales. The rates are computed on a three-year period, including the census year and the one immediately preceding and following. This method provides a reasonably trustworthy basis for estimating the liability to specific diseases or accidents in specified occupations or groups of employments. Since the census occupation classification is under the same direction as the mortality occupation classification, the risk of serious errors is materially reduced. Two methods are employed in computing the mortality rates by causes—that is, either by the inclusion or exclusion of those retired from the occupations considered. Since the accident liability, for the present purpose, is chiefly with reference to industrial accidents, it would obviously be less scientific to include the retired, who as a class would be removed from the conditions of work giving rise to accidents in industry. The analysis for

the three years 1900 to 1902 includes 24,948 deaths due to accidents among males of the ages of 15 and over, with 31,389,867 years of life exposed to risk—that is to say, the actual number of persons exposed to risk during the period was one-third of the number of years of life just given, or 10,463,289; and the average number of deaths due to accidents for each one of the three years was one-third of the total previously given, or 8,316. The aggregates for the three years are given in each case, not only as a matter of convenience, but also to show the true numerical basis of the facts under observation. Since the age distribution in different occupations varies widely it is essential that the rates should be calculated for divisional periods of life. In the tabulations which follow for each occupation or group of employments, the facts are given for seven divisional periods of life, commencing with ages 15 to 19 and ending with ages 65 and over. It would no doubt be of interest to know the exact rate for shorter periods of life, and especially at the more advanced ages, but the numbers under consideration would frequently be too small to warrant safe conclusions. No data for years later than 1900 to 1902 are as yet available, and it is quite doubtful whether the facts for 1910 to 1912 will be published much before 1918.

In the tabulations following, the accident rates, as a matter of convenience, have been computed on the basis of 100,000 population for each period of life. For all ages, 15 and over, the rate was 79.5 per 100,000 of population, which, in round numbers, would be equivalent to a rate of 0.8 per 1,000. By reference to the estimate of fatal industrial accidents in the United States for 1913 (Table 1), it will be found that the rate assumed for occupied males was 0.73, but this rate, of course, is exclusive of nonindustrial accidents, which would, according to circumstances, materially increase the rate. In the occupational mortality study of the United States census of 1900 (no later data being available) the accident rate, including industrial as well as other injuries, but excluding suicides, was 113.2 per 100,000 of population, ages 10 and over, which conforms to the expected result in view of the known higher accident liability of American wage earners in most of the dangerous trades in which they are employed. For reasons which can not at present be explained in a satisfactory manner, the accident rate among unoccupied males is higher for every period of life under 55 than for the occupied. This result may be due to errors in classification, particularly of the deaths, in that by the omission of the occupation the deaths would be assigned to the group of the unoccupied, whereas in fact the deceased might have been employed. This difficulty can not be easily overcome in a general system of death classification, but it is almost entirely avoided in compulsory or private insurance experience, where the deaths are assigned, with accuracy, to the occupations to which they belong.

According to the English experience, the accident mortality rate rises from an average of 44.6 per 100,000 at ages 15 to 19 to 52.6 at ages 20 to 24, to 57.8 at ages 25 to 34, to 78.8 at ages 35 to 44, to 103.5 at ages 45 to 54, to 133.8 at ages 55 to 64, and finally to 182.2 at ages 65 and over. The rates for occupied males do not vary decidedly from the rates for all males, but it seems best to compare any particular occupation or group of employments with the average rate for occupied males only.

The present analysis of the English experience, which is fully set forth in the table which follows, shows for each occupation or industry as enumerated by the Registrar General the numbers exposed to risk (given in years of life), the deaths from accident, and the resulting rates for seven divisional periods of life. The totals for ages 15 and over are not comparable for the separate occupations and industries, on account of wide variations in the age distribution of different employments. A table, however, is given at the end (No. 89), in which all of the occupations or industries are reduced to a standard age basis, and these rates, for ages 15 and over, are strictly comparable.

TABLE 82.—MORTALITY FROM ACCIDENTS IN ENGLAND AND WALES, 1900 TO 1902, BY OCCUPATIONS AND AGE GROUPS.

Age group.	All males.			Occupied males.		
	Years of life.	Deaths from accidents.	Rate per 100,000 population.	Years of life.	Deaths from accidents.	Rate per 100,000 population.
15 to 19 years.....	4,822,566	2,152	44.6	4,526,391	1,946	43.0
20 to 24 years.....	4,417,932	2,322	52.6	4,336,335	2,270	52.3
25 to 34 years.....	7,457,862	4,314	57.8	7,337,565	4,182	57.0
35 to 44 years.....	5,795,829	4,568	78.8	5,668,233	4,275	75.4
45 to 54 years.....	4,188,627	4,334	103.5	4,024,074	4,037	100.3
55 to 64 years.....	2,723,835	3,645	133.8	2,424,456	3,241	133.7
65 years and over.....	1,983,216	3,613	182.2	1,202,520	2,421	201.3
15 years and over..	31,389,867	24,948	79.5	29,519,574	22,372	75.8
	Unoccupied males.			Occupied males in London.		
15 to 19 years.....	296,175	206	69.6	576,099	193	33.5
20 to 24 years.....	81,597	52	63.7	637,374	225	35.3
25 to 34 years.....	120,297	132	109.7	1,095,027	485	44.3
35 to 44 years.....	127,596	293	229.6	823,536	529	64.2
45 to 54 years.....	164,553	297	180.5	562,533	575	102.2
55 to 64 years.....	299,379	404	134.9	313,266	410	130.9
65 years and over.....	780,696	1,192	152.7	122,007	260	213.1
15 years and over..	1,870,293	2,576	137.7	4,129,842	2,677	64.8
	Occupied males in industrial districts.			Occupied males in agricultural districts.		
15 to 19 years.....	1,187,061	416	35.0	661,200	251	38.0
20 to 24 years.....	1,189,341	511	43.0	525,798	312	59.3
25 to 34 years.....	2,014,302	1,057	52.5	893,781	444	49.7
35 to 44 years.....	1,511,544	1,095	72.4	784,014	497	63.4
45 to 54 years.....	1,051,485	1,024	97.4	610,221	488	80.0
55 to 64 years.....	575,952	820	142.4	447,492	464	103.7
65 years and over.....	218,604	478	218.7	313,359	524	167.2
15 years and over..	7,748,289	5,401	69.7	4,235,925	2,980	70.4



TABLE 82.—MORTALITY FROM ACCIDENTS IN ENGLAND AND WALES, 1900 TO 1902, BY OCCUPATIONS AND AGE GROUPS—Continued.

Age group.	Farm laborers.				Gardeners.			
	Years of life.	Deaths from accidents.	Rate per 100,000 population.	Standard rate for all males.	Years of life.	Deaths from accidents.	Rate per 100,000 population.	Standard rate for all males.
<b>All occupied males 15 years and over</b> .....	<b>29,519,574</b>	<b>22,372</b>	<b>75.8</b>	<b>79.5</b>	<b>29,519,574</b>	<b>22,372</b>	<b>75.8</b>	<b>79.5</b>
15 to 19 years.....	330,042	129	39.1	44.6	73,158	13	17.8	44.6
20 to 24 years.....	293,373	118	58.0	52.6	64,965	11	16.9	52.6
25 to 34 years.....	294,123	150	51.0	57.8	125,709	25	19.9	57.8
35 to 44 years.....	293,655	187	70.9	78.8	111,882	31	27.7	78.8
45 to 54 years.....	215,895	191	88.5	103.5	98,877	29	29.3	103.5
55 to 64 years.....	181,137	239	131.9	133.8	79,524	54	67.9	133.8
65 years and over.....	150,189	310	206.4	182.2	60,837	67	110.1	182.2
	Fishermen.				Brewers.			
15 to 19 years.....	7,386	12	162.5	44.6	8,238	1	12.1	44.6
20 to 24 years.....	9,069	22	242.6	52.6	10,992	7	63.7	52.6
25 to 34 years.....	17,136	35	204.2	57.8	22,314	16	71.7	57.8
35 to 44 years.....	14,940	27	180.7	78.8	18,720	15	80.1	78.8
45 to 54 years.....	10,896	14	128.5	103.5	12,531	7	55.9	103.5
55 to 64 years.....	7,035	14	199.0	133.8	6,744	9	133.5	133.8
65 years and over.....	3,990	9	225.6	182.2	2,535	3	118.3	182.2
	Innkeepers.				Waiters.			
15 to 19 years.....	1,965	.....	.....	44.6	26,385	7	26.5	44.6
20 to 24 years.....	7,284	2	27.5	52.6	39,477	9	22.8	52.6
25 to 34 years.....	56,532	25	44.2	57.8	43,011	15	34.9	57.8
35 to 44 years.....	75,801	48	63.3	78.8	18,111	20	110.4	78.8
45 to 54 years.....	61,086	51	83.5	103.5	8,769	11	125.4	103.5
55 to 64 years.....	36,684	41	111.8	133.8	3,753	1	26.6	133.8
65 years and over.....	14,403	20	138.9	182.2	1,176	2	170.1	182.2
	Grocers.				Printers.			
15 to 19 years.....	87,777	9	10.3	44.6	56,076	14	25.0	44.6
20 to 24 years.....	75,459	13	17.2	52.6	46,080	7	15.2	52.6
25 to 34 years.....	108,672	14	12.9	57.8	78,153	11	14.1	57.8
35 to 44 years.....	70,440	17	24.1	78.8	48,465	7	14.4	78.8
45 to 54 years.....	45,927	15	32.7	103.5	28,542	13	45.5	103.5
55 to 64 years.....	29,961	13	43.4	133.8	13,752	10	72.7	133.8
65 years and over.....	16,806	7	41.7	182.2	4,383	9	205.3	182.2
	Watchmakers and jewelers.				Butchers.			
15 to 19 years.....	54,165	10	18.5	44.6	56,763	6	10.6	44.6
20 to 24 years.....	55,620	22	39.6	52.6	56,637	8	14.1	52.6
25 to 34 years.....	85,698	29	33.8	57.8	87,975	22	25.0	57.8
35 to 44 years.....	53,313	21	39.4	78.8	56,697	23	49.4	78.8
45 to 54 years.....	31,797	16	50.3	103.5	34,266	25	73.0	103.5
55 to 64 years.....	18,675	17	91.0	133.8	17,688	25	141.3	133.8
65 years and over.....	7,542	11	145.8	182.2	7,230	14	193.6	182.2
	Corn millers.				Bakers.			
15 to 19 years.....	7,083	3	42.4	44.6	51,735	8	15.5	44.6
20 to 24 years.....	8,496	.....	.....	52.6	49,218	9	18.3	52.6
25 to 34 years.....	16,347	5	30.6	57.8	78,903	24	30.4	57.8
35 to 44 years.....	14,553	11	75.6	78.8	54,450	24	44.1	78.8
45 to 54 years.....	10,665	10	93.8	103.5	33,645	13	38.6	103.5
55 to 64 years.....	6,825	7	102.6	133.8	19,653	11	56.0	133.8
65 years and over.....	3,675	14	351.0	182.2	8,844	11	124.4	182.2



TABLE 82.—MORTALITY FROM ACCIDENTS IN ENGLAND AND WALES, 1930 TO 1932, BY OCCUPATIONS AND AGE GROUPS—Continued.

Age group.	Employees in shipbuilding.				Employees in wool manufacture.			
	Years of life.	Deaths from accidents.	Rate per 100,000 population.	Standard rate for all males.	Years of life.	Deaths from accidents.	Rate per 100,000 population.	Standard rate for all males.
<b>All occupied males 15 years and over</b> .....	<b>29,519,574</b>	<b>22,372</b>	<b>75.8</b>	<b>79.5</b>	<b>29,519,574</b>	<b>22,372</b>	<b>75.8</b>	<b>79.5</b>
15 to 19 years.....	39,492	27	68.4	44.6	39,249	5	12.7	44.6
20 to 24 years.....	34,254	21	61.3	52.6	30,222	6	19.9	52.6
25 to 34 years.....	61,266	39	63.7	57.8	56,322	7	12.4	57.8
35 to 44 years.....	47,361	45	95.0	78.8	44,046	10	22.7	78.8
45 to 54 years.....	37,989	50	131.6	103.5	33,132	17	51.3	103.5
55 to 64 years.....	25,509	51	199.9	133.8	20,268	16	78.9	133.8
65 years and over.....	8,727	20	229.2	182.2	8,610	15	174.2	182.2
	<b>Employees in cotton manufacture.</b>				<b>Potters.</b>			
15 to 19 years.....	107,298	13	12.1	44.6	19,455	5	25.7	44.6
20 to 24 years.....	82,881	10	12.1	52.6	17,112	4	23.4	52.6
25 to 34 years.....	135,507	30	22.1	57.8	29,463	9	30.5	57.8
35 to 44 years.....	98,739	44	44.6	78.8	20,043	10	49.9	78.8
45 to 54 years.....	59,079	36	60.9	103.5	12,894	7	54.3	103.5
55 to 64 years.....	27,948	28	100.2	133.8	6,408	5	78.0	133.8
65 years and over.....	7,965	9	113.0	182.2	2,055	5	243.3	182.2
	<b>Glassworkers.</b>				<b>Coal miners.</b>			
15 to 19 years.....	17,700	9	50.8	44.6	307,785	368	119.6	44.6
20 to 24 years.....	11,589	8	69.0	52.6	301,512	358	118.7	52.6
25 to 34 years.....	20,166	7	34.7	57.8	510,879	628	122.9	57.8
35 to 44 years.....	13,167	3	22.8	78.8	345,959	566	163.6	78.8
45 to 54 years.....	9,030	7	77.5	103.5	224,634	473	210.6	103.5
55 to 64 years.....	4,374	3	68.6	133.8	107,454	297	276.4	133.8
65 years and over.....	1,290	2	155.0	182.2	30,003	116	386.6	182.2
	<b>Ironstone miners.</b>				<b>Quarrymen.</b>			
15 to 19 years.....	4,869	8	164.3	44.6	24,282	18	74.1	44.6
20 to 24 years.....	6,984	5	71.6	52.6	30,906	19	61.5	52.6
25 to 34 years.....	13,104	20	152.6	57.8	52,494	51	97.2	57.8
35 to 44 years.....	10,422	15	143.9	78.8	43,467	48	110.4	78.8
45 to 54 years.....	8,583	12	139.8	103.5	33,705	54	160.2	103.5
55 to 64 years.....	4,827	14	290.0	133.8	19,206	55	286.4	133.8
65 years and over.....	1,506	7	464.8	182.2	7,683	14	182.2	182.2
	<b>Employees in gas works.</b>				<b>Brickmakers.</b>			
15 to 19 years.....	5,247	2	38.1	44.6	34,734	15	43.2	44.6
20 to 24 years.....	14,679	2	13.6	52.6	28,458	14	49.2	52.6
25 to 34 years.....	41,067	25	60.9	57.8	42,024	20	47.6	57.8
35 to 44 years.....	38,718	18	46.5	78.8	30,222	20	66.2	78.8
45 to 54 years.....	24,918	20	80.3	103.5	20,226	11	54.4	103.5
55 to 64 years.....	12,393	9	72.6	133.8	11,943	9	75.4	133.8
65 years and over.....	3,798	5	131.6	182.2	5,373	10	186.1	182.2
	<b>General laborers.</b>				<b>Chimney sweeps.</b>			
15 to 19 years.....	137,919	98	71.1	44.6	1,128	1	88.7	44.6
20 to 24 years.....	161,739	154	95.2	52.6	1,551	.....	.....	52.6
25 to 34 years.....	281,736	345	122.5	57.8	4,146	1	24.1	57.8
35 to 44 years.....	245,052	400	163.2	78.8	5,079	3	59.1	78.8
45 to 54 years.....	193,623	406	209.7	103.5	4,536	3	66.1	103.5
55 to 64 years.....	123,969	305	246.0	133.8	2,724	6	220.3	133.8
65 years and over.....	71,004	295	415.5	182.2	1,146	4	349.0	182.2

TABLE 82.—MORTALITY FROM ACCIDENTS IN ENGLAND AND WALES, 1900 TO 1902, BY OCCUPATIONS AND AGE GROUPS—Concluded.

Age group.	Commercial travelers.				Coal heavers.			
	Years of life.	Deaths from accidents.	Rate per 100,000 population.	Standard rate for all males.	Years of life.	Deaths from accidents.	Rate per 100,000 population.	Standard rate for all males.
<b>All occupied males 15 years and over .....</b>	<b>29,519,574</b>	<b>22,372</b>	<b>75.8</b>	<b>79.5</b>	<b>29,519,574</b>	<b>22,372</b>	<b>75.8</b>	<b>79.5</b>
15 to 19 years.....	3,768	.....	.....	44.6	6,018	4	66.5	44.6
20 to 24 years.....	20,739	2	9.6	52.6	8,574	11	128.3	52.6
25 to 34 years.....	66,327	18	27.1	57.8	22,008	18	81.8	57.8
35 to 44 years.....	49,722	14	28.2	78.8	19,725	30	152.1	78.8
45 to 54 years.....	31,431	21	66.8	103.5	12,768	23	180.1	103.5
55 to 64 years.....	14,925	9	60.3	133.8	6,141	12	195.4	133.8
65 years and over.....	4,908	6	122.2	182.2	2,112	8	378.8	182.2
	Bargemen and lightermen.				Navy laborers.			
15 to 19 years.....	9,780	48	490.8	44.6	27,717	31	111.8	44.6
20 to 24 years.....	11,604	51	439.5	52.6	60,591	67	110.6	52.6
25 to 34 years.....	21,168	61	288.2	57.8	123,555	127	102.8	57.8
35 to 44 years.....	18,276	65	355.7	78.8	108,972	125	114.7	78.8
45 to 54 years.....	14,436	45	311.7	103.5	87,735	129	147.0	103.5
55 to 64 years.....	8,985	39	434.1	133.8	60,807	124	203.9	133.8
65 years and over.....	3,783	16	422.9	182.2	33,903	81	238.9	182.2

The concluding summary observations regarding the occupation accident data of England and Wales should prove practically useful in studies of workmen's compensation problems. The table following shows the mortality from accidents by industries or occupations, for five danger classes, as subsequently explained in detail, first, on the basis of the crude rate, and, second, on the basis of rates corrected for variations in the age distribution of the different employments considered. It will be observed that the changes are not very material, but the rates are slightly increased for all occupied males and for all of the five danger classes except Class III, for which the corrected rate is slightly lower than the crude rate.

TABLE 83.—CRUDE AND CORRECTED ACCIDENT MORTALITY RATES PER 100,000 PERSONS EXPOSED TO RISK, ENGLAND AND WALES, 1900 TO 1902, BY OCCUPATIONAL DANGER CLASSES.

Class.	Years of life.	Number of deaths.	Crude rates.	Corrected rates.
<b>All males .....</b>	<b>31,389,867</b>	<b>24,948</b>	<b>79.48</b>	<b>79.48</b>
<b>All occupied males .....</b>	<b>29,519,574</b>	<b>22,372</b>	<b>75.79</b>	<b>78.66</b>
Danger Class I.....	5,347,332	1,547	28.93	30.36
Danger Class II.....	6,970,230	3,796	54.46	56.40
Danger Class III.....	2,896,260	2,396	82.73	81.76
Danger Class IV.....	4,837,752	7,353	151.99	158.81
Danger Class V.....	379,227	1,386	365.48	374.13

The range in accident liability for the five groups is shown to be very considerable. For Danger Class I the corrected rate was only 30.4 per 100,000, against a rate of 374.1 for Danger Class V.

Considering first in detail Danger Class I, the corrected fatal accident rates are given for 15 occupations in the following table:

TABLE 84.—MORTALITY FROM ACCIDENTS PER 100,000 PERSONS EXPOSED TO RISK, CORRECTED FOR AGE, ENGLAND AND WALES, 1900 TO 1902, BY OCCUPATIONS.

**Danger Class I.**

Occupation.	Years of life.	Number of deaths.	Crude rates.	Corrected rates.
Clergymen.....	118,968	27	22.7	17.4
Grocers.....	435,042	88	20.2	22.1
Clerks.....	1,058,352	211	19.9	23.9
School-teachers.....	173,487	41	23.6	26.4
Shoemakers.....	573,810	173	30.1	29.1
Printers.....	273,451	71	25.8	30.9
Cabinetmakers.....	333,141	90	29.7	31.7
Gardeners.....	615,012	230	37.4	33.4
Wool manufacture.....	231,849	76	32.8	34.0
Tailors.....	403,362	141	35.0	35.4
Commercial travelers.....	191,820	70	36.5	36.7
Bakers.....	296,448	100	33.7	37.0
Cotton manufacture.....	519,417	170	32.7	37.4
Tanners.....	28,215	11	39.0	39.2
Toolmakers.....	122,958	48	39.0	39.5
Total.....	5,347,332	1,547	28.9	30.4

The lowest accident rate for this group was experienced by clergymen, or 17.4 per 100,000, against a rate of 39.5 for toolmakers. The average for the group was 30.4.

Danger Class II includes 17 specific occupations. The details for this group are given in the table following:

TABLE 85.—MORTALITY FROM ACCIDENTS PER 100,000 PERSONS EXPOSED TO RISK, CORRECTED FOR AGE, ENGLAND AND WALES, 1900 TO 1902, BY OCCUPATIONS.

**Danger Class II.**

Occupation.	Years of life.	Number of deaths.	Crude rates.	Corrected rates.
Domestic indoor servants.....	173,280	61	35.2	43.1
Butchers.....	317,256	128	40.3	45.6
Metal workers.....	479,613	197	41.1	45.6
Watchmakers and jewelers.....	306,810	126	41.1	46.3
Potters.....	107,430	45	41.9	47.0
Engine makers.....	898,893	407	45.3	50.7
Blacksmiths.....	403,242	211	52.3	53.1
Tramway service.....	53,988	24	44.5	53.2
Carpenters.....	799,484	430	53.8	54.2
Gasworks service.....	140,820	81	57.5	56.7
Painters.....	664,251	414	62.3	57.4
Glassworkers.....	77,316	39	50.4	57.8
Waiters.....	140,682	65	46.2	58.7
Brickmakers.....	172,980	99	57.2	59.8
Farmers and graziers.....	858,465	508	59.2	61.3
Innkeepers.....	253,755	187	73.7	63.1
Masons.....	1,121,985	774	69.0	69.7
Total.....	6,970,230	3,796	54.5	56.4

The range in the rates for this group was from a minimum of 43.1 per 100,000 for domestic indoor servants to a maximum of 69.7 for masons. The average for the group was 56.4.

The third danger class includes eight specified occupations, as shown by the table following.

TABLE 86.—MORTALITY FROM ACCIDENTS PER 100,000 PERSONS EXPOSED TO RISK, CORRECTED FOR AGE, ENGLAND AND WALES, 1900 TO 1902, BY OCCUPATIONS.

## Danger Class III.

Occupation.	Years of life.	Number of deaths.	Crude rates.	Corrected rates.
Corn millers.....	67,644	50	73.9	71.6
Brewers.....	82,074	58	70.7	72.3
Farm laborers.....	1,638,414	1,324	80.8	76.7
Chimney sweeps.....	20,310	18	88.6	79.0
Physicians.....	67,458	62	91.9	80.4
Cab drivers.....	629,520	506	80.4	85.5
Boiler makers.....	136,242	125	91.7	99.6
Shipbuilding.....	254,598	253	99.4	101.8
Total.....	2,896,260	2,396	82.7	81.8

The minimum rate in this group was experienced by corn millers, or 71.6 per 100,000, against a maximum rate of 101.8 for men employed in shipbuilding. The average rate for this group was 81.8.

Danger Class IV includes 10 occupations, as shown by the table below:

TABLE 87.—MORTALITY FROM ACCIDENTS PER 100,000 PERSONS EXPOSED TO RISK, CORRECTED FOR AGE, ENGLAND AND WALES, 1900 TO 1902, BY OCCUPATIONS.

## Danger Class IV.

Occupation.	Years of life.	Number of deaths.	Crude rates.	Corrected rates.
Railway engine drivers and stokers.....	197,928	203	102.6	120.1
Quarrymen.....	211,743	259	122.3	123.8
Navvies.....	503,280	684	135.9	124.8
Dock laborers.....	265,080	365	137.7	125.8
Coal heavers.....	77,346	106	137.0	139.0
General laborers.....	1,215,042	2,003	164.9	159.5
Ironstone miners.....	50,295	81	161.0	161.7
Coal miners.....	1,828,206	2,806	153.5	172.3
Fishermen.....	70,452	133	188.8	182.9
Railway guards and porters.....	418,380	713	170.4	158.8
Total.....	4,837,752	7,353	152.0	158.8

The minimum rate in this group was experienced by railway engine drivers and stokers, or 120.1, and the maximum by railway guards and porters, or 188.8. The average for this group was 158.8.

Danger Class V includes only two occupations. The details are given in the table below:

TABLE 88.—MORTALITY FROM ACCIDENTS PER 100,000 PERSONS EXPOSED TO RISK, CORRECTED FOR AGE, ENGLAND AND WALES, 1900 TO 1902, BY OCCUPATIONS.

## Danger Class V.

Occupation.	Years of life.	Number of deaths.	Crude rates.	Corrected rates.
Bargemen and lightermen.....	88,032	325	369.2	364.3
Seamen.....	291,195	1,061	364.4	377.2
Total.....	379,227	1,386	365.5	374.1

The average for the two occupations combined was 374.1.

As a matter of convenience the crude and corrected rates for the separate occupations considered, together with the factor used for corrections, are given in Table 89.

TABLE 89.—MORTALITY FROM ACCIDENTS PER 100,000 PERSONS EXPOSED TO RISK, CORRECTED FOR AGE, ENGLAND AND WALES, 1900 TO 1902, BY OCCUPATIONS.

Crude and corrected death rates.

Occupation.	Years of life.	Number of deaths.	Crude rates.	Factor for correction.	Corrected rates.
All males, 15 years of age and over.....	31,389,867	24,948	79.5	1.0000	79.5
Occupied males.....	29,519,574	22,372	75.8	1.0379	78.7
Unoccupied males.....	1,870,293	2,576	137.7	.6357	87.5
Occupied males in London.....	4,129,842	2,677	64.8	1.0597	68.7
Occupied males in industrial districts.....	7,748,289	5,401	69.7	1.0677	74.4
Occupied males in agricultural districts.....	4,235,925	2,980	70.4	.9599	67.6
Clergymen.....	118,968	27	22.7	.7650	17.4
Physicians.....	67,458	62	91.9	1.0747	80.4
School-teachers.....	173,487	41	23.6	1.1193	26.4
Domestic indoor servants.....	173,280	61	35.2	1.2243	43.1
Clerks.....	1,038,352	211	19.9	1.2028	23.9
Commercial travelers.....	191,820	70	36.5	1.0003	36.7
Railway engine drivers and stokers.....	197,928	203	102.6	1.1705	120.1
Railway guards and porters.....	418,380	713	170.4	1.1080	188.8
Cab drivers.....	629,520	509	80.4	1.0630	85.5
Tramway service.....	53,988	24	44.5	1.1952	53.2
Seamen.....	201,195	1,061	361.4	1.0350	377.2
Dock laborers.....	265,080	365	137.7	.9801	135.8
Bargemen and lightermen.....	88,032	325	369.2	.9808	364.3
Farmers and graziers.....	888,465	508	59.2	1.0350	61.3
Farm laborers.....	1,638,414	1,324	80.8	.9495	76.7
Gardeners.....	615,012	230	37.4	.8933	33.4
Fishermen.....	70,452	133	188.8	.9688	182.9
Brewers.....	82,074	58	70.7	1.0225	72.3
Innkeepers.....	253,755	187	73.7	1.8500	63.1
Waiters.....	140,682	65	46.2	1.2707	55.7
Grocers.....	435,042	88	20.2	1.0657	22.1
Printers.....	275,451	71	25.8	1.1608	30.9
Watchmakers and jewelers.....	336,810	126	41.1	1.1258	46.3
Butchers.....	317,256	128	40.3	1.1307	45.6
Corn millers.....	67,614	50	73.9	.9687	71.6
Bakers.....	296,448	100	33.7	1.0975	37.0
Tailors.....	403,362	141	35.0	1.0113	35.4
Shoemakers.....	573,810	173	30.1	.9654	29.1
Tanners.....	28,215	11	39.0	1.0056	39.2
Engine makers.....	898,893	407	45.3	1.1193	50.7
Boiler makers.....	136,242	125	91.7	1.0861	99.6
Toolmakers.....	122,958	48	39.0	1.0127	39.5
Blacksmiths.....	403,242	211	52.3	1.0152	53.1
Metal workers.....	479,613	197	41.1	1.1097	45.6
Masons.....	1,121,985	774	69.0	1.0065	69.7
Carpenters.....	799,464	430	53.8	1.0074	54.2
Painters.....	664,251	414	62.3	.9210	57.4
Cabinetmakers.....	303,141	90	29.7	1.0676	31.7
Shipbuilding.....	254,598	253	99.4	1.0241	101.8
Wool manufacture.....	231,849	76	32.8	1.0364	34.0
Cotton manufacture.....	519,417	170	32.7	1.1449	37.4
Potters.....	107,430	45	41.9	1.1220	47.0
Glassworkers.....	77,316	39	50.4	1.1464	57.8
Coal miners.....	1,828,206	2,806	153.5	1.1223	172.3
Ironstone miners.....	50,295	81	161.0	1.0044	161.7
Quarrymen.....	211,743	259	122.3	1.0120	123.8
Gas works service.....	110,820	81	57.5	.9861	56.7
Brickmakers.....	172,980	99	57.2	1.0463	59.8
Chimney sweeps.....	20,310	18	83.6	.8918	79.0
Coal heavers.....	1,215,042	2,003	164.9	1.0144	139.0
General laborers.....	1,215,042	2,003	164.9	.9675	159.5
Navvies.....	503,280	684	135.9	.9185	124.8

### INDUSTRIAL ACCIDENT STATISTICS OF NORWAY.

The industrial accident experience of Norway is of practical importance in that the data have been consolidated for a 16-year period ending with 1910 and correlated to the wages paid, with the resulting cost of industrial accident insurance determined per 1,000 crowns of

wage expenditures. The experience is for a large number of representative industries, and includes 1,512,491,000 crowns (\$405,347,588) paid in wages, and 25,771,000 crowns (\$6,906,628) paid in accident compensation. Relatively 17.04 crowns (\$4.57), or 1.7 per cent were required for payments on account of accidents out of every 1,000 crowns (\$268) paid in wages.

The most hazardous employments, in the order of their importance, were rock blasting, with a cost rate of 72.6; tunnel construction, with a rate of 59.3; canal building and operation, with a rate of 50.7; sawmills, with a rate of 41.1; laundries, with a rate of 38.4; powder mills, with a rate of 32.7; metal mining, with a rate of 32.4; furniture workers, with a rate of 31.9; and river regulation, with a rate of 30.3.

The least hazardous occupations, in the order of their importance, were tailors, with a rate of 0.2; hatters, with a rate of 2.3; pottery and earthenware makers, with a rate of 2.4; tobacco manufacture, with a rate of 2.5; printers, with a rate of 2.6; gold and silver workers and bookbinders, each with a rate of 3.1; rubber manufacturers, with a rate of 3.3; candy makers, with a rate of 3.5; glassworkers, with a rate of 3.8; and shoe factories, with a rate of 3.9.

The details for 78 occupations or industries are given in Table 90.

TABLE 90.—COST OF INDUSTRIAL ACCIDENT INSURANCE OF NORWAY, 1895 TO 1910, BY INDUSTRIES OR OCCUPATIONS.

[Source: Ulykkesforsikringen, 1910. Utgit av Riksforsikringsanstalten. Christiania, 1913 (Norges Officielle Statistik, V. 195).]

*I. Accident cost under 10 crowns per 1,000 crowns wages.*

Industry or occupation.	Total wage payments (crowns).	Amount paid in compensation (crowns).	Compensation in crowns per 1,000 crowns wages.
1. Tailors.....	3,689,348	772	0.2
2. Hat manufacture.....	1,970,709	4,498	2.3
3. Pottery and earthenware makers.....	6,256,584	14,797	2.4
4. Tobacco manufacture.....	13,365,762	33,478	2.5
5. Printers.....	28,732,510	73,812	2.6
6. Book binderies.....	10,375,111	31,988	3.1
7. Gold and silver works.....	6,309,765	19,614	3.1
8. Rubber manufacture.....	1,276,715	4,207	3.3
9. Candy makers.....	3,860,791	13,624	3.5
10. Glassworkers.....	12,669,977	48,771	3.8
11. Shoe manufacture.....	12,388,055	48,457	3.9
12. Cotton industry.....	34,656,862	143,354	4.1
13. Nail manufacture.....	11,999,950	56,175	4.7
14. Navy yards.....	14,072,292	70,921	5.0
15. Bakeries.....	17,862,961	91,604	5.1
16. Tanneries.....	6,521,267	35,453	5.4
17. Brass and copper industry.....	4,227,328	22,763	5.4
18. Oleomargarine manufacture.....	5,165,028	29,590	5.7
19. Match factories.....	8,204,594	50,581	6.2
20. Dairies.....	8,735,701	61,353	7.0
21. Steel works.....	852,870	6,111	7.2
22. Carriage and car shops.....	6,556,631	48,795	7.4
23. Rope and net industry.....	7,035,531	53,242	7.6
24. Meat packing.....	4,917,449	38,714	7.9
25. Wool industry.....	25,103,186	199,984	8.0
26. Soap and tallow factories.....	2,600,943	22,729	8.5
27. Iron and steel foundries.....	13,792,113	118,122	8.6
28. Canneries.....	14,752,096	135,305	9.2
Total.....	288,017,138	1,478,814	5.1

TABLE 90.—COST OF INDUSTRIAL ACCIDENT INSURANCE OF NORWAY, 1895 TO 1910, BY INDUSTRIES OR OCCUPATIONS—Concluded.

*II. Accident cost 10 to 19.9 crowns per 1,000 crowns wages.*

Industry or occupation.	Total wage payments (crowns).	Amount paid in compensation (crowns).	Compensation in crowns per 1,000 crowns wages.
29. Dyehouses.....	2,917,210	29,116	10.0
30. Iron furnaces.....	1,542,062	15,840	10.3
31. Private railways.....	11,319,967	122,732	10.8
32. Street railways.....	8,401,961	91,869	10.9
33. Electric construction and repair.....	6,857,115	74,860	10.9
34. Tool manufacture.....	1,218,400	13,646	11.2
35. Painters.....	14,122,200	160,511	11.4
36. Chimney sweeps.....	1,263,071	14,506	11.5
37. Breweries.....	24,505,678	285,493	11.7
38. Machine shops.....	50,931,447	671,045	11.8
39. Paper manufacture.....	31,611,124	385,088	12.2
40. Flour mills.....	16,734,902	212,190	12.7
41. Brickmakers.....	24,735,300	334,675	13.5
42. Celluloid manufacture.....	45,332,145	627,011	13.8
43. Blacksmiths.....	5,576,434	76,742	13.8
44. Plumbers and gas fitters.....	5,204,097	75,674	14.4
45. Cement workers.....	4,091,015	59,955	14.7
46. Distilleries.....	2,257,167	33,150	14.7
47. Carpenters.....	118,505,943	1,754,875	14.8
48. Rafting.....	34,449,553	560,823	16.3
49. Wood-pulp manufacture.....	41,070,955	672,770	16.4
50. Coopers.....	3,868,701	64,038	16.6
51. Sheet-iron workers.....	4,142,923	69,630	16.8
52. Shipbuilding (iron).....	83,324,602	1,517,125	18.2
53. Lime workers.....	1,635,747	31,233	19.1
54. Chemical industry.....	4,756,599	92,998	19.6
Total.....	556,436,445	8,047,500	14.5

*III. Accident cost 20 to 29.9 crowns per 1,000 crowns wages.*

55. Electric power plants.....	3,733,731	74,663	20.0
56. Shipbuilding (wood).....	9,245,033	187,535	20.3
57. Forestry.....	17,811,322	360,136	20.7
58. Lighthouse service.....	1,907,744	41,451	21.7
59. Fish and whale oil manufacture.....	4,208,680	94,655	22.5
60. Docks and wharves.....	127,522,405	2,883,936	22.6
61. Road construction.....	3,892,652	91,525	23.5
62. Copper smelters.....	1,922,779	45,375	23.6
63. Wood carvers and turners.....	3,406,475	85,674	25.0
64. Government railways.....	43,797,954	1,112,105	25.4
65. Masons.....	10,883,209	287,831	26.4
66. House building.....	60,906,139	1,637,559	26.9
67. Peat manufacture.....	1,109,256	33,092	29.8
68. Railway construction.....	9,928,775	297,017	29.9
69. Stone and slate quarries.....	34,946,310	1,045,259	29.9
Total.....	335,221,855	8,286,213	24.7

*IV. Accident cost 30 to 39.9 crowns per 1,000 crowns wages.*

70. River regulation.....	3,895,591	118,157	30.3
71. Furniture workers.....	15,922,171	507,306	31.9
72. Metal mining.....	48,534,396	1,570,721	32.4
73. Powder mills.....	1,434,621	46,967	32.7
74. Laundries.....	1,469,210	56,475	38.4
Total.....	71,255,989	2,299,626	32.3

*V. Accident cost 40 crowns and over per 1,000 crowns wages.*

75. Sawmills.....	18,624,827	766,057	41.1
76. Canal construction and operation.....	9,667,585	490,181	50.7
77. Tunnel construction.....	1,974,069	117,124	59.3
78. Rock blasting.....	4,583,118	332,787	72.6
Total.....	34,849,609	1,706,149	49.0
All industries and occupations.....	1,512,491,039	25,771,224	17.0

ACCIDENTS IN THE NORWAY FISHERIES.<sup>1</sup>

There are few occupations for which the available data regarding accident liability are of more interest than the fisheries. For the United States, excepting the Gloucester fisheries,<sup>2</sup> practically no useful and conclusive data are obtainable. The following statistics, derived from official sources, for the Norway fisheries are, therefore, of special value. The table following exhibits the number of accidents reported and compensated for under the Norwegian law providing for the compulsory accident insurance of fishermen:

TABLE 91.—ACCIDENTS REPORTED AND COMPENSATED AND RATE PER 10,000 PERSONS INSURED, FISHERMEN'S ACCIDENT INSURANCE DEPARTMENT, NORWAY, 1909 TO 1912.

Year.	Number insured.	Accidents reported.				Compensated accidents resulting in—			
		Compen- sated.	Not com- pen- sated.	Total.	Rate per 10,000.	Death.		Disability.	
						Num- ber.	Rate per 10,000.	Num- ber.	Rate per 10,000.
1909.....	91,240	422	116	538	59.0	186	20.4	236	25.9
1910.....	89,923	342	122	464	51.6	199	22.1	143	15.9
1911.....	87,832	291	92	383	43.6	163	18.6	128	14.6
1912.....	87,896	260	102	362	41.2	131	14.9	129	14.7
Total.....	356,893	1,315	432	1,747	49.0	679	19.0	636	17.8

The total number of accidents, whether compensated for or not, during the four-year period was 1,747, which on the basis of the total number of 356,893 exposed to risk one year results in an accident rate of 49 per 10,000 persons insured. The maximum rate of 59 prevailed in 1909, and the minimum rate of 41.2 prevailed in 1912. Considering compensated accidents only, it is shown that the fatality rate was 19 per 10,000 and the serious disability rate was 17.8. The fatality rate of 1.9 per 1,000 is relatively low, but in determining this rate fishermen in all branches of the industry are considered.

Differentiating the three branches—that is, coast fisheries, high-sea fisheries, and whalers and sealers—it is shown by the following table that the fatality rates vary considerably, but unfortunately the data in detail are available for only the year 1912, when the combined accident rate was exceptionally low.

<sup>1</sup> Data are from the official annual reports of "Fiskerforsikringen," Norway. 1912.

<sup>2</sup> During the period 1896-1910 the average fatality rates in Gloucester (Mass.) fisheries was 12.8 per thousand employed. The total number of lives lost during this period was 791. This calculation is based upon special returns made and compiled for many years by Procter Bros., Gloucester, Mass.

TABLE 92.—NUMBER AND RATE PER 10,000 PERSONS INSURED OF ACCIDENTS RESULTING IN DEATH AND IN DISABILITY, FISHERMEN'S ACCIDENT INSURANCE DEPARTMENT, NORWAY, 1912, BY CLASSES OF FISHERIES.

Class of fisheries.	Number insured.	Compensated accidents resulting in—				Total compensated accidents.	
		Death.		Disability.		Number.	Rate per 10,000.
		Number.	Rate per 10,000.	Number.	Rate per 10,000.		
Coast fisheries.....	18,546	35	18.9	31	16.7	66	35.6
High-sea fisheries.....	67,013	91	13.6	95	14.2	186	27.8
Whalers and sealers.....	2,337	5	21.4	3	12.8	8	34.2
Total.....	87,896	131	14.9	129	14.7	260	29.6

It is shown by this table that the fatality rate was highest in whaling and sealing, or 21.4 per 10,000, against a rate of only 13.6 in the high-sea fisheries and 18.9 in the coast fisheries. The very low rate in the high-sea fisheries is particularly significant and may be accepted as evidence of an unusually careful and skilled body of employees. The conditions under which the North Sea fisheries are carried on are well brought out in the report of the Scottish departmental committee on the North Sea fishing industry, including notes on the fishing fleets of Norway and maps illustrative of the fisheries in the North Sea and the adjacent seas, by the principal countries interested. The Norwegian fishery administration is described, but there are no data in the report regarding the hazards of the industry.

The accident liability, by age, is brought out with approximate accuracy in the returns for 1912. A strictly conclusive statement should represent the experience for a period of years, for which, however, the data are not available at the present time.

TABLE 93.—NUMBER AND RATE PER 10,000 PERSONS INSURED OF ACCIDENTS RESULTING IN DEATH AND IN DISABILITY, FISHERMEN'S ACCIDENT INSURANCE DEPARTMENT, NORWAY, 1912, BY AGE GROUPS.

Age group.	Number insured.	Compensated accidents resulting in—				Total compensated accidents.	
		Death.		Disability.		Number.	Rate per 10,000.
		Number.	Rate per 10,000.	Number.	Rate per 10,000.		
15 to 24 years.....	23,884	43	18.0	23	9.6	66	27.6
25 to 34 years.....	18,702	38	20.3	19	10.2	57	30.5
35 to 44 years.....	16,403	18	11.0	21	12.8	39	23.8
45 to 54 years.....	14,138	14	9.9	30	21.2	44	31.1
55 to 64 years.....	10,031	13	13.0	25	24.9	38	37.9
65 to 74 years.....	4,038	5	12.4	11	27.2	16	39.6
75 to 84 years.....	677						
85 to 94 years.....	23						
Total.....	87,896	131	14.9	129	14.7	260	29.6

This table would seem to warrant the conclusion that the fatality risk is slightly greater at ages under 45 than at 45 and over, but that the serious disability risk increases gradually from youth to old age.

During the four years ending with 1912 there were 636 compensated accidents resulting in invalidity, of which number 434, or 68.2 per cent, caused a degree of invalidity equivalent to less than 20 per cent of the earning capacity; 157 accidents, or 24.7 per cent, caused a degree of invalidity equivalent to an earning capacity of from 20 to 49 per cent; and 45 accidents caused a degree of invalidity equivalent to an earning capacity of from 50 per cent to 100 per cent, or 7.1 per cent of the total number of compensated invalidity cases.

The insurance experience is not given in complete detail. It appears that the premiums collected are insufficient to pay the claims for each branch of the fisheries, as shown by the following table, which gives the combined results for the four years ending with 1912:

TABLE 94.—PREMIUMS AND CLAIMS PAID, FISHERMEN'S ACCIDENT INSURANCE DEPARTMENT, NORWAY, 1909 TO 1912, BY CLASSES OF FISHERIES.

Class of fisheries.	Premiums paid.	Claims paid.
High-sea fisheries.....	\$111,562.77	\$123,418.29
Coast fisheries.....	30,338.41	33,624.62
Whalers and sealers.....	2,761.47	6,192.67
Boatmen.....	826.24	1,608.00
Total.....	145,488.88	164,843.58

The total premiums received, according to this table, amounted to 542,869 crowns (\$145,488.88), whereas the claims paid amounted to 615,088 crowns (\$164,843.58); in other words, during the four years all the administration expenses and in addition thereto 11.74 per cent of the claims, must have been provided for by general taxation.

It may be stated in conclusion that the fishery industry of Norway is one of the most important industrial pursuits, and that according to the industrial census of 1909 no other industry approaches it in the number employed. In fact, all the manufacturing industries combined during that year employed only 95,251 males, against 91,240 males employed in the fisheries.

### GERMAN INDUSTRIAL ACCIDENT INSURANCE EXPERIENCE.

The German industrial accident experience data are of special interest on account of the long period of years that the compulsory system of workmen's compensation insurance has been in operation. The experience data are separately reported for the 66 industrial accident associations, conveniently consolidated for the years 1901 to 1912 in the table below. This table shows, first, the number of full-time

workmen on the basis of 300 working days per annum, or 3,000 working hours. In addition to the number of industrial accidents of all kinds the table shows the degrees of injury—fatal, permanent (total or partial), and temporary. The table gives the actual numbers as well as the relative rates per 1,000 of full-time workmen employed. The experience is exclusive of the persons employed in connection with governmental administrative bodies, employing 728,415 full-time workmen in 1912.

TABLE 95.—NUMBER OF INDUSTRIAL ACCIDENTS COMPENSATED FOR FIRST TIME, BY RESULTS OF INJURY, IN GERMANY, 1901 TO 1912.

[Source: Amtliche Nachrichten des Reichs-Versicherungsamts, 1901 to 1912.]

Year.	Full-time (300-day) employees.	Total number of accidents.	Fatal accidents.	Permanent total incapacity.	Permanent partial incapacity.	Temporary disability (over 13 weeks).
1901.....	6,000,615	55,525	4,979	595	26,158	23,793
1902.....	6,226,584	57,244	4,572	605	26,680	25,387
1903.....	6,553,514	60,550	4,720	621	27,427	27,782
1904.....	6,868,496	65,205	4,976	603	28,878	30,738
1905.....	7,159,842	68,360	5,154	572	29,423	33,211
1906.....	7,512,728	71,227	5,398	578	30,134	35,117
1907.....	7,869,421	75,370	6,078	571	30,280	38,441
1908.....	7,868,531	74,581	5,939	566	29,114	38,962
1909.....	7,945,797	70,986	5,612	453	25,726	39,195
1910.....	8,291,936	69,311	5,292	453	23,809	39,766
1911.....	8,653,302	70,423	5,532	413	22,878	41,300
1912.....	9,011,570	74,488	6,594	352	23,566	43,976
Total.....	83,362,336	813,270	65,146	6,382	324,054	417,088

TABLE 96.—NUMBER OF INDUSTRIAL ACCIDENTS COMPENSATED FOR FIRST TIME, PER 1,000 FULL-TIME WORKERS, BY RESULTS OF INJURY, IN GERMANY, 1901 TO 1912.

[Source: Amtliche Nachrichten des Reichs-Versicherungsamts, 1901 to 1912.]

Year.	Full-time (300-day) employees.	Rates per 1,000 full-time employees.				
		All accidents.	Fatal accidents.	Permanent total incapacity.	Permanent partial incapacity.	Temporary disability (over 13 weeks).
1901.....	6,000,615	9.25	0.83	0.10	4.36	3.96
1902.....	6,226,584	9.19	.73	.10	4.23	4.08
1903.....	6,553,514	9.24	.72	.09	4.19	4.24
1904.....	6,868,496	9.49	.72	.09	4.20	4.48
1905.....	7,159,842	9.55	.72	.08	4.11	4.64
1906.....	7,512,728	9.48	.72	.08	4.01	4.67
1907.....	7,869,421	9.58	.77	.07	3.85	4.89
1908.....	7,868,531	9.48	.76	.07	3.70	4.95
1909.....	7,945,797	8.93	.70	.06	3.24	4.93
1910.....	8,291,936	8.36	.64	.05	2.87	4.80
1911.....	8,653,302	8.14	.68	.05	2.64	4.77
1912.....	9,011,570	8.27	.73	.04	2.62	4.88
Total.....	83,362,336	9.04	.73	.07	3.60	4.64

The average industrial accident rate in the experience of industrial accident insurance institutions for the 12-year period under observation was 9.04 per 1,000 full-time workmen employed. Based upon the average number of persons employed, the rate would be

7.94 per 1,000, a difference of 1.10 per 1,000 when compared with the rate determined on the basis of the full-time employees; but for strictly scientific purposes this method is to be preferred to the more crude method in common use, of determining the rate on the basis of the average number employed, which is frequently obtained only by a simple addition of the numbers ascertained at different periods during the year and divided by the number of periods considered. For the year 1912 the accident rate as determined on the basis of the average number of persons injured was 7.32, against a rate of 8.27 as determined on the basis of 1,000 normal full-time employees. The fatal accident rate was increased from 0.65, as ascertained by the first method, to 0.73 according to the second. The practical difficulty in the way of the universal adoption of the more useful and conclusive rate, based on full-time employees only, lies in the reluctance on the part of employers to undertake the necessary calculations, involving a slightly more complex method of bookkeeping, to determine at the end of each year the actual number of hours of labor performed, which, divided by 3,000, would give the number of full-time employees during the year. In other words, by thus reducing the number of employees from a theoretical average to a true exposure the accident rates are necessarily increased. For the year 1912, the average number of workmen insured under the German industrial accident system was 10,178,577, whereas the number of full-time employees, as determined by the method explained, was 9,011,570. Or, to express it differently, reducing the average number of employees to 100, the number of full-time workmen would be represented by 88.5.

The German industrial accident experience data have been made available in several important and conveniently accessible publications. It would therefore not seem necessary to enlarge upon the details of the German experience, but for the purpose of comparison with other data, the following tables are included. The statistics are for the period 1897 to 1908, and it has not seemed necessary to bring them down to date on account of the large amount of labor involved and the practical certainty that the results would probably not be modified in essential particulars. Accidents resulting in temporary incapacity of 13 weeks or less are not included.

TABLE 97.—NUMBER OF INDUSTRIAL ACCIDENTS REPORTED AND NUMBER COMPENSATED BY RESULTS OF INJURY, COMPENSATION PAID, AND COST OF ACCIDENT PREVENTION, GERMAN INDUSTRIAL ACCIDENT ASSOCIATIONS, 1897 TO 1908, BY INDUSTRIES.<sup>1</sup>

Industry.	Total number of full-time (300-day) employees.	Total accidents.			Accidents resulting in—			
		Number reported.	Number compensated.	Per cent compensated.	Death.		Permanent total incapacity.	
					Number.	Per cent of total compensated.	Number.	Per cent of total compensated.
Mining.....	7,388,942	862,582	104,207	12.08	15,243	14.63	915	0.88
Quarrying.....	1,867,734	198,018	26,470	24.61	2,974	11.24	254	.96
Glass, potteries, and brick-making.....	4,021,251	108,251	25,311	23.38	2,203	8.70	128	.51
Iron and steel.....	12,667,601	1,104,080	136,021	12.32	7,504	5.52	1,465	1.08
Small metal ware, tools, and musical instruments.....	4,200,992	157,409	25,261	16.05	811	3.21	279	1.10
Chemicals.....	2,037,878	114,530	17,382	15.18	1,386	7.97	323	1.86
Gas works and waterworks.....	636,133	42,325	3,925	9.27	354	9.02	53	1.35
Textiles.....	9,715,484	130,333	30,452	23.36	1,199	3.94	249	.82
Paper and printing.....	3,621,155	91,842	17,018	18.53	905	5.32	145	.85
Leather and clothing.....	3,109,049	46,358	11,351	24.49	466	4.11	113	1.00
Woodworking.....	3,902,851	197,620	49,858	25.23	1,885	3.78	88	.18
Food and tobacco.....	3,900,852	71,172	16,988	23.87	497	2.93	64	.38
Flour milling, sugar, dairies, distilleries, and starch.....	3,493,496	237,029	39,096	16.87	3,416	8.54	511	1.28
Private building.....	12,118,000	667,652	139,264	20.85	12,753	9.16	1,762	1.27
Private railways.....	957,256	67,765	6,462	9.54	785	12.15	223	3.45
Warehousing and teaming.....	3,539,708	237,820	52,497	22.07	4,987	9.50	378	.72
Inland shipping.....	615,463	35,930	8,108	22.57	1,871	23.08	77	.95
Merchant marine.....	792,392	37,261	5,050	13.55	1,322	26.18	20	.40
Total.....	78,496,277	4,317,977	715,561	16.57	60,561	8.46	7,047	.98

  

Industry.	Accidents resulting in—			Compensated accidents.		Accident compensation paid per 1,000 full-time employees.	Cost of accident prevention per \$1,000 received in wages.
	Permanent partial incapacity.		Temporary incapacity.	Total per 1,000 full-time employees.	Per cent caused by machinery per 1,000 full-time employees.		
	Number.	Per cent of total compensated.					
Mining.....	37,787	36.26	50,262	14.10	1.60	\$20.11	\$0.02
Quarrying.....	10,118	38.22	13,124	14.17	1.68	18.97	.43
Glass, potteries, and brick-making.....	8,466	33.45	14,514	6.29	1.68	7.82	.12
Iron and steel.....	72,033	52.96	55,019	10.74	3.62	11.84	.10
Small metal ware, tools, and musical instruments.....	18,779	74.34	5,392	6.01	3.46	5.45	.07
Chemicals.....	11,220	64.55	4,453	8.53	1.82	12.00	.47
Gas works and waterworks.....	1,291	32.89	2,227	6.17	.56	9.26	.11
Textiles.....	13,152	59.61	10,852	3.13	1.84	5.02	.08
Paper and printing.....	8,770	51.53	7,198	4.70	2.88	6.19	.11
Leather and clothing.....	3,151	71.80	2,621	3.65	1.95	4.61	.03
Woodworking.....	23,456	47.05	24,429	12.78	7.31	13.98	.17
Food and tobacco.....	5,870	34.55	10,557	4.35	1.15	4.98	.18
Flour milling, sugar, dairies, distilleries, and starch.....	19,186	47.97	16,883	11.45	2.85	19.64	.24
Private building.....	54,505	39.15	70,184	11.49	1.00	14.61	.27
Private railways.....	3,399	52.60	2,055	6.75	.38	9.54	.07
Warehousing and teaming.....	15,486	29.50	31,646	14.83	1.05	16.66	.10
Inland shipping.....	2,017	24.88	4,143	13.17	1.44	20.79	.16
Merchant marine.....	1,620	32.08	2,088	7.19	1.41	15.96	1.70
Total.....	320,306	44.76	327,647	9.11	2.29	12.20	.20

<sup>1</sup> Source: Verein deutscher Revisions-Ingenieure. Schriften, No. 10 (25 Jahre Unfallverhütung. Bearb. von E. Bauer, Berlin, 1910).

<sup>2</sup> This total is not the correct sum of the items. The figures are given as shown in the original report.

The tables give only the averages for certain specified groups of industries. For additional information regarding subgroups or important branches, the original experience as published in the annual reports of the imperial insurance office,<sup>1</sup> and in the review of 25 years of accident prevention in German industry, published by the German Society of Supervising Engineers,<sup>2</sup> must be consulted. Considering the experience as a whole, it is shown that for the period 1897 to 1908 the rate of compensated accidents per 1,000 of full-time employees was 9.11; the accident rate due to machinery only was 2.29 per 1,000; the average compensation cost per \$1,000 paid in wages was \$12.20, equivalent to 1.22 per cent; and the average cost of accident prevention was \$0.20 per \$1,000 paid in wages. The industry best illustrating the very material differences in the average number of persons employed and the number of full-time workmen on the basis of 3,000 working hours per annum is the German stone industry, which in 1908 returned 439,719 insured persons, but only 169,566 full-time employees. The accident rate in this industry was, therefore, increased from 6.04 on the basis of the average number insured, to 15.67 as determined on the basis of full-time employees. In other words, industries with much irregularity of employment, particularly seasonable trades, require to be considered on the basis of full-time employees rather than on the average number of persons employed as usually determined by calculating a mean of the number at work on January 1 and July 1.

The general causes or contributing factors of industrial accidents in German industry during the period 1885 to 1908 are given, in conclusion, to afford a convenient means of comparison with corresponding statistics for other countries:

TABLE 98.—GENERAL CAUSES OF COMPENSATED INDUSTRIAL ACCIDENTS, EXPERIENCE OF GERMAN INDUSTRIAL ACCIDENT ASSOCIATIONS, 1885 TO 1908.<sup>2</sup>

Cause.	Compensated accidents.	
	Number.	Per cent.
Motors and transmission of power.....	210,558	21.01
Lifts, cranes, etc.....	35,715	3.56
Boiler and steam-pipe explosions.....	3,572	.36
Explosives.....	9,993	1.00
Heat, acids, steam, gases, etc.....	33,689	3.36
Collapses or breakdowns.....	165,410	16.51
Falls from ladders, stairs, etc.....	162,074	16.17
Loading, lifting, and carrying.....	131,240	13.10
Teaming, vehicles, etc.....	61,808	6.17
Railways.....	40,355	4.03
Shipping.....	10,089	1.01
Animals.....	13,968	1.39
Tools.....	71,911	7.18
All others.....	51,792	5.17
Total.....	1,002,174	100.00

<sup>1</sup> Amtliche Nachrichten des Reichs-Versicherungsamts. Jahresberichte der gewerblichen Berufsgenossenschaften über Unfallverhütung für 1911, Volume V, Berlin, 1912.

<sup>2</sup> Verein deutscher Revisions-Ingenieure. Schriften, No. 10 (25 Jahre Unfallverhütung. Bearb. von E. Bauer. Berlin, 1911).

AUSTRIAN INDUSTRIAL ACCIDENT INSURANCE EXPERIENCE.<sup>1</sup>

The compulsory industrial accident insurance experience data of Austria extend over a period of 20 years, but the complete details are available only for the last 15 years. The most recent statistics are for the five years ending with 1911, including summary observations for the two previous five-year periods. The experience is published in detail for the purpose of providing an adequate basis for the required readjustment in the insurance rates, according to danger classes. The table following exhibits the general accident experience for the period 1897 to 1911, limited, however, to compensated accidents, with the rates of accident frequency calculated on the number of full-time workmen employed, instead of the average number insured. Disabilities of four weeks or less are not subject to accident compensation, but are cared for by the sickness insurance associations.

TABLE 99.—NUMBER OF COMPENSATED ACCIDENTS PER 1,000 FULL-TIME WORKMEN IN AUSTRIA, 1897 TO 1911.

Year.	Number of full-time (300-day) workmen.	Number of compensated accidents.	Rate per 1,000 full-time workmen.
1897 to 1901.....	6,164,095	95,269	15.46
1902 to 1906.....	7,011,595	119,396	17.03
1907.....	1,608,939	28,696	17.84
1908.....	1,661,979	29,585	17.80
1909.....	1,702,149	28,897	16.98
1910.....	1,767,615	29,695	16.80
1911.....	1,813,553	30,570	16.86
Total, 1907 to 1911.....	8,554,235	147,443	17.24

The general accident rate increased in the Austrian experience from 15.46 per 1,000 during the five years ending with 1901, to 17.03 during 1902 to 1906. Subsequently thereto the rate increased during the first two years, but diminished during the three years following, remaining at practically a stationary level. The average rate for the five years ending with 1911 was 17.24 per 1,000. The table does not sustain the frequently expressed opinion that in *all* compulsory industrial accident experience of European countries the degree of accident frequency has constantly and rapidly increased.

The changes in accident frequency, differentiating fatal and non-fatal injuries, and in the latter case accidents causing permanent and temporary incapacity for work are disclosed in the table following. Only compensated accidents, however, are considered.

<sup>1</sup> Data are taken from Ergebnisse der Unfallstatistik der fünfjährigen Beobachtungs-periode 1907-1911. Vienna, 1914.

TABLE 100.—NUMBER OF COMPENSATED ACCIDENTS PER 1,000 FULL-TIME WORKERS, BY RESULTS OF INJURY, IN AUSTRIA, 1897 TO 1911.

Year.	Number of full-time (300-day) workmen.	Fatal accidents.		Nonfatal injuries.			
		Number.	Rate per 1,000 full-time workmen.	Permanent.		Temporary disabilities lasting more than 4 weeks.	
				Number.	Rate per 1,000 full-time workmen.	Number.	Rate per 1,000 full-time workmen.
1897 to 1901.....	6,164,095	3,871	0.63	35,940	5.83	55,458	9.00
1902 to 1906.....	7,011,595	4,478	.64	46,506	6.63	68,412	9.76
1907.....	1,608,939	1,010	.63	10,600	6.59	17,086	10.62
1908.....	1,661,979	1,038	.62	10,310	6.20	18,237	10.97
1909.....	1,702,149	1,010	.59	9,813	5.77	18,074	10.62
1910.....	1,767,615	975	.55	10,146	5.74	18,574	10.51
1911.....	1,813,553	1,001	.55	10,781	5.94	18,788	10.36
Total, 1907 to 1911.	8,554,235	5,034	.59	51,650	6.04	90,759	10.61

Fatal accidents are shown to have decreased from an average of 0.63 per 1,000 during the first five years and 0.64 during the second to 0.59 during the third five years. The lowest fatality rate prevailed during the last two years of the 15-year period under observation. Serious injuries causing permanent incapacity for work increased from 5.83 per 1,000 during the first five years, to 6.63 during the second, but the rate diminished to 6.04 during the last five years, and reached a point as low as 5.74 per 1,000 during the year 1910. Serious injuries causing temporary incapacity for work increased from 9 per 1,000 during the first five years to 9.76 during the second and 10.61 during the third. There was a slight decrease in the rate during the year 1911, but the increase observed during the 15-year period can not be considered alarming or evidence of an excessive amount of malingering.

The financial statistics of the experience are given in detail in the table following, exhibiting (1) the amounts of pay roll contributing the required premium charges, (2) the amounts paid in premiums, (3) the per cent of pay roll required for premium payments, (4) the amounts paid in compensation, and (5) the per cent of claims paid, on the basis of the pay roll.

TABLE 101.—AMOUNT AND PER CENT OF PAY ROLL OF PREMIUMS AND OF COMPENSATION PAID FOR ACCIDENT INSURANCE IN AUSTRIA, 1897 TO 1911.

Year.	Amount of pay roll insured (crowns).	Premium payments.		Compensation paid.	
		Amount (crowns).	Per cent of pay roll.	Amount (crowns).	Per cent of pay roll.
1897 to 1901.....	4,450,232,300	77,774,968	1.75	87,481,675	1.97
1902 to 1906.....	5,423,487,400	101,608,625	1.87	108,132,872	1.99
1907.....	1,377,035,000	27,549,395	2.00	25,920,735	1.88
1908.....	1,466,064,600	30,308,094	2.07	26,520,566	1.81
1909.....	1,543,848,900	31,923,605	2.07	25,484,405	1.65
1910.....	1,647,243,000	36,029,951	2.19	26,917,325	1.63
1911.....	1,752,169,300	38,110,499	2.18	28,230,937	1.61
Total, 1907 to 1911.....	7,786,360,800	163,921,544	2.11	133,073,968	1.71

The interesting fact is brought out by this table that the cost of insurance on the pay-roll basis increased from 1.75 per cent of the amount paid in wages during the first five years to 1.87 per cent during the second and to 2.11 per cent during the third five-year period. The percentage of pay roll paid out in compensation increased very slightly, from 1.97 per cent during the first five years to 1.99 during the second, but diminished to 1.71 per cent during the third period. During the year 1911 the percentage was as low as 1.61. The differences in the two results are probably due to higher expenses of administration and possibly to increased expenditures on account of accident prevention.

Considering briefly the results for the year 1911, it is shown that a contributing pay roll of 1,752,169,300 crowns (\$355,690,367.90) provided 38,110,499 crowns (\$7,736,431.30) in premium payments, or 2.18 per cent. Assuming that the approximate annual earnings of 30,760,000 American male wage earners for the year 1913 were \$15,380,000,000, and of 7,200,000 female wage earners \$2,160,000,000, the total pay roll of American wage earners of both sexes would be \$17,540,000,000, which, contributing at the rate of 2.18 per cent, would require a compensation cost of \$382,372,000 to provide total compensation payment on the Austrian basis of 1.61 per cent for the year 1911 of \$282,294,000. It must be kept in mind, of course, that under the Austrian method of compulsory industrial accident insurance all the required contributions are paid by the employer.

The Austrian industrial accident experience is published in detail for 625 industries and occupations. For the present purpose the discussion of the experience is limited to the following table, illustrating the accident experience for the five years ending with 1911 for 15 representative groups of employments. It is necessary to take into account the important fact that Austrian labor and industrial conditions vary quite considerably from those common to the United States; but, as a rule, the degree of fatal accident frequency

at least is relatively less in Austria than in this country. This perhaps is best illustrated by the average fatality rate in coal mining, which for Austria is 1.19 per 1,000 against 3.71 for the United States. Accidents resulting in incapacity of 4 weeks or less are not included.

TABLE 102.—NUMBER OF COMPENSATED ACCIDENTS PER 1,000 FULL-TIME WORKERS, BY INDUSTRY GROUPS, IN AUSTRIA, 1897 TO 1911.

Industrial group.	Rates per 1,000 full-time workmen.			
	All accidents.	Fatal accidents.	Incapacity for work.	
			Permanent.	Temporary.
Agriculture (including corn milling).....	22.99	1.12	11.97	9.90
Transportation and warehousing.....	23.82	1.10	8.89	13.83
Metallurgical industries, etc.....	39.87	1.05	8.15	30.67
Stone industry.....	16.55	.92	6.41	9.22
Metal manufacturing industries.....	20.15	.21	5.50	14.44
Machinery, tool manufacture, etc.....	29.46	.36	8.13	20.97
Chemical industry.....	13.64	.70	4.24	8.70
Gas, oil, petroleum, etc.....	17.38	.64	4.81	11.93
Textile industry.....	6.22	.14	2.51	3.57
Paper, leather, and rubber.....	13.73	.43	4.86	8.44
Woodworking industry.....	32.98	1.00	12.81	19.17
Food-producing industry.....	13.00	.47	4.56	7.97
Clothing industry.....	4.48	.12	1.85	2.51
Building and contracting.....	20.61	1.01	7.82	11.78
Printing, lithographing, etc.....	5.98	.04	2.00	3.94
Total.....	17.24	.59	6.04	10.61

The practical utility of this table is quite limited on account of the occupational and industrial combination unavoidable in a condensed presentation of the facts. For all industries the general accident rate was 17.24 per 1,000, the fatal-accident rate was 0.59, the rate of frequency for accidents causing serious permanent incapacity, 6.04, and for serious temporary incapacity, 10.61. The highest rate prevailed in the metallurgical industries, or 39.87, and the lowest in the clothing industry, or 4.48 per 1,000. The highest fatality rate prevailed in agriculture, including corn milling, or 1.12 per 1,000, and the lowest rate in the printing, lithographing, and allied trades, or 0.04. In the earlier report on fatal industrial accident frequency in the United States<sup>1</sup> the rate assumed for American industry (males) was 0.565 per 1,000. The rate for males now assumed as an average fatality rate resulting from industrial causes is 0.73. This latter estimate, being based on wider experience, is probably nearer the truth. It is practically certain that the Austrian fatality rates throughout are lower than the corresponding fatality rates for American industries. It is doubtful, however, whether the same conclusion applies to the Austrian rates for serious injuries causing permanent and temporary incapacity for work.

<sup>1</sup> Bulletin of the Bureau of Labor No. 78, p. 422.

For the purpose of illustrating the variations in the rate of accident frequency, by single years, during the 15-year period ending with 1911, the present discussion is concluded with the following table, which fully sustains the earlier observation that there has been no pronounced upward tendency in the serious accident frequency in Austrian experience, and that the increase in the accident rate for injuries causing temporary incapacity for work was also not of an alarming character, an apparently stationary condition having been reached during the last six years.

TABLE 103.—NUMBER OF COMPENSATED ACCIDENTS PER 1,000 FULL-TIME WORKERS IN AUSTRIA, 1897 TO 1911, BY YEARS.<sup>1</sup>

Year.	All compensated acci- dents.	Fatal acci- dents.	Serious accidents.		Year.	All compensated acci- dents.	Fatal acci- dents.	Serious accidents.	
			Perma- nent inca- pacity for work.	Tempo- rary inca- pacity for work.				Perma- nent inca- pacity for work.	Tempo- rary inca- pacity for work.
1897.....	14.92	0.67	5.32	8.93	1905.....	17.39	0.67	6.88	9.84
1898.....	15.01	.61	5.58	8.82	1906.....	17.80	.59	6.81	10.40
1899.....	15.51	.63	5.95	8.93	1907.....	17.84	.63	6.59	10.62
1900.....	15.73	.61	6.11	9.01	1908.....	17.80	.62	6.20	10.98
1901.....	16.07	.63	6.16	9.28	1909.....	16.98	.59	5.77	10.62
1902.....	16.48	.64	6.42	9.42	1910.....	16.80	.55	5.74	10.51
1903.....	16.31	.62	6.37	9.32	1911.....	16.86	.55	5.95	10.36
1904.....	17.02	.67	6.64	9.71					

<sup>1</sup>In comparing the Austrian industrial accident statistics with corresponding data for the United States, it is necessary to keep in mind the important fact that the Austrian experience rates are calculated on the number of full-time workmen—that is, 300 days' labor per annum—which, according to the industries considered, materially changes rates based on the average number of persons employed, as fully brought out in the discussion of the compulsory industrial accident insurance statistics of Germany. It is also necessary to bear in mind that, in Austria, disabilities of four weeks or less are not covered by the accident insurance.

## STANDARD INDUSTRIAL ACCIDENT REPORTING, CLASSIFICATION, TABULATION, AND ANALYSIS.

The reporting, classification, tabulation, and analysis of industrial accidents is far from having been developed into a thoroughly well-considered branch of statistical science. Even the fundamental requirement for the accurate and complete reporting of industrial accidents by uniform methods, and upon uniform blanks, has probably not yet been attained for any American State.

On the occasion of a conference of the American Association for Labor Legislation, held in September, 1911, a committee<sup>1</sup> was appointed charged with the specific duty "to frame a uniform system of reporting industrial accidents and occupational diseases and tabulating accident statistics."

<sup>1</sup>The members of the committee were: Leonard W. Hatch, chief statistician of the New York State Department of Labor, chairman; Lucian W. Chaney, United States Bureau of Labor Statistics; John R. Commons, at the time a member of the industrial commission of Wisconsin; Don D. Lescohier, statistician, Minnesota State Bureau of Labor; and John B. Andrews, secretary, American Association for Labor Legislation.

The committee, in cooperation with persons and official bodies interested in accident reporting, prepared a tentative schedule which was subsequently submitted to public officials, insurance companies, and representatives of employers and employees, and numerous helpful suggestions were received and utilized, and the final draft was formally adopted at a joint meeting, held in Washington in December, 1911, of the American Association for Labor Legislation and the American Statistical Association.

Copies of the final draft of the standard schedule for accident reports were sent out with explanatory letters early in 1912 to State officials, with urgent suggestions for its adoption. In a majority of the States it was found, however, that insufficient legal authority precluded the securing of all the information desired. It therefore became apparent that legislation would be necessary in many States before the standard schedule could be generally adopted. The committee in charge, therefore, agreed upon a standard reporting bill, as follows:

STANDARD BILL FOR INDUSTRIAL ACCIDENT REPORTS.

*An act to require the recording and reporting of certain industrial accidents, and to provide for its enforcement.*

*Be it enacted, etc., as follows:*

SECTION 1.—*Record of accidents.*

Every employer of labor, except agricultural or domestic labor, in this State, whether a person, partnership, or corporation, including the State and all governmental agencies created by it, shall keep a record of every accident which causes personal injury to an employee in the course of his employment. The record shall contain such information as the (proper official) may require and shall be open to inspection by him at all reasonable times.

SECTION 2.—*Report of accidents.*

Within 48 hours after any such accident the employer shall send to the (proper official) a report thereof, stating:

- (a) Name, address, and business of employer.
- (b) Name, address, and occupation of employee.
- (c) Cause of injury.
- (d) Nature of injury.
- (e) Time of injury.
- (f) Place of injury.

(g) Such other information as may be reasonably required by the (proper official).

Subsequent reports of the results of the accident and of the condition of the injured employee shall be made by the employer at such times and containing such information as the (proper official) may require. The reports herein required shall be on or in conformity with the standard schedule blanks hereinafter provided for. The posting of the report, within the time required, in a stamped envelope addressed to the office of the (proper official) shall be a compliance with this section.

SECTION 3.—*Blanks for reports.*

The (proper official) shall prepare and furnish, free of cost, to the employers included in Section 1 standard schedule blanks for the reports required under this act. The form and contents of such blanks shall be determined by the (proper official).

SECTION 4.—*Reports not evidence.*

Reports made under this act shall not be evidence of the facts therein stated in any action arising out of the accident therein reported.

SECTION 5.—*Penalty.*

Any employer who neglects or refuses to send the report or reports as herein required shall be liable to the State for a penalty of \_\_\_\_\_ dollars for each offense, recoverable by civil action by the (proper official).

SECTION 6.—*Time of taking effect.*

This act shall take effect on the first day of . . . . ., 19.....

The accident report schedule as agreed upon by this committee was subsequently modified in minor particulars, largely with reference to the practical requirements of workmen's compensation laws. The blank for first reports, as adopted by the committee, has served as a basis, with minor changes, of the accident report blank adopted by a number of the principal States. It also served as the basis of the discussion in nearly all the conferences on the subject which have been subsequently held, and differs but slightly from the standard blank which was adopted by the Chicago conference of labor and workmen's compensation officials and others interested, which was held in October, 1914.

The practical difficulties in the way of making comparisons of the accident statistics of various countries had made the subject of uniform accident reporting and standard methods of tabulation and analysis one of serious concern to the United States Bureau of Labor Statistics for several years. A conference of labor and workmen's compensation officials upon this subject had been under consideration for some months, and the first meeting was finally held in New York City on February 26, 1914, chiefly for the purpose of devising a plan for standardizing forms and methods of reporting and tabulating accident statistics collected by Federal and State labor bureaus and workmen's compensation commissions. The subjects discussed in detail at this first conference were: (1) The definition of a reportable accident; (2) the unit of risk; (3) the classification of industries; (4) the computation of the rate of accidents; (5) accident report forms, and (6) the time of reporting accidents.

The second meeting of the committee was held in New York City on April 10, 1914. Among the additional matters taken up were: (1) The method of reporting accidents causing a disability of less than the time covered by the adopted definition of a reportable accident; (2) the classification of accidents according to their consequences; and (3) the standard method of determining the average number of men exposed to risk.

The third meeting of the conference was held at Harrisburg, Pa., September 2, 1914, in conjunction with a committee of the National Council for Industrial Safety on standard forms for accident reporting. The chief business of the conference was the consideration of a revision of the Pennsylvania accident report blank. The form tentatively adopted was considerably at variance with the standard

blank recommended by the earlier meetings of the conference, but it was explained that the additional items were in conformity to special State requirements.

The fourth meeting of the conference was held in Chicago on October 12 and 13, 1914. Among those present<sup>1</sup> were representatives of official and corporate bodies directly interested in the subject of standardization of accident reports and tabulations. The ground covered by the previous conferences was first gone over with care and close attention to even minute details of far-reaching practical importance to those interested. The resolutions finally adopted by the conference were as follows:

1. *Definition of reportable accident.*—(a) All accidents causing death, permanent disability, or loss of time other than the balance of the day, turn, or shift on which the accident occurred shall be classified as reportable accidents, and a report of all such accidents to some State or national authority shall be required. (b) Where a compensation act provides for any expense on account of medical attendance or hospital treatment, thus necessarily involving a report of such cases, even though resulting in no loss of time or in a loss less than that specified above, such minor accidents should be classified separately in all tabulations and compiled reports. (c) The employer shall be required to enter upon his record all reportable accidents as above defined, and also all accidents causing a loss of time less than that above specified or requiring any medical attention.

2. *Classification of accidents according to their consequences.*—(a) Accidents should be classified according to their consequences, as resulting in death, total permanent disability, partial permanent disability, and temporary disability. (b) Accidents resulting in temporary disability should be classified according to length of temporary disability so as to show the number terminating in the 2d and 3d days, number terminating in the 4th to 7th days, inclusive, number terminating in the 2d week, in the 3d week, in the 4th week, in the 5th to 13th weeks, inclusive, in the 14th week and later. (Clear definitions of the classes are yet to be adopted.)

3. *Time of reporting accidents.*—(a) In the case of accidents terminating fatally within 7 days of the accident occurrence, notice shall be given within 24 hours of death. All reportable accidents shall be reported, upon standard accident blanks, in full, within 7 days of the occurrence of the accident. (b) A committee shall be appointed to formulate a resolution covering the subject of the final report.

<sup>1</sup> The minutes of the meeting give the following list of the persons present:

*Representatives of official bodies handling accident statistics.*—Commissioner Meeker, C. H. Verrill, United States Bureau of Labor Statistics; A. H. Fay, H. M. Wilson, F. H. Willcox, J. M. Sampson, United States Bureau of Mines; J. B. Vaughn, P. J. Angsten, Robert Eadie, W. V. Conley, Thomas A. Murphy, Industrial Board of Illinois; Edwin Mulready, Commissioner of Labor, Massachusetts; Richard L. Drake, Michigan Industrial Accident Board; Fred C. Croxton, Industrial Commission of Ohio; A. R. Houck, Lew R. Palmer, Pennsylvania Department of Labor and Industry; E. H. Downey, W. H. Burhop, Wisconsin Industrial Commission.

*Members of National Council of Safety Committee on Standard Forms.*—C. L. Close, United States Steel Corporation; James B. Douglas, United Gas Improvement Co.; Frederick L. Hoffman, Prudential Insurance Co.; W. B. Spaulding, St. Louis & San Francisco Railroad Co.

*Representative of committee on standard schedules, American Association for Labor Legislation.*—Dr. John B. Andrews.

*Representatives of Workmen's Compensation Service Bureau, insurance companies, and employers.*—Albert W. Whitney, C. E. Scattergood, C. M. Hanson, Workmen's Compensation Service Bureau, New York City; E. G. Trimble, Employers' Indemnity Corporation, Kansas City, Mo.; Louis I. Dublin, Metropolitan Life Insurance Co.; Dudley R. Kennedy, Youngstown Sheet and Tube Co., Youngstown, Ohio; George T. Fonda, Bethlehem Steel Co.; R. C. Richards, Chicago & North Western Railway Co.; Dr. D. Z. Dunott, Western Maryland Railway Co.

4. *Accident report forms.*—The form of report adopted to be recommended for first reports of accidents is as follows:

## STANDARD SCHEDULE FOR ACCIDENT REPORTS.

## FIRST REPORT OF ACCIDENT TO EMPLOYEE.

[To be filled out and sent in within 7 days of the accident.]

---

1. Employer, place, and time.

a. Employer's name .....

b. Office address: Street and No. ....; City or village.....

c. Business (goods produced, work done, or kind of trade or transportation).....

d. Location of plant or place of work where accident occurred, if not at office address: Street and No.....; City or village.....

e. Date on which accident occurred.....

f. Hour of day.....; g. Hour injured person began work that day.....

---

2. Injured person.

a. Name.....; Address.....

b. Sex.....; c. Age....; d. Single, married, widowed, or divorced....

e. Number of children under 18 years.....

f. Speak English? .....; If not, what language?.....

g. Occupation when injured.....; In what department or branch of work? .....; Was this regular occupation? .....

h. Length of experience both here and elsewhere in occupation followed when injured.....

i. Piece or time worker? ....; j. Wages, or average earnings, per day.....

k. Working hours per day....; l. Working days per week.....

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3. Cause.

a. Name of machine, tool, or appliance in connection with which accident occurred.....; By what kind of power driven? .....

Hand feed or mechanical feed? .....; Part on which accident occurred.....

b. Describe in full how accident happened.....

.....

.....

---

4. Nature and extent of injury.

a. State exactly part of person injured and nature of injury.....

b. Did injury cause loss of any member or part of a member? If so, describe exactly.....

c. Attending physician or hospital where sent: Name and address.....

d. Has injured person returned to work? .....; If so, give date and hour.....

---

Date of report.....; Made out by.....

5. *Average number of men.*—(a) The basis used for the average number of men should be the actual number of man-hours for the year; that is, the total working time for all employees of the establishment or the department for the year reduced to the number of hours required for one man to do the same work. This should be taken from exact records if such records are in existence. (b) If this exact informa-

tion is not available in this form in the records, then an approximation should be computed by taking the number of men at work (or enrolled) on a certain day of each month in the year, and the average of these numbers multiplied by the number of hours worked by the establishment for the year would be the number of man-hours measuring the exposure to risk for the year.

6. *Computation of rate of accidents.*—Accident rates should be expressed in terms of number of accidents per 1,000 full-time workers; that is, workers employed 300 days of 10 hours each. (This is in accordance with the practice of Germany, Austria, and a number of other European countries, and also in accordance with the recommendations of a joint committee of the permanent international committee on social insurance and the international institute of statistics.)

7. *Classification of causes of accidents.*—The chair shall appoint a committee on the classification of causes of accidents, the committee to meet not later than early in December and to submit its report to a later meeting of the conference.

8. *Classification of nature and extent of injury.*—The chair shall appoint a committee on the classification of the nature and extent of injury, the committee to meet not later than early in December and to submit its report to a later meeting of the conference.

The foregoing results must be considered a decided step in advance in the direction of efficient and trustworthy industrial accident reporting, tabulation, and analysis. The points of difference between the final blank as adopted by the conference and the earlier form recommended by the American Association for Labor Legislation must be considered a satisfactory compromise in the direction of harmonizing conflicting points of view in matters of theory and practice. The chaotic condition of existing requirements as to accident reporting in the various States is best shown in the form of an analysis prepared by the United States Bureau of Labor Statistics and furnished for the use of the fourth meeting on standardization of accident reports and tabulations, held on October 12 and 13, 1914. The analysis is given in full in Appendixes I and II, Appendix I showing the requirements as to accident reporting in the various States and Appendix II the questions which are asked in the accident report forms of 26 States.

Aside from the technical difficulties affecting the adoption of a standard form of industrial accident reports, there is the additional and even more complex question of strictly scientific yet practically useful methods of accident classification by industries and by causes and nature of injuries sustained.

#### CLASSIFICATION OF INDUSTRIAL ACCIDENTS BY INDUSTRIES.

A uniform classification of accidents by industries is the classification of the first importance for the comparison of accident hazards or costs of compensation. Those classifications which have thus far been used by the various States show a great lack of uniformity. At one extreme we find the list of the Washington compensation act with only 48 classes and at the other the list of the Massachusetts insurance department with nearly 1,300 classes.

The committee appointed according to the action of the Chicago conference has held one meeting and agreed upon a preliminary report, which is being used as the basis of the further studies of the committee. The preliminary report in full is as follows:

**PRELIMINARY REPORT OF COMMITTEE ON STANDARD CLASSIFICATION OF INDUSTRIES, APPOINTED IN ACCORDANCE WITH ACTION OF THE JOINT CONFERENCE ON STANDARDIZATION OF ACCIDENT REPORTS AND TABULATIONS, HELD AT CHICAGO, OCTOBER 12 AND 13, 1914.**

The following committee was appointed by Commissioner Meeker for the purpose of working out a standard classification of industries for use in the tabulation of accident statistics. This committee was authorized by the joint conference on standardization of accident reports and tabulations, held at Chicago, October 12 and 13, 1914:

Mr. E. H. Downey, chairman, chief statistician, Wisconsin Industrial Commission, Madison, Wis.

Mr. F. C. Croxton, chief statistician, the Industrial Commission of Ohio, Columbus, Ohio.

Mr. L. W. Hatch, chief statistician, Bureau of Statistics and Information, Department of Labor, Albany, N. Y.

Mr. W. N. Magoun, Insurance Department of Massachusetts, Boston, Mass.

Dr. Alba M. Edwards, Bureau of the Census, Washington, D. C.

Mr. C. E. Scattergood, chairman statistical committee, Workmen's Compensation Service Bureau, New York City, N. Y.

Mr. W. J. Meyers, statistician, Interstate Commerce Commission, Washington, D. C.

The committee met in New York on December 1 and 2, the following members being present: E. H. Downey, F. C. Croxton, L. W. Hatch, W. N. Magoun, Alba M. Edwards, C. E. Scattergood, W. J. Meyers.

The committee also had the assistance in its discussions of Mr. A. H. Fay, United States Bureau of Mines, and Dr. I. M. Rubinow, Ocean Accident and Guarantee Corporation, New York City.

The classification of industries tentatively agreed upon by the committee is as follows. It was agreed that further work in arranging subclassifications should be carried on by various members of the committee in preparation for a later meeting of the whole committee.

**GENERAL GROUP.**

Numbers assigned  
for Hollerith card.

0000	Agriculture.
1000	Extraction of minerals.
2000	} Manufacturing.
3000	
4000	
5000	Construction.
6000	Transportation and public utilities.
7000	Trade.
8000	Service:
	Domestic.
	Personal.
	Professional.
	Public, n. o. c.
9000	Miscellaneous.

## SUBGROUPS.

(The subgroup lists were not entirely completed.)

## Agriculture:

- General farming.
- Dairy farming.
- Power farming.
- Stock farming.
- Garden or truck farming.
- Operating farm machinery—not by farmer—
  - Threshing.
  - Ensilage cutting.
  - Corn shredding.

## Extraction of minerals:

## Mining—

- Coal mines.
- Open-pit metal mining—
  - Copper.
  - Iron.
  - Lead and zinc.
  - Precious metals.
  - Mining, n. o. c.
- Underground mining—
  - Copper.
  - Iron.
  - Lead and zinc.
  - Precious metals.
  - Mining, n. o. c.
- Auxiliary operations.

## Quarrying:

- Building-stone quarries—
  - Blue stone.
  - Granite.
  - Limestone.
  - Marble.
  - Sandstone.
  - Slate.

## Quarrying and stone crushing.

- Cement rock.
- Road material.
- Clay digging.
- Sand and gravel digging.

## Ore reduction and concentration.

## Manufacturing:

- Stone and earth products.
- Blast furnaces and smelting.
- Rolling mills and steel works.
- Machinery and instruments.
- Metal products.
- Vehicles.
- Woodworking.
- Leather, and manufactures of.
- Rubber and composition goods.
- Chemicals and allied products.

## Manufacturing—Concluded.

- Paper, and manufactures of.
- Printing, publishing.
- Textiles.
- Clothing and furnishings.
- Food, beverages, and tobacco.
- Miscellaneous manufacturing.

## Construction:

- Clearing, and wrecking and moving.
- Grading, excavating, and foundation work—
  - Road making.
  - Tunneling.
- Erecting—
  - Bridge.
  - Track laying
- Finishing and equipping—
  - Plastering.
  - Plumbing.
  - Installing elevators, furnaces, boilers.
  - Tile laying, houses, tunnels, etc.

## Transportation and public utilities:

- Steam railroads.
- Electric railroads.
- Cartage and storage.
  - Livery stables.
- Grain elevators.
- Stockyards.
- Transportation by water—
  - Steamships.
  - Sailing vessels.
  - Barges, lighters, and canal boats.
  - Stevedoring.
- Electric light and power.
- Telegraph and telephone.
- Natural gas.
- Gas works.
- Pipe lines.
- Waterworks.
- Miscellaneous—
  - Central heating plants.
  - Garbage disposal.
  - Sewage disposal.

## Trade:

- Offices.
- Salesrooms.
- Yards.

## Service:

- Domestic—
  - Maintenance.
- Personal—
  - Amusements.
- Professional.
- Public, n. o. c.

## CLASSIFICATION OF INDUSTRIAL ACCIDENTS BY CAUSES.

A classification of accidents by causes involves unusual difficulties, and in the absence of a satisfactory basis for preliminary consideration, the adoption of a resolution providing for the appointment of a special committee to consider the subject was evidently called for.

The industrial accident classification of any given State must necessarily fall short of the degree of completeness required for the United States as a whole. The limitations of any State classification are inherent in that many industries important to other sections may not be carried on at all, or to only a limited extent. In the present state of imperfect development of workmen's compensation administration and State control of industry for the specific purpose of preventing accidents much may be learned by the study of local practice in conformity to local conditions. In the classification of the causes of industrial accidents in the State of Wisconsin an effort has been made to bring together causes or conditions giving rise to accidents which seem naturally to belong together. To permit of a convenient extension or enlargement of the plan adopted, a decimal numbering system was employed, so that, for illustration, all numbers up to 400 refer to machine accidents, although as yet not all of these numbers are actually assigned. The difficulty of cross classification has been avoided by the omission of all reference to fault, as, for example, intoxication, illness, improper clothing, etc. Railway accidents are omitted in the Wisconsin classification, since they do not come within the scope of the Wisconsin compensation act. The classification of causes, it is frankly conceded, is also rather weak with respect to mines, since the mining industry in the State of Wisconsin is of rather limited extent, consisting chiefly of shallow lead and zinc mines and open-pit iron mines.

As an aid to the more convenient study of this important aspect of industrial accident statistics the accident classifications, by causes, of Wisconsin and Ohio, together with those of the compulsory insurance institutions of Austria and Germany, are given in full in Appendixes III to VI. The translation of the foreign classifications was provided by the United States Bureau of Labor Statistics for the use of the Chicago conference on standardization of accident reports and tabulations. All these classifications are in actual use and the details of the same should, therefore, prove of considerable practical interest in the required scientific study of the industrial accident problem.

PRELIMINARY REPORT OF COMMITTEE ON STANDARD CLASSIFICATION OF CAUSES OF ACCIDENTS, APPOINTED IN ACCORDANCE WITH ACTION OF THE JOINT CONFERENCE ON STANDARDIZATION OF ACCIDENT REPORTS AND TABULATIONS, HELD AT CHICAGO, OCTOBER 12 AND 13, 1914.

The following committee was appointed by Commissioner Meeker for the purpose of devising a standard form for the classification of the causes of accidents. This committee was authorized at the Chicago meeting of the conference on the standardization of accident reports and tabulations called by Commissioner Meeker. At that meeting there was not sufficient time to discuss this feature of the work, and upon motion of Dr. Hoffman, of the Prudential Insurance Co., the chairman of the meeting was authorized to appoint a committee to meet at a future date to consider the question of the standardization of a form to cover causes of accidents. Commissioner Meeker therefore appointed the following members as committeemen:

L. W. Hatch, chairman, chief statistician, Bureau of Statistics and Information, Department of Labor, Albany, N. Y.

Mr. F. C. Croxton, chief statistician, the Industrial Commission of Ohio, Columbus, Ohio.

Mr. E. H. Downey, chief statistician, Wisconsin Industrial Commission, Madison, Wis.

Mr. A. R. Houck, chief, Bureau of Statistics, Department of Labor and Industry, Harrisburg, Pa.

Robert E. Grandfield, secretary, Industrial Accident Board, Boston, Mass.

Mr. A. H. Fay, mining engineer, United States Bureau of Mines, Washington, D. C.

Mr. C. E. Scattergood, chairman, statistical committee, Workmen's Compensation Service Bureau, New York, N. Y.

Mr. C. L. Close, member of the Committee on Standard Forms for Accident Reporting of the National Council for Industrial Safety, New York, N. Y.

Mr. W. J. Meyers, statistician, Interstate Commerce Commission, Washington, D. C.

The committee met on December 1, at the rooms of the committee on organization of the ninth international congress on social insurance in the Russell Sage Foundation Building, 130 East Twenty-second Street, New York City. The following members were present: L. W. Hatch, chairman; F. C. Croxton, E. H. Downey, A. R. Houck, A. H. Fay, I. M. Rubinow, representing C. E. Scattergood; W. N. Magoun, Robert E. Grandfield, C. L. Close, and W. J. Meyers.

The meeting was called to order by Chairman Hatch, and after a brief informal discussion, it was decided to prepare a list of causes in which the principal grouping should be small, not to exceed 10, and that this should be followed by subgroups under each division. Mr. Downey proposed the question, What shall be considered a primary cause of accident? This was answered by adopting the following definition: "That the accident should be charged to that condition or circumstance the absence of which would have prevented the accident; but if there be more than one such condition or circumstance, then to the one most easily prevented."

After three sessions of formal and informal discussion, the accompanying form showing causes of accidents was adopted.

With reference to railway accidents the committee recommended the adoption of the form used by the Interstate Commerce Commission.

With reference to mining accidents Mr. Hatch suggested that the United States Bureau of Mines' form be adopted, but as no agreement could be decided upon the matter was left in abeyance for future consideration.

Classification of accidents, by causes.

	Manner of occurrence of machine accident.									
	Ad-justing ma-chine or work.	Start-ing.	Oper-ating and feed-ing.	Stop-ping.	Oil-ing.	Clean-ing.	Re-pair-ing.	Break-ing of ma-chine or work.	Fly-ing ob-jects.	All others.
	1	2	3	4	5	6	7	8	9	10
I. Machinery:										
(a) Boilers and steam pipes.....										
(b) Prime movers (engines and motors).....										
(c) Transmission apparatus.....										
(d) Working machinery—(Name, class, or type of machine to be inserted here).....										
(e) Hoisting apparatus and conveyers.....										
(f) Miscellaneous.....										

II. Explosives, electricity, fires, hot and corrosive substances:

- (a) Corrosive substances.
- (b) Electricity.
- (c) Explosives.
- (d) Hot substances and flames.
- (e) Conflagrations.

III. Falling objects:

- (a) Rock, earth, etc.
- (b) Collapse of building and walls.
- (c) Collapse of scaffold and staging.
- (d) Stored or piled-up material.
- (e) Objects dropped by other persons.
- (f) Objects falling from trucks or vehicles, not loading or unloading.
- (g) Objects falling from buildings, trestles, or scaffold.
- (h) All others.

IV. Falls of persons:

- (a) From ladders.
- (b) From scaffolds and platforms.
- (c) From vehicles (trucks, wagons, cars, etc.).
- (d) From structures in course of erection.
- (e) From structures (all others).
- (f) From other elevations.
- (g) Into excavations.
- (h) Into other openings.
- (i) On level.
- (j) All others.

## V. Handling of tools and objects:

- (a) Hand tools in hands of injured person.
- (b) Hand tools in hands of fellow workman.
- (c) Handling sharp objects.
- (d) Loading and unloading.
- (e) Carrying and lifting heavy objects (not loading or unloading).
- (f) All other objects.

## VI. Power vehicles:

- (a) Operated on tracks (or cables).
- (b) Not operated on tracks.
- (c) Operated on water.

## VII. Stepping on sharp objects:

- (a) On nails.
- (b) All others.

## VIII. Running into or striking against objects.

## IX. Poisonous substances.

## X. Miscellaneous:

- (a) Flying objects, not from machines, tools, or explosives.
- (b) Animals.
- (c) Doors, windows, gates (exclusive of elevator gates).
- (d) Asphyxiation and suffocation.
- (e) Lightning.
- (f) Heat prostration.
- (g) Frostbites.
- (h) Drowning.
- (i) Intentional violence.
- (j) All others.

**CLASSIFICATION OF INDUSTRIAL ACCIDENTS BY NATURE OF INJURY.**

The scientific classification of industrial accidents according to the nature, extent, and location of injuries, requires to be made with a due regard to medical and economic considerations. The standard accident blank calls for information as to the exact part of the person injured and the nature of the injury, but neither of these two requirements is specifically limited and defined. Bodily injuries are most conveniently classified in conformity to the anatomical basis, but thus far no generally accepted plan has been agreed upon.

On the occasion of an exhibit made by the Prudential Insurance Co., at the First International Exposition of Safety and Sanitation, held in the city of New York in 1913, four charts of industrial accidents according to the nature of the injury were shown, on the principle of an anatomical basis, briefly described as follows:

Four general groups were adopted: (1) Accidents to the head and face; (2) accidents to the upper extremities; (3) accidents to the trunk; and (4) accidents to the lower extremities. The first group—accidents to the head and face—was subdivided into accidents to the head, the face, the eyes, and the nose; the second group—

accidents to the upper extremities—was subdivided into accidents to the shoulder, the arm, the wrist, the hands, and the fingers; the third group—accidents to the trunk—was subdivided into accidents to the collar bone, the ribs, the trunk, and internal injuries; and the fourth group—accidents, to the lower extremities—was subdivided into accidents to the hip, the leg, the knee, the ankle, the feet and the toes. Aside from the foregoing four groups, a fifth subgroup was found necessary for “Other and not specified” accidents, including multiple injuries not admitting of being specifically assigned to any one of the subgroups. The problem of classification in the case of multiple injuries is exactly the same as the proper assignment of a primary cause of death in cases where collateral or contributory causes are given equal importance. The Prudential classification included anthracite and bituminous coal miners of Pennsylvania, 1907–1911; the railway service, New Jersey, 1888–1911; iron mining and lumbering, Minnesota, 1910–1912; and United States Government employees, compensation experience, 1908–1911. The details of these occupations are given in four tables of Appendix VII.

For general purposes this classification of the nature of injuries would seem suitable and sufficient. For the more exacting requirements of workmen’s compensation experience, however, a much more detailed classification is not only essential but, for other reasons, desirable. The Prudential classification was primarily for exhibition purposes to visualize in a convenient form the salient facts of the problem of nonfatal industrial accidents. The wide degree of variation in the nature of injuries sustained is well brought out by the classification referred to. For illustration, injuries to the head constituted 5.3 per cent of the total number of nonfatal injuries to anthracite coal miners; 3.9 per cent to bituminous coal miners; 7.9 per cent to railway brakemen; 14.7 per cent to locomotive firemen; 11 per cent to men employed in iron mining; 9.5 per cent to men employed in the lumbering and woodworking industries; 6.7 per cent to the employees of the Isthmian Canal Commission; and 5.8 per cent to employees of other United States Government departments.

The corresponding percentages for injuries to the eyes were as follows: Anthracite coal miners, 1 per cent; bituminous coal miners, 0.9 per cent; railway brakemen, 0.3 per cent; locomotive firemen, 2.6 per cent; iron mining, 9.9 per cent; lumbering and woodworking, 6.2 per cent; Isthmian Canal Commission employees, 6.5 per cent; and employees of other United States Government departments, 5 per cent. For other details the tables should be consulted.

The economic importance of a scientific and thoroughly comprehensive classification of industrial accidents, according to the nature of the injury sustained, is clearly brought out by the actual experience under workmen's compensation law. The nature of the injury in the case of many accidents is practically the equivalent of the degree of seriousness, both physical and economic. The classification previously referred to, however, leaves out of consideration the loss of a member, or multiple injuries and occupational diseases. As an illustration of a more precise method of classification the following analysis of the Federal workmen's compensation experience, for the fiscal year 1910-11, will prove of interest:

ACCIDENTS ACCORDING TO THE NATURE OF THE INJURY, FEDERAL WORKMEN'S COMPENSATION EXPERIENCE, 1910-11.

Nature of injury.	Number of injuries.	Per cent of total.
<b>Upper extremities:</b>		
Loss of right arm.....	6	0.1
Loss of either arm, not specified.....	2	( <sup>1</sup> )
Fracture of arm or forearm.....	50	1.0
Other injuries to either arm or forearm.....	277	3.0
Loss of right hand.....	3	( <sup>1</sup> )
Loss of either hand, not specified.....	1	( <sup>1</sup> )
Fracture of bones of hand.....	46	.5
Other injuries to hand.....	723	7.7
Loss of one finger, right hand.....	47	.5
Loss of one finger, left hand.....	33	.4
Loss of more than one finger, right hand.....	14	.1
Loss of more than one finger, left hand.....	14	.1
Loss of finger or fingers, both hands or either hand, not specified.....	5	.1
Fracture of fingers.....	200	2.1
All other injuries to fingers.....	1,268	13.5
All other injuries, upper extremities.....	40	.4
Total.....	2,769	29.5
<b>Lower extremities:</b>		
Loss of either leg.....	23	.3
Loss of both legs.....	8	.1
Fracture of either thigh.....	17	.2
Fracture of either leg.....	123	1.3
Fracture of both thighs or legs.....	1	( <sup>1</sup> )
Other injuries to thigh or leg.....	899	9.6
Loss of foot.....	7	.1
Fracture of bones of foot.....	163	1.7
Other injuries to foot.....	1,792	19.1
Loss of toe or toes.....	21	.2
All other injuries, lower extremities.....	54	.6
Total.....	3,110	33.2
<b>Injuries affecting both upper and lower extremities:</b>		
Including fractures.....	4	( <sup>1</sup> )
All other injuries to the extremities.....	47	.5
Total.....	51	.5
<b>Trunk:</b>		
Fracture of rib.....	90	1.0
Other chest injuries.....	114	1.2
Injuries to back.....	365	3.9
Hernias.....	187	2.0
Other abdominal injuries.....	34	.4
All other injuries to trunk.....	444	4.7
Total.....	1,234	13.2

<sup>1</sup> Less than one-tenth of 1 per cent.

ACCIDENTS ACCORDING TO THE NATURE OF THE INJURY, FEDERAL WORKMEN'S  
COMPENSATION EXPERIENCE, 1910-11—Concluded.

Nature of injury.	Number of injuries.	Per cent of total.
<b>Eyes:</b>		
Loss of either eye.....	16	0.2
Other injuries to either eye.....	516	5.5
Other injuries to both eyes.....	49	.5
Total.....	581	6.2
<b>Head:</b>		
Fracture of skull.....	52	.5
Fracture of other bones.....	6	.1
Concussion of brain without fracture.....	7	.1
All other injuries.....	541	5.8
Total.....	606	6.5
<b>Neck:</b>		
All injuries.....	16	.2
<b>Miscellaneous:</b>		
Internal injuries.....	31	.3
Poisoning.....	10	.1
All other (including multiple injuries).....	784	8.4
Not reported.....	180	2.0
Total.....	1,014	10.8
Grand total.....	9,381	100.0

The classification used in this table has been rearranged for the two separate groups of Isthmian Canal employees, and other Federal employees, in Table D of Appendix VII, represented by one of the charts of the Prudential exhibit on the occasion of the First International Exposition of Safety and Sanitation. The more logical arrangement of the injuries, according to a strict anatomical basis, facilitates the study of the subject. The method used in the report on compensation for injuries to employees of the United States, as published in Bulletin No. 155 of the Bureau of Labor Statistics, would seem to be less satisfactory except for the elaborate details.

It may prove useful in this connection to consider briefly the methods of accident tabulation, according to the nature of the injury, in the reports of the chief inspector of factories and workshops for the United Kingdom. The statistical data have been consolidated for the period 1908 to 1913 in order to avoid the irregularities which occur in the distribution of the smaller numbers of a single year. The table following exhibits the details of 243,245 accidents to males and 40,792 accidents to females, according to the degree and the nature of the injury sustained.

## ACCIDENTS, ACCORDING TO DEGREE AND NATURE OF INJURY, REPORTED TO CERTIFYING SURGEONS, UNITED KINGDOM, 1908 TO 1913.

## All Ages.

Degree of accidental injury.	Accidents to—			
	Males.		Females.	
	Number.	Per cent.	Number.	Per cent.
Fatal.....	6,671	2.7	148	0.4
Nonfatal:				
Loss of right hand or arm.....	403	.2	64	.2
Loss of left hand or arm.....	373	.2	38	.1
Loss of part of right hand.....	8,337	3.4	1,899	4.6
Loss of part of left hand.....	8,439	3.5	1,463	3.6
Loss of part of leg or foot.....	574	.2	14	( <sup>1</sup> )
Fracture of limbs or bones of trunk.....	5,083	2.1	370	.9
Fracture of hand or foot.....	4,371	1.8	738	1.8
Loss of sight of one or both eyes.....	331	.1	55	.1
Other injury to eyes.....	12,494	5.1	470	1.2
Injuries to head or face.....	15,034	6.2	2,659	6.5
Burns or scalds.....	38,020	15.6	2,791	6.8
Other injuries.....	143,115	58.9	30,083	73.8
Total, nonfatal.....	236,574	97.3	40,644	99.6
Total, fatal and nonfatal.....	243,245	100.0	40,792	100.0

<sup>1</sup> Less than one-tenth of 1 per cent.

In this table the data have been classified and enumerated irrespective of age; but in order to facilitate the study of these interesting statistics the same data have been arranged in the three following tables according to age groups.

In the first table which follows, the data are for children 12 and under 14 years, working half-time.

## ACCIDENTS, ACCORDING TO DEGREE AND NATURE OF INJURY, REPORTED TO CERTIFYING SURGEONS, UNITED KINGDOM, 1908 TO 1913.

## Children, ages 12 and under 14 (half-timers).

Degree of accidental injury.	Accidents to—			
	Males.		Females.	
	Number.	Per cent.	Number.	Per cent.
Fatal.....	8	1.0	1	0.3
Nonfatal:				
Loss of right hand or arm.....	2	.3	2	.7
Loss of left hand or arm.....	1	.1	.....	.....
Loss of part of right hand.....	36	4.7	16	5.3
Loss of part of left hand.....	36	4.7	14	4.7
Loss of part of leg or foot.....	1	.1	.....	.....
Fracture of limb or bones of trunk.....	31	4.0	7	2.3
Fracture of hand or foot.....	13	1.7	11	3.7
Loss of sight of one or both eyes.....	.....	.....	1	.3
Other injury to eyes.....	4	.5	1	.3
Injuries to head or face.....	36	4.7	29	9.7
Burns or scalds.....	79	10.0	53	17.6
Other injuries.....	523	68.2	166	55.1
Total, nonfatal.....	767	99.0	300	99.7
Total, fatal and nonfatal.....	775	100.0	301	100.0

In the next table the data relate to young persons, ages 13 and under 18.

## ACCIDENTS, ACCORDING TO DEGREE AND NATURE OF INJURY, REPORTED TO CERTIFYING SURGEONS, UNITED KINGDOM, 1908 TO 1913.

## Young persons, ages 13 and under 18.

Degree of accidental injury.	Accidents to—			
	Males.		Females.	
	Number.	Per cent.	Number.	Per cent.
Fatal.....	512	1.0	55	0.4
Nonfatal:				
Loss of right hand or arm.....	88	.2	22	.1
Loss of left hand or arm.....	82	.2	13	.1
Loss of part of right hand.....	2,201	4.4	794	5.1
Loss of part of left hand.....	1,958	3.9	612	3.9
Loss of part of leg or foot.....	110	.2	9	.1
Fracture of limb or bones of trunk.....	1,038	2.1	136	.9
Fracture of hand or foot.....	826	1.7	268	1.7
Loss of sight of one or both eyes.....	48	.1	12	.1
Other injury to eyes.....	1,652	3.3	103	.7
Injuries to head or face.....	1,686	3.4	724	4.6
Burns or scalds.....	5,908	11.9	1,323	8.5
Other injuries.....	33,704	67.6	11,552	73.8
Total, nonfatal.....	49,301	99.0	15,568	99.6
Total, fatal and nonfatal.....	49,813	100.0	15,623	100.0

And finally in the third table the data are for adults, or persons of ages 18 and over:

## ACCIDENTS, ACCORDING TO DEGREE AND NATURE OF INJURY, REPORTED TO CERTIFYING SURGEONS, UNITED KINGDOM, 1908 TO 1913.

## Adults, ages 18 and over.

Degree of accidental injury.	Accidents to—			
	Males.		Females.	
	Number.	Per cent.	Number.	Per cent.
Fatal.....	6,151	3.2	92	0.4
Nonfatal:				
Loss of right hand or arm.....	313	.2	40	.2
Loss of left hand or arm.....	290	.2	25	.1
Loss of part of right hand.....	6,100	3.2	1,089	4.4
Loss of part of left hand.....	6,445	3.4	837	3.4
Loss of part of leg or foot.....	463	.2	5	( <sup>1</sup> )
Fracture of limbs or bones of trunk.....	4,014	2.0	227	.9
Fracture of hand or foot.....	3,532	1.8	459	1.8
Loss of sight of one or both eyes.....	283	.1	42	.2
Other injury to eyes.....	10,838	5.6	366	1.5
Injuries to head or face.....	13,312	6.9	1,906	7.7
Burns or scalds.....	32,033	16.7	1,415	5.7
Other injuries.....	108,883	56.5	18,365	73.7
Total, nonfatal.....	186,506	96.8	24,776	99.6
Total, fatal and nonfatal.....	192,657	100.0	24,868	100.0

<sup>1</sup> Less than one-tenth of 1 per cent.

All of these tables include fatal accidents, which of course modify the resulting percentage of distribution of specific degrees of injury or accidents according to the nature of the injury, as the case may be. The two terms are largely interchangeable or inclusive of each other.

The practical importance of this tabulation is briefly illustrated by the wide variation in the percentage of accidents due to the fracture

of limbs or bones of the trunk. For males at all ages the percentage of such accidents was 2.1; for male children, ages 12 and under 14, the proportion was 4.0 per cent; for young persons, ages 13 and under 18, 2.1 per cent; and for adults, ages 18 and over, 2.0 per cent. Another illustration is burns or scalds, which for males constitute 15.6 per cent of the accidents at all ages; 10.0 per cent for children, ages 12 and under 14; 11.9 per cent for young persons, ages 13 and under 18; and 16.7 per cent for adults, ages 18 and over.

The tables bring out the serious limitations of a general classification combining the degree of injury and the nature of the injury. It requires to be said in this connection that the tables condense the more elaborate details given in the original reports. The classification in full is contained in the annual reports of the chief inspector of factories and workshops.

No matter how important a phase of the industrial accident problem, it would not be feasible to consider in a brief discussion all the numerous variations in methods met with in official accident reports. One of the best classifications of accidents, according to the nature of the injury, is that of Austria, of which a translation was provided by the Bureau of Labor Statistics for the use of the conference on standardization of accident reports and tabulations. This classification, consisting of 110 classes, is given in full in Appendix VIII.

The official German classification is more condensed and arranged upon a fundamentally different principle. This classification is also derived from a translation by the Bureau of Labor Statistics provided for the use of the conference on standardization of accident reports and tabulations and given in full below:

**Official classification (24 classes) of industrial accidents according to the nature of the injury, made use of in the reports of the Imperial Insurance Office of Germany.<sup>1</sup>**

#### I. *Burns and scalds.*

1. Several parts of the body at the same time and the whole body.
2. Individual parts of the body (arms, legs, head, etc.), excluding eye injuries.
3. Injuries to the eyes.

#### II. *Wounds, contusions, fractures, etc.*

##### (a) *Arms.*

4. Right arm (or right hand).
5. Left arm (or left hand).
6. Both arms (or both hands).

##### (b) *Legs.*

7. Right leg (or right foot).
8. Left leg (or left foot).
9. Both legs (or both feet).

<sup>1</sup> Amtliche Nachrichten des Reichsversicherungsamts. 1910. I. Beiheft. Part 1. Gewerbeunfallstatistik 1907. pp. 310 ff.

*(c) Neck and head.*

10. Head and neck, excluding injuries to the eyes.
11. Injuries to the eyes.

*(d) Trunk.*

12. Chest.
13. Back.
14. Shoulders.
15. Ribs.
16. Pelvis (hips).
17. Hernia.
18. Other and several injuries to the trunk.
19. *(c)* Several parts of the body (*a-d*) at the same time.
20. *(f)* Injuries to the whole body.
21. III. Injuries through frostbite and various other injuries.
22. IV. Suffocation.
23. V. Drowning.
24. VI. Other fatal injuries (freezing, lightning, heat stroke, etc.).

What is required is a precise differentiation of the facts according to the objective nature of the bodily injuries sustained in consequence of industrial accidents, and the degree of the injury sustained, as measured by resulting incapacity for work, according to its length. These two elements must not be confused with the cause or the manner of the injury, as is frequently the case. The term nature of injury should be strictly limited to the character of the bodily damage done to the person injured, or rather the descriptive record of the part or organ of the body injured. Such a classification, in other words, should be strictly in conformity to an anatomical nomenclature, and in the order of logical sequence the arrangement of the facts should begin with the skull and end with the feet. As yet no country, State, or insurance organization has adopted such a classification, which for many reasons would prove extremely convenient and practically useful. In the German classification the first group of accidents resulting in wounds, contusions, fractures, etc., is for arms, divided properly according to whether the right arm or hand, the left arm or hand, or both arms or both hands. This is followed by legs, the neck and head combined, the trunk, and finally, multiple injuries and injuries to the whole body. Where the line for the different organs or parts should be drawn remains a matter for special inquiry and compromise agreement. In this respect it would seem best that the medical judgment should control. Any standard work on anatomy and osteology would readily provide a basis for precise delineation.<sup>1</sup>

<sup>1</sup> As an aid to the necessarily precise differentiation, the treatise by L. Bathe Rawling, on "Landmarks and surface markings of the human body," may be referred to. This work is divided into five groups: (1) The head and neck, (2) the upper extremity, (3) the thorax, (4) the abdomen, and (5) the lower extremity. In the Prudential classification of industrial accidents according to the nature of the injuries, the thorax and the abdomen have been combined into one group. Gray's Anatomy may be referred to as a standard work of reference which will meet all reasonable requirements.

At the present time no accident classification according to the nature of the injury, or, more accurately, the part of the body injured, conforms to strictly scientific requirements. The proposed nature-of-injury code suggested by the Workmen's Compensation Service Bureau of New York fails partly in this respect. The code, as far as completed, is given in Appendix IX. The injuries are arranged as follows:

1. Injuries to the arm or arms.
2. Injuries to the hand or hands.
3. Injuries to the thumbs or fingers.
4. Fractures of thumbs or fingers.
5. Injury to foot or leg.
6. Injury to eye.
7. Injury to head.

These specific groups are followed by a number of special groups, evidently without reference to a definite anatomical or other scientific plan. Commencing with No. 251 of the code, the first two items are, deafness in one ear or both, followed by injury to one ear or both, injury to the shoulder (including the arm), fracture of the shoulder blade or scapula, fracture of the collar bone, fracture of the sternum or breast bone, fracture of the ribs, etc. No such classification can be considered satisfactory for general purposes. The practical value of the Workmen's Compensation Service Bureau classification is to be found in connection with the solution of administrative questions in workmen's compensation law. The details of injuries have been worked out quite elaborately, so much so that there is a serious risk of overclassification. This is best illustrated, perhaps, by the following list of accidents resulting in stiffness of the first joint of the thumb and fingers included in Nos. 136-150 of the classification as given in full in the appendix, but reproduced in part below:

**Classification of accidents resulting in stiffness of the first joint of the thumb and fingers, according to the Workmen's Compensation Service Bureau of New York.**

136. Stiffness of the first joint of the thumb, left hand.
137. Stiffness of the first joint of the thumb, right hand.
138. Stiffness of the first joint of the thumb, both hands.
139. Stiffness of the first joint of the first finger, left hand.
140. Stiffness of the first joint of the first finger, right hand.
141. Stiffness of the first joint of the first finger, both hands.
142. Stiffness of the first joint of the second finger, left hand.
143. Stiffness of the first joint of the second finger, right hand.
144. Stiffness of the first joint of the second finger, both hands.
145. Stiffness of the first joint of the third finger, left hand.
146. Stiffness of the first joint of the third finger, right hand.
147. Stiffness of the first joint of the third finger, both hands.
148. Stiffness of the first joint of the fourth finger, left hand.
149. Stiffness of the first joint of the fourth finger, right hand.
150. Stiffness of the first joint of the fourth finger, both hands.

It is questionable whether such an elaboration in matters of minute detail can be made to serve a practical purpose. A truly enormous experience would be necessary to determine the true law of average for so large a number of individual units, each of which would be subject to a considerable variation in regard to the true nature of the physical injury sustained and its relation to the degree of resulting incapacity for work.

Perhaps the most elaborate attempt which has thus far been made, and which more than any other conforms to the fundamental principles of an anatomical classification, is the one adopted by the Industrial Accident Commission of California. In this classification there are 21 general groups, as follows:

**Classification of accidents according to the nature of the injury, adopted by the Industrial Accident Commission of California.**

- I. The skull.
- II. The eyes.
- III. The ears.
- IV. The face.
- V. The neck.
- VI. The chest.
- VII. Shoulders and arms.
- VIII. Hands.
- IX. Thumb.
- X. Index finger.
- XI. Middle and ring fingers.
- XII. Little finger.
- XIII. Thumb and index finger.
- XIV. Thumb, index, and middle fingers.
- XV. Thumb and all the fingers.
- XVI. All the fingers not including thumb.
- XVII. Different fingers on both hands.
- XVIII. The spine.
- XIX. The abdomen.
- XX. The pelvis.
- XXI. The lower extremities.

The details of this classification are given in full in Appendix X, together with the disability number. It is explained in the introductory text of the classification that "I refers to the group of disabilities resulting from injury to the skull. These group numbers start with the skull and end with the toes. Under each group the various degrees of disability are designated by Arabic numerals. The whole of the disability number is therefore composed of a group number and an injury number; that is, of a Roman and an Arabic numeral." It is further pointed out in the text that the list of disabilities given is not intended to be complete. Some disabilities are of such varying degrees that it has become necessary to introduce three ratings, to fit the degrees of slight, moderate, and severe. This

makes the rating of the injury indefinite unless a physician is consulted. The same applies to the nature of the injury, which, as a rule, can not be precisely determined except on the basis of a medical report.

The California classification involves serious difficulties. While on an anatomical basis, it is largely medical as regards the nature of the injury sustained. In other words, it is a combined classification of accidents according to the part of the body injured and the medical character of the injury sustained. From a workmen's compensation point of view such a classification has practical advantages. The classification clearly shows the location of the injury and its pathological consequences. An injury to the skull may result in insanity or paralysis. An injury to an eye may result in the complete loss of both eyes, or such a permanent impairment of the vision of one eye as to render it useless for purposes of high visual requirements, but not affecting one's ability to find one's way, since the other eye remains uninjured. An injury to the neck may require the constant wearing of a tracheal tube, or cause loss of speech due to injury to the vocal organs. It is self-evident that such a classification can not be theoretically perfected, but must depend upon actual experience for its completion. It is further evident that the California classification proceeds upon a fundamentally different assumption from the classification adopted by the Workmen's Compensation Service Bureau of New York. In actual administration it will be found that the California plan involves more serious difficulties, since the pathological consequences of the injury will in each and every case require to be determined by a qualified physician and even by a medical specialist. As a matter of convenience, the classification of the Workmen's Compensation Service Bureau is more in conformity to the text of the majority of our workmen's compensation laws. Indeed the fundamental question is the mechanical nature of the injury rather than its pathological character. Of course, most of the injuries which require consideration are those to the hands and feet, the arms and legs, and the eyes, where the consequences or the degree of impairment are determinable physically rather than pathologically, and the schedule of compensation for specific injuries is generally adapted to such a situation. At the present time it can not be said that a definite principle of action has been evolved, and for this reason the information here brought together from different sources should prove practically useful.

The schedule for rating permanent disabilities under the Workmen's Compensation, Insurance, and Safety Act of California, which became effective on January 1, 1914, as published by the Industrial Accident Commission, must be considered one of the most important contributions to the scientific study of the accident problem from an

American point of view. In the introduction to the tables published for rating permanent disability it is suggested as a first requirement that, in case of an accident, as soon as possible the following facts are to be determined: (1) The nature of the physical injury or disfigurement, (2) the occupation of the injured person, (3) the age of the injured person, and (4) the average weekly wage of the injured person. After having determined the nature of the physical injury or disfigurement, Table I of the schedule<sup>1</sup> (Appendix X) must be consulted for the determination of the proper line to be read for each injury and disfigurement, in order to determine the proper line to be consulted in taking the item of age into consideration. This reference can not be fully understood without the elaborate tables printed in the official report, which briefly serve as a guide to the determining of the percentage of wages to be allowed in the fixing of the pension for permanent disabilities.

The line thus determined remains fixed for each occupation, of which a large number are given in detail in alphabetical order, showing, respectively, (1) the specific occupation, and (2) the industry. As an illustration of the use of this classification the following is quoted from the report:

*Case I:*

Nature of physical injury or disfigurement: Loss of major arm at shoulder joint.

Occupation: Laborer.

Age: 28 years, 9 months.

Wage: \$15 per week.

- (1) Table I shows that the correct *line* to be read for the given injury is line 56.
- (2) Table II shows that the correct *table* to read line 56 in is Table A.
- (3) Table A shows that the correct *entry* corresponding to the nearest enumerated age and the proper line is 57:2.
- (4) Applying the general rules for determining the duration and amount of compensation for the given *entry*, we find that the injured person is entitled to 65 per cent of his wages (\$9.75 per week) for 230 weeks.

It would not be feasible to explain further this seemingly rather complex, but actually not very involved, method of computing the exact compensation payable for specified accidents according to the nature of the injury sustained. It may be proper, however, to point out in this connection that the California law provides a limit to the compensation at 65 per cent of the wages for one week must not exceed \$20.83 nor be less than \$4.17; and in the case of pension payments, the percentage of weekly wages requires to be taken on not more than \$30.05 nor less than \$6.41 as the full wages for one week.

<sup>1</sup> Copies of this publication can be had free of charge on application to the Industrial Accident Commission of California, San Francisco, Cal.

**APPENDIX I.—REQUIREMENTS AS TO ACCIDENT REPORTING IN THE VARIOUS STATES.**

State and office receiving report.	What accidents are required to be reported.	When reports are required to be made.	
		First.	Others.
California: Industrial Accident Commission.	Every industrial accident which disables a man through the day of injury or requires the attention of a physician. If not disabled, but requires the attention of some one skilled in the art of surgery or medicine.	Within 7 days.....	First supplemental report within 30 days, then supplemental reports every 60 days till disability ends.
Colorado: Bureau of Metal Mines, and Bureau of Coal Mines.	Metal mines, accidents serious enough in character to cause the injured party to stop work for 2 consecutive days. Coal mines, fatal accidents and nonfatal accidents resulting in disability of 5 days or more.	Metal mines, immediately. Coal mines, fatal accidents, immediately; nonfatal accidents in monthly reports.	
Connecticut: Compensation commissioner in district in which accident occurred.	Such injuries as result in incapacity for 1 day or more.	Each week to commissioner, and by him to the factory inspector once in 3 months.	
Illinois: Industrial Board.	All fatal accidents and all other accidents which entail a loss to the employee of more than 1 week's time.	Fatal accidents, immediately; other accidents between 15th and 25th of each month.	Further report in case of permanent disability.
Indiana: State Bureau of Inspection.	All accidents or injuries, required by law. Department requires reports when the accident is of sufficient importance to have caused any loss of time. Also encourage the reporting of slight accidents.	Within 48 hours.....	
Iowa: Iowa Industrial Commissioner and Bureau of Labor.	All accidents except those of domestic service, farm laborers, clerical help, and persons whose employment is of a casual nature.	Within 48 hours.....	
Kansas: Department of Labor and Industry.	All accidents sufficiently serious to cause the loss of more than 1 day's time.	Immediate report within 24 hours.	Report of fatal accidents as soon after death as possible. Report of nonfatal accidents when injured employee returns to work or at the end of 3 months.
Maine: Department of Labor and Industry.	All deaths, accidents, or serious physical injuries (every accident which results in the death of the employee or causes absence from work for at least 6 days).	Within 10 days.....	
Massachusetts: Industrial Accident Board.	All injuries which necessitate any absence from work or require medical attention of any kind.	Within 48 hours.....	Upon termination of disability.
Michigan: Industrial Accident Board.	All accidents which result in disability of more than 1 day. All causing death or involving the loss of a member.	Weekly. In case of death or loss of a member, within 10 days.	One month after first report. Final report at death or the termination of disability.
Commissioner of Labor.	All accidents whether slight or serious, at the end of each month.		

REQUIREMENTS AS TO ACCIDENT REPORTING IN THE VARIOUS STATES—Concluded.

State and office receiving report.	What accidents are required to be reported.	When reports are required to be made.	
		First.	Others.
Minnesota: Commissioner of Labor of Department of Labor and Industries.	Any accident which causes death or serious injury and all other accidents. Letter says: A reportable accident is one which disables an employee for 1 week or which causes permanent injury, such as the loss of the end of a finger.	Accidents which cause death or serious injury within 48 hours; all other accidents within 14 days.	
Missouri: Bureau of Labor Statistics.	All accidents where the services of a physician or surgeon are required.	Annually.....	
Montana.....	Mines: Operator must make and preserve a record of all accidents.	.....	
Nebraska: Bureau of Labor and Industrial Statistics.	All accidents.....	Fatal, within 48 hours. Other accidents within 2 weeks.	
Nevada: Nevada Industrial Commission.	Each case of injury interrupting work for 1 day or longer.	Not later than second day after accident.	At end of 2 weeks.
New Hampshire: Bureau of Labor.	All accidents that incapacitate for a period of 2 weeks or over.	Immediately.....	
New Jersey: Employers' Liability Commission.	Accidents which result in a disability of 2 weeks.	Within 4 weeks; or after the death of such person injured, within 2 weeks.	
New York.....	All accidents.....	Within 10 days; in case of death resulting, within 30 days after death.	
Ohio: Ohio Industrial Commission.	Any injury which requires medical attention or which involves loss of time.	Within 1 week.....	
Oklahoma: Department of Labor.	Each and every accident.....	Immediately.....	
Oregon: State Industrial Accident Commission.	All accidents.....	Within 5 days.....	
Pennsylvania: Division of accident reports of Department of Labor and Industry.	Such accidents as result in a disability continuing 2 days or more.	Fatal and serious, within 24 hours.	
Rhode Island: Factory inspectors.	All fatal accidents and all accidents which prevent the injured from returning to work within 2 days after injury.	All others, at end of month. Fatal, within 48 hours. All others, within 1 week after the expiration of the 2 weeks.	
Texas: Industrial Accident Board.	All injuries, fatal or otherwise.	Within 8 days.....	
Utah: State coal mine inspector.	All accidents occurring in coal mines.	.....	
Virginia: Factory inspector.	All mine accidents.....	Immediately.....	
Washington: Industrial Insurance Commission.	All accidents resulting in a disability of more than 1½ days.	Within 5 days.....	
West Virginia: Public Service Commission.	All personal injuries.....	Promptly.....	
Wisconsin: Industrial Commission.	Each accident which causes a disability of more than 1 week.	8th day after accident..	Supplemental report on 29th day after accident and at end of each 4th week during disability. A final report is also required.

**APPENDIX II.—QUESTIONS ASKED IN ACCIDENT REPORT FORMS OF 26 STATES.**

	Number of States.
1. Name of injured person?.....	26
2. Name and address of the employer?.....	26
3. Exact nature and extent of the accident?.....	26
4. Date—month and day?.....	26
5. Age of injured?.....	24
6. Nature of business or industry?.....	24
7. Address of the injured?.....	23
8. Location of plant of employer?.....	22
9. Hour of day at which accident occurred?.....	21
10. Occupation of the injured?.....	20
11. Sex of the injured?.....	20
12. Wages of the injured?.....	19
13. How did the accident occur?.....	18
14. Name of the machine or part causing accident?.....	17
15. Conjugal condition of the injured?.....	17
16. Probable period of disability?.....	17
17. Attending physicians—names and addresses?.....	17
18. Was the thing causing accident guarded? If not, why not?.....	13
19. What caused the accident?.....	12
20. Has injured person resumed work? If so, on what date?.....	12
21. Where was the injured person sent?.....	12
22. Time or piece worker?.....	12
23. Nationality of the injured?.....	11
24. How long had the injured been in the occupation?.....	10
25. Did the injured person speak English?.....	10
26. Was this regular occupation?.....	10
27. Dependents of the injured?.....	9
28. Suggestions to prevent similar accidents?.....	9
29. If injured did not speak English, then what language?.....	9
30. Loss of time in working-days?.....	7
31. In what department or branch of work?.....	7
32. Working-days per week?.....	7
33. Day of week of accident?.....	5
34. Names and addresses of witnesses of accident?.....	5
35. Was safety device removed?.....	5
36. If not, state regular occupation?.....	5
37. By what kind of power driven?.....	5
38. How long had the injured person been at work with or at the thing causing accident?.....	4
39. Negligence of fellow servant?.....	4
40. If away from plant, state where?.....	4
41. Was accident caused by removal of any safeguard?.....	4
42. Hour at which injured employee commenced work on day of injury?.....	4
43. Hand feed or mechanical feed?.....	4
44. Describe guard or safety device?.....	3

	Number of States.
45. Did the accident cause permanent total disability?.....	3
46. Did the accident cause permanent partial disability?.....	3
47. Has any accident occurred under similar circumstances, at same place, or with same apparatus?.....	3
48. Medical and surgical attention since accident?.....	3
49. Did accident happen on the premises?.....	3
50. Was workman in course of employment at time of injury?.....	3
51. Engaged in construction, operation, or repair?.....	3
52. What statement, if any, has injured person made?.....	3
53. Responsibility: (a) Fault of employer, agent, or machinery admitted; (b) willful misconduct of employee injured; (c) contributory negligence of the injured?.....	2
54. Hours of work on day of accident?.....	2
55. Was accident fatal, serious, severe, or slight?.....	2
56. Did the accident cause temporary disability?.....	2
57. How long was the injured in the establishment?.....	2
58. Have you taken precaution against the repetition of the accident?.....	2
59. In whose service was person who caused accident?.....	2
60. Was accident caused by defective equipment?.....	2
61. Was the injured aware of danger; what instructions were given?.....	1
62. Did the injured make proper use of safety devices?.....	1
63. Was the injury due to natural hazards of industry?.....	1
64. Loss in wages?.....	1
65. Number of employees?.....	1
66. Was the injured person insured?.....	1
67. Personal habits of the injured?.....	1
68. In whose control was the machine or part causing injury at the time of accident?.....	1
69. Condition of lighting?.....	1
70. Define safety organization of plant?.....	1
71. At what employed when injured?.....	1
72. Had injured person worked on similar machinery prior to this employment?..	1
73. Was injured person skilled in this work? If not, why was he placed at this machine?.....	1
74. Was injury purposely self-inflicted or the result of willful misconduct or intoxication (give particulars)?.....	1

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**APPENDIX III.—OFFICIAL CLASSIFICATION OF INDUSTRIAL ACCIDENTS,  
BY CAUSES—GERMANY.<sup>1</sup>**

**I. Power generators:**

1. Steam engines.
2. Water-power engines.
3. Gas, pneumatic, and wind motors.
4. Electric motors and dynamos.
5. Animal-power motors.

**II. Transmissions:**

6. Shafting and shaft connections.
7. Toothed and friction gearing.
8. Belt pulleys.
9. Driving belts.
10. Rope and chain drives.

**III. Working machinery:**

11. Lathes (for metal, wood, horn, etc.).
  12. Boring machinery.
  13. Planing, shaping, nut, and striking machines for metal.
  14. Planing machines for wood, slate, etc.
  15. Milling machines for metal.
  16. Milling machines for wood, pasteboard, etc.
  17. Circular and band saws for metal.
  18. Circular saws for wood.
  19. Band and frame saws for wood, etc.; stone saws.
  20. Grinding machines and emery wheels.
  21. Cutting and chopping machines of all kinds.
  22. Flour mills of all kinds; millstones and milling rollers; mixing, kneading, mashing, rasping, sifting, and breaking machines.
  23. Forging and stamping mills.
  24. Presses and embossing or coining machines.
  25. Rollers and calenders.
  26. Printing, pressing, and embossing machines for paper, leather, textiles, etc.
  27. Machines for the preparatory processes of spinning (carding, hackling, and combing machines).
  28. Spinning machines.
  29. Weaving and knitting machines.
  30. Finishing machines.
  31. Basting, sewing, and embroidering machines.
  32. Threshing machines and steam plows.
  33. Centrifugal machines.
  34. Ventilators and exhaust machines.
  35. Pumps.
  36. Other working machines.
- IV. Hoisting machinery:**
37. Lifts and elevators.
  38. Tackles, winches, cranes, etc
  39. Other hoisting machinery.

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<sup>1</sup> Source: *Amtliche Nachrichten des Reichsversicherungsamts*. 1910. I. Beiheft. Part 2, pp. 352 ff. Berlin, 1914.

- V. Steam boilers, steam cooking apparatus, and steam piping:
  - 40. Explosions of steam boilers or steam cooking apparatus.
  - 41. Other accidents (breaking of water gauges, etc.).
  - 42. Steam piping.
- 43. VI. Electric currents.
- 44. VII. Explosives (explosions of powder, dynamite, etc.).
- VIII. Inflammable, hot, and corrosive materials, etc. (incandescent metals, gases, vapors):
  - 45. Explosion and ignition of gases, petroleum, benzine, alcohol, etc.
  - 46. Flames from furnaces, conflagrations.
  - 47. Incandescent metal, slag, ashes, etc.
  - 48. Steam, hot water, and hot fluids.
  - 49. Corrosive materials, acids, quicklime, lye, etc.
  - 50. Poisonous materials and noxious gases.
- IX. Collapsing, caving in, and falling of objects:
  - 51. Masses of rock, sand, earth, etc.
  - 52. Buildings, walls, vaults, cornices, etc.
  - 53. Scaffolds, landing places, etc.
  - 54. Merchandise, lumber, etc.
  - 55. Other objects.
- X. Falls from ladders, stairs, etc.; from hatchways, etc.; into excavations:
  - 56. From ladders and stairs.
  - 57. From scaffolds, beams, walls, etc.
  - 58. From windows, hatchways, roofs, etc.
  - 59. Into excavations, etc. (pits, cellars, wells, etc.).
  - 60. On the floor, in the working place, etc.
- XI. Loading and unloading by hand, lifting, carrying, etc.:
  - 61. Loading and unloading of wagons.
  - 62. Transport of heavy loads without the aid of transportation apparatus.
- 63. XII. Vehicles.
- 64. XIII. Railway operation.
- 65. XIV. Navigation and transportation by water.
- 66. XV. Animals (kicking, biting, etc., inclusive of all accidents in riding).
- 67. XVI. Hand tools and simple appliances (hammers, axes, chisels, hatchets, spades, etc.).
- XVII. Miscellaneous:
  - 68. Flying chips, splinters, etc.
  - 69. Other miscellaneous causes.

**APPENDIX IV.—OFFICIAL CLASSIFICATION OF INDUSTRIAL ACCIDENTS,  
BY CAUSES—AUSTRIA.<sup>1</sup>**

1. Use of hand tools; various manipulations.
2. Flying fragments in stone working (inclusive of stone breaking).
- 2a. Flying fragments in metal working.
3. Burns in general (incandescent, hot, and molten metals, slag, etc.; hot liquids vapors, gases).<sup>2</sup>
4. Corrosive substances (acids, lye, quicklime, etc.) in other than building trades.
5. Injuries by quicklime (in building trades).
6. Lifting and moving of burdens by hand by means of handcarts, etc.
7. Loading and unloading by hand in transportation establishments.
8. Loading and unloading by hand in other than transportation establishments.
9. Vehicles in other than transportation establishments.
10. Industrial railroads.
11. Electric currents.
12. Belting.
- 12a. Animal-power motors (inclusive of the lever and the draft animals).
13. Falls into the drums of threshing machines.
14. Other accidents caused by drums of threshing machines.
15. Toothed gearing and other moving parts of threshing machines.
16. Stones, sand, and kernels of grain hurled around by threshing machines.
17. Feed rolls of fodder-chopping machines.
18. Knives of fodder-chopping machines.
19. Toothed gearing and other moving parts of fodder-chopping machines.
20. Millstones.
21. Milling rollers in flour mills.
22. Kicks, pushes, and steps by draft animals (in transportation establishments).
23. Bites of draft animals (in transportation establishments).
24. Falls from vehicles (in transportation establishments).
25. Run over by own wagon (in transportation establishments).
26. Run over in getting on or off a vehicle in motion (in transportation establishments).
- 26a. Rollers, also injuries by hot-rolled material (in iron and steel mills).
27. Fall or collapse of masses of stone, earth, or gravel in pits and quarries, and in excavation work for building purposes.
28. Explosion of blasting material and accidents in general through blasting work.
29. Brickmaking machinery (pressing, repressing, etc.) including that operated by hand.
30. Grinding apparatus (in glass works).
- 30a. Use of blowpipe (in glass works).
- 30b. Breaking of glass, splinters, fragments (in glass works).
31. Hammers of all kinds, pile drivers.
32. Shearing and cutting machines.
33. Pressing, stamping, and coining machines.

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<sup>1</sup> Source: Ergebnisse der Unfallstatistik der fünf jährigen Beobachtungs-periode 1902-1906, Zweiter Theil, pp. 49 ff. Wien, 1911.

<sup>2</sup> Burns caused by steam boilers or working machines are charged to those causes and therefore not counted under this heading.

34. Boring machines (for metal).
35. Lathes for metal.
- 35a. Planing, shaping, and stamping machines for metal.
36. Flying fragments from bursting grindstones and emery wheels.
37. Other accidents by grinding machines and emery wheels.
38. Opening machines (willows, openers).<sup>1</sup>
39. Carding machines.
40. Self-acting mules.
41. Other spinning machines.
42. Calenders (textile industry).
43. Power looms.
44. Printing machines (textile industry).
45. Centrifugal machines (textile industry).
46. Vertical rolls (paper making).
47. Cylinder rolls (paper making).
48. Wood-grinding machinery.
49. Pasteboard-making machinery.
50. Paper-making machinery (including parts of such, as, for instance, drying cylinders, calenders, wetting machines, etc.).
51. Leather rollers, mangles, etc.
- 51a. Frame saws.
52. Circular saws for wood.
53. Band saws for wood.
54. Milling machinery for wood.
55. Planing machinery for wood.
- 55a. Chopping and splitting machinery.
56. Lifting and moving of casks, etc., in breweries.
57. Machinery for compressing, cutting, etc., of meats.
58. Centrifugal machines (in sugar making).
- 58a. Ironing machines.
59. Hoists for brick.
60. Cylinder presses (printing).
61. Platen presses.
62. Cleaning and oiling of working machines while in motion.

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<sup>1</sup> Accidents caused by the cleaning and oiling of the textile machines subsequently enumerated were charged to cause No. 62.

**APPENDIX V.—OFFICIAL CLASSIFICATION OF INDUSTRIAL ACCIDENTS,  
BY CAUSES—INDUSTRIAL COMMISSION OF OHIO.**

(General Classifications.)

**Machinery:**

- Motors and engines.
- Transmission apparatus.
- Working machines.
- Hoisting machinery.
- Assembling and fitting of parts.
- Miscellaneous.

**Nature of material used or similar working conditions:**

- Corrosive materials.
- Electricity.
- Explosions and inflammability of explosive substances.
- Hot materials, hot objects, and great heat.
- Poisonous material.
- Glass.
- Miscellaneous.

**Objects:**

- Blows.
- Bumps.
- Falling, sliding, slipping.
- Handling sharp edged objects.
- Nails, splinters, wire screens, etc., attached.
- Stepping on sharp or edged objects.
- Doors.
- Miscellaneous.

**Great weights, strains, etc.**

**Falls:**

- From tools slipping.
- From means of ascent.
- From structural works, etc.
- On floors and ordinary surfaces.
- Falling, slipping, or stumbling over objects.
- From trains, etc.
- From other means of transportation.
- Into elevator shafts.
- Into mine shafts.
- Into excavations and vats.
- Miscellaneous.

**Transportation on tracks.**

**Transportation not on tracks.**

**Animals.**

**Hand tools.**

**Not otherwise classified—more serious accidents.**

**Not reported or unknown.**

**Miscellaneous.**

**APPENDIX VI.—OFFICIAL CLASSIFICATION OF INDUSTRIAL ACCIDENTS,  
BY CAUSES—INDUSTRIAL COMMISSION OF WISCONSIN.**

*Prime movers.*

- 0. Gas and gasoline engines.
- 1. Steam engines.
- X. Other prime movers.

*Transmission apparatus.*

- 20. Shafting.
- 21. Pulleys.
- 22. Tooth and friction gears.
- 23. Belts.
- 24. Belt shifters.
- 25. Chains and sprockets.
- 26. Ropes and cables.
- 27. Clutches.
- 28. Set screws.
- 2X. Other transmission apparatus.
- 2Y. Shaft couplings and collars.

*Woodworking machinery.*

- 100. Boring machines (wood).
- 101. Edgers.
- 102. Jointers.
- 103. Lathes, woodworking.
- 104. Planers, woodworking.
- 105. Sanders.
- 106. Saws, n. o. c.
- 10Y. Saws, band.
- 107. Shapers.
- 108. Stickers.
- 109. Veneer clippers.
- 10X. Other woodworking machines.
- 110. Tenoners.
- 112. Veneer presses.
- 114. Matches.

*Paper and its products.*

- 120. Barkers.
- 121. Calenders, paper stocks, drying and winding machines, and other rolled machines.
- 122. Staying and ending machines.
- 123. Paper cutters.
- 24. Paper-box presses.

*Paper and its products—Concluded.*

- 125. Chippers.
- 126. Corner creasers.
- 127. Slatters.
- 128. Lacers.
- 129. Box bottomers.
- 12X. Paper machinery, n. o. c.
- 12Y. Rag cutters.

*Metal.*

- 130. Boring machines (metal).
- 131. Emery wheels.
- 132. Buffing and polishing wheels.
- 133. Lathes, metal.
- 134. Planers, metal.
- 137. Presses, stamping.
- 138. Riveters.
- 139. Power shears.
- 13X. Milling machines.
- 13Y. Power hammers.
- 140. Reamers.
- 141. Bulldozers.
- 14X. Metal-working machinery, n. o. c.

*Laundry.*

- 150. Extractors.
- 151. Washing machines.
- 152. Collar ironers.
- 153. Body, sleeve, and bosom ironers.
- 154. Flat-work ironers.
- 15X. Laundry machinery, n. o. c.

*Leather-working machinery.*

- 160. Sole cutters.
- 161. Sewing machines, shoe manufacturing.
- 162. Shanking machines.
- 163. Pullers-over.
- 164. Tackers.
- 165. Cutters.
- 166. Heelers.
- 16X. Leather-working machinery, n. o. c.

*Tannery.*

- 170. Unhairing machines.
- 171. Setting out machines.
- 172. Glazing machines.
- 173. Brushing machines.
- 174. Splitters.
- 175. Shavers.
- 176. Fleshers.
- 17X. Tannery machinery, n. o. c.

*Textile.*

- 180. Knitting machines.
- 181. Spinning machines.
- 182. Power looms.
- 183. Carding machines.
- 184. Clamping machines.
- 185. Bobbin winders.
- 186. Beamers.
- 187. Sewing machines, cloth.
- 18X. Textile machinery, n. o. c.

*Farm machinery.*

- 190. Corn shredders and huskers.
- 191. Feed and ensilage cutters.
- 192. Other farm machinery.

*Bakery and confectionery machinery.*

- 200. Dough machines.
- 201. Bread-molding machines.
- 202. Bread cutters.
- 203. Confectionery machinery.

*Printing.*

- 220. Printing presses.
- 221. Embossing machines.
- 222. Perforators.
- 223. Linotype machines.
- 22X. Other printing machinery.

*Miscellaneous.*

- 250. Feed rolls.
- 251. Conveyors.
- 253. Electric fans.
- 254. Concrete mixers.
- 255. Pile drivers.
- 25X. Machinery, n. o. c.

*Elevators.*

- 300. Falls from car, not inclosed.
- 301. Falls from floor, down shaft.
- 302. Elevator dropping, broken cable.

*Elevators—Concluded.*

- 303. Elevator dropping, broken machine parts.
- 304. Elevator dropping, cables unwinding.
- 305. Struck by elevator, cleaning pit.
- 306. Caught between elevator platform and floor.
- 307. Caught between elevator platform and top of gate.
- 308. Hit by counterweights.
- 309. Hit by objects falling down shaft.
- 30X. Caught in hoisting machinery.
- 30Y. Other elevator accidents.

*Cranes and derricks.*

- 320. Caught in hoisting machinery.
- 321. Caught in hook or sling while hitching.
- 322. Hit by moving cranes.

*Explosions.*

- 400. Boiler explosions.
- 401. Blasting.
- 402. Compressed air.
- 40X. Other explosions.

*Hits.*

- 500. Hit by particles while grinding or chipping.
- 501. Hit by flying nails.
- 502. Hit by other flying objects.
- 503. Caught under object lowered by crane.
- 504. Caught between object swinging in crane and other object.
- 505. Hit by object swinging in crane.
- 506. Hit by objects falling from cranes—Chain or hook broken.
- 507. Hit by objects falling from cranes—Hook or sling slipping.
- 508. Hit by objects falling from hoisted buckets or hoppers—Not in mines.
- 509. Hit by object on conveyor or slide.
- 510. Hit by dragged or skidded objects.
- 511. Hit or caught by loads shifting.
- 512. Hit by falling trees or parts of trees.
- 513. Hit by objects falling from pile.
- 514. Hit by falling piles.
- 515. Hit by trenches or ditches caving in.
- 516. Hit by rocks, etc., falling from roofs of mines.

*Hits—Concluded.*

- 517. Hit by rocks, etc., falling from walls and slopes of mines.
- 518. Hit by cave-ins in mines.
- 519. Hit by objects falling from buckets or hoppers in mines.
- 520. Hit by objects falling from trucks or vehicles (not loading or unloading).
- 521. Hit by objects falling from trucks or vehicles—Loading or unloading.
- 522. Hit by objects falling from buildings, trestles, scaffolds, etc.
- 523. Hit by objects falling from benches, racks, and machines.
- 524. Hit by objects tipping over.
- 525. Caught by doors or windows.
- 526. Hit by broken machine parts.
- 527. Hit by vehicles, cars, trucks, etc.
- 528. Caught between two vehicles, cars, trucks, etc.
- 529. Caught between vehicles and other objects.
- 530. Other hits.

*Falls.*

- 600. Falls from stairs.
- 601. Falls from ladders, ladder slipping.
- 60X. Falls from ladders, ladder breaking.
- 60Y. Falls from ladders, loss of balance.
- 602. Falls from scaffolds.
- 603. Falls from tramways and trestles.
- 604. Falls from runways or loading platforms.
- 605. Falls from buildings.
- 606. Falls down shafts.
- 607. Falls into excavations and down embankments.
- 608. Falls into trenches.
- 609. Falls into holes and trapdoors.
- 610. Falls from horses.
- 611. Falls from wagons, cars, and trucks—Not moving.

*Falls—Concluded.*

- 612. Falls from wagons, cars, and trucks—Moving.
- 613. Falls from pile.
- 614. Falls from poles and trees.
- 615. Falls from machines and boilers.
- 616. Falls from boxes, chairs, tables, and benches.
- 617. Falls from docks, boats, and bridges.
- 618. Falls from hoisted objects—Not elevators.
- 619. Falls into vats, bins, and pits.
- 620. Slipping.
- 621. Stumbling.
- 622. Jumping.
- 623. Falls from cranes.

*Handling objects.*

- 700. Lifting or moving heavy objects.
- 701. Dropping objects while carrying or lifting.
- 702. Dropping objects while loading or unloading.
- 703. Caught between two objects handled.
- 704. Caught between object handled and other object.
- 705. Handling sharp objects—Nails, splinters, or sharp edges.

*General causes.*

- 800. Trucking—Truck or vehicle propelled by injured.
- 801. Animal bites, kicks, etc.
- 802. Tools and hand apparatus.
- 803. Stepping or kneeling on nails or sharp objects.
- 804. Bumping into objects.
- 805. Lightning.
- 806. Heat prostration.
- 807. Frostbites.
- 808. Asphyxiations.
- 809. Drowning.
- 850. Miscellaneous causes.
- 851. Causes not known.

**APPENDIX VII.—CLASSIFICATION OF INDUSTRIAL ACCIDENTS, BY  
NATURE OF INJURY—PRUDENTIAL INSURANCE CO.**

**TABLE A.—NONFATAL INDUSTRIAL ACCIDENTS IN COAL MINING, PENNSYLVANIA,  
1907 TO 1911.**

Part of body injured.	Anthracite coal mines.		Bituminous coal mines.	
	Number of injuries.	Per cent of total injuries.	Number of injuries.	Per cent of total injuries.
<b>Head and face:</b>				
Head.....	306	5.3	217	3.9
Face.....	315	5.4	146	2.6
Eyes.....	56	1.0	52	.9
Nose.....	24	.4	11	.2
<b>Total.....</b>	<b>704</b>	<b>12.1</b>	<b>426</b>	<b>7.6</b>
<b>Upper extremities:</b>				
Shoulder.....	86	1.5	87	1.5
Arm.....	453	7.9	291	5.2
Wrist.....	28	.5	32	.6
Hand.....	519	9.0	166	3.0
Finger.....	129	2.2	164	2.9
<b>Total.....</b>	<b>1,215</b>	<b>21.1</b>	<b>740</b>	<b>13.2</b>
<b>Trunk:</b>				
Collar bone.....	130	2.3	258	4.6
Rib.....	201	3.5	195	3.5
Trunk.....	270	4.7	520	9.3
Internal.....	47	.8	67	1.2
<b>Total.....</b>	<b>648</b>	<b>11.3</b>	<b>1,040</b>	<b>18.6</b>
<b>Lower extremities:</b>				
Hip.....	164	2.9	195	3.5
Leg.....	1,820	31.7	2,121	37.9
Knee.....	49	.9	45	.8
Ankle.....	1,115	2.0	170	3.0
Foot.....	118	3.3	380	6.8
Toe.....	47	.8	78	1.4
<b>Total.....</b>	<b>3,313</b>	<b>41.6</b>	<b>2,989</b>	<b>53.4</b>
<b>Other and not specified.....</b>	<b>805</b>	<b>14.0</b>	<b>407</b>	<b>7.3</b>

**TABLE B.—NONFATAL INDUSTRIAL ACCIDENTS IN RAILWAY SERVICE, NEW JERSEY,  
1888 TO 1911.**

Part of body injured.	Railway brakemen.		Locomotive firemen.	
	Number of injuries.	Per cent of total injuries.	Number of injuries.	Per cent of total injuries.
<b>Head and face:</b>				
Head.....	404	7.9	109	14.7
Face.....	115	2.3	51	6.9
Eyes.....	13	.3	19	2.6
Nose.....	15	.3	12	1.6
<b>Total.....</b>	<b>547</b>	<b>10.8</b>	<b>191</b>	<b>25.8</b>
<b>Upper extremities:</b>				
Shoulder.....	146	2.9	32	4.3
Arm.....	549	10.7	56	7.5
Wrist.....	116	2.3	25	3.4
Hand.....	758	14.8	55	7.4
Finger.....	1,018	19.9	57	7.7
<b>Total.....</b>	<b>2,587</b>	<b>50.6</b>	<b>225</b>	<b>30.3</b>

TABLE B.—NONFATAL INDUSTRIAL ACCIDENTS IN RAILWAY SERVICE, NEW JERSEY, 1888 TO 1911—Concluded.

Part of body injured.	Railway brakemen.		Locomotive firemen.	
	Number of injuries.	Per cent of total injuries.	Number of injuries.	Per cent of total injuries.
<b>Trunk:</b>				
Collar bone.....	29	0.6	3	0.4
Rib.....	60	1.2	7	.9
Trunk.....	486	9.5	116	15.6
Internal.....	48	.9	8	1.1
<b>Total.....</b>	<b>623</b>	<b>12.2</b>	<b>134</b>	<b>18.0</b>
<b>Lower extremities:</b>				
Hip.....	169	3.3	25	3.4
Leg.....	371	7.3	59	8.0
Knee.....	147	2.9	15	2.0
Ankle.....	273	5.3	40	5.4
Foot.....	343	6.7	37	4.9
Toe.....	50	1.0	16	2.2
<b>Total.....</b>	<b>1,353</b>	<b>26.5</b>	<b>192</b>	<b>25.9</b>

TABLE C.—NONFATAL INDUSTRIAL ACCIDENTS IN IRON MINING AND LUMBERING, MINNESOTA, 1910 TO 1912.

Part of body injured.	Iron mining.		Lumbering and wood-working.	
	Number of injuries.	Per cent of total injuries.	Number of injuries.	Per cent of total injuries.
<b>Head and face:</b>				
Head.....	1,130	11.0	339	9.5
Eyes.....	1,024	9.9	6	.2
Nose.....	11	.1	221	6.2
<b>Total.....</b>	<b>2,165</b>	<b>21.0</b>	<b>566</b>	<b>15.9</b>
<b>Upper extremities:</b>				
Shoulder.....	242	2.4	52	1.6
Arm.....	342	3.3	157	4.3
Wrist.....	206	2.0	80	2.2
Hand.....	986	9.6	348	9.7
Finger.....	2,271	22.0	868	24.3
<b>Total.....</b>	<b>4,047</b>	<b>39.3</b>	<b>1,505</b>	<b>42.1</b>
<b>Trunk:</b>				
Collar bone.....	13	.1	9	.3
Rib.....	41	.3	43	1.2
Trunk.....	1,013	9.8	303	8.5
Internal.....	60	.6	24	.7
<b>Total.....</b>	<b>1,127</b>	<b>10.9</b>	<b>379</b>	<b>10.7</b>
<b>Lower extremities:</b>				
Hip.....	87	.8	19	.5
Leg.....	692	6.7	303	8.5
Knee.....	281	2.7	121	3.4
Ankle.....	354	3.4	142	4.0
Foot.....	935	9.1	336	9.4
Toe.....	412	4.0	123	3.4
<b>Total.....</b>	<b>2,761</b>	<b>26.7</b>	<b>1,044</b>	<b>29.2</b>
<b>Other and not specified.....</b>	<b>214</b>	<b>2.1</b>	<b>79</b>	<b>2.2</b>

TABLE D.—NONFATAL INDUSTRIAL ACCIDENTS TO GOVERNMENT EMPLOYEES,  
1908 TO 1911.

Part of body injured.	Employees of—			
	Isthmian Canal Com- mission.		All other departments.	
	Number of injuries.	Per cent of total injuries.	Number of injuries.	Per cent of total injuries.
<b>Head and face:</b>				
Head.....	701	6.7	581	5.8
Eyes.....	679	6.5	499	5.0
Neck.....	20	.2	21	.2
Total.....	1,400	13.4	1,101	11.0
<b>Upper extremities:</b>				
Arm.....	500	4.8	601	6.0
Hand.....	855	8.1	763	7.6
Finger.....	1,717	16.3	1,659	16.5
Total.....	3,072	29.2	3,023	30.1
<b>Trunk:</b>				
Rib.....	54	0.5	235	2.3
Trunk.....	1,146	10.9	1,316	13.1
Internal.....	13	.1	47	.5
Total.....	1,213	11.5	1,598	15.9
<b>Lower extremities:</b>				
Leg.....	1,448	13.8	1,273	12.6
Foot.....	2,424	23.1	1,625	16.1
Toe.....	31	.3	11	.1
Total.....	3,903	37.2	2,909	28.8
<b>Other and not specified.....</b>	925	8.7	1,426	14.2

**APPENDIX VIII.—OFFICIAL CLASSIFICATION OF INDUSTRIAL ACCIDENTS,  
BY NATURE OF INJURY—AUSTRIA.<sup>1</sup>**

- |  |   |
|--|---|
| <p>1. Loss of left arm (including total disability of).<br/>                 2. Loss of right arm (including total disability of).<br/>                 3. Fracture of left upper arm.<br/>                 4. Fracture of right upper arm.<br/>                 5. Fracture of left lower arm.<br/>                 6. Fracture of right lower arm.<br/>                 7. Other injuries of left arm.<br/>                 8. Other injuries of right arm.<br/>                 9. All injuries of left arm (titles 1, 3, 5, 7).<br/>                 10. All injuries of right arm (titles 2, 4, 6, 8).<br/>                 11. All injuries of the arm, right or left (titles 1 to 8).<br/>                 12. Injury of right and left arm at the same time.<br/>                 13. Loss of left hand (including total disability of).<br/>                 14. Loss of right hand (including total disability of).<br/>                 15. Fracture of bone of left hand.<br/>                 16. Fracture of bone of right hand.<br/>                 17. Other injuries of left hand.<br/>                 18. Other injuries of right hand.<br/>                 19. All injuries of left hand (titles 13, 15, 17).<br/>                 20. All injuries of right hand (titles 14, 16, 18).<br/>                 21. All injuries of the hand, right or left (titles 13 to 18).<br/>                 22. Loss of thumb of left hand (both phalanges).<br/>                 23. Loss of thumb of right hand (both phalanges).<br/>                 24. Loss of the index finger of the left hand.<sup>2</sup><br/>                 25. Loss of the index finger of the right hand.<br/>                 26. Loss of middle finger of left hand.<br/>                 27. Loss of middle finger of right hand.<br/>                 28. Loss of ring finger of left hand.<br/>                 29. Loss of ring finger of right hand.</p> | <p>30. Loss of little finger of left hand.<br/>                 31. Loss of little finger of right hand.<br/>                 32. Loss of thumb and of one or more fingers of left hand.<br/>                 33. Loss of thumb and of one or more fingers of right hand.<br/>                 34. Loss of two or more fingers (not including thumb) of left hand.<br/>                 35. Loss of two or more fingers (not including thumb) of right hand.<br/>                 36. Loss of one phalanx of thumb of left hand.<br/>                 37. Loss of one phalanx of thumb of right hand.<br/>                 38. Loss of one phalanx of index finger of left hand.<br/>                 39. Loss of one phalanx of index finger of right hand.<br/>                 40. Loss of one phalanx of middle finger of left hand.<br/>                 41. Loss of one phalanx of middle finger of right hand.<br/>                 42. Loss of one phalanx of ring finger of left hand.<br/>                 43. Loss of one phalanx of ring finger of right hand.<br/>                 44. Loss of one phalanx of little finger of left hand.<br/>                 45. Loss of one phalanx of little finger of right hand.<br/>                 46. Stiffness of first joint of thumb of left hand.<br/>                 47. Stiffness of first joint of thumb of right hand.<br/>                 48. Stiffness of first joint of index finger of left hand.<br/>                 49. Stiffness of first joint of index finger of right hand.<br/>                 50. Stiffness of first joint of middle finger of left hand.<br/>                 51. Stiffness of first joint of middle finger of right hand.<br/>                 52. Stiffness of first joint of ring finger of left hand.<br/>                 53. Stiffness of first joint of ring finger of right hand.</p> |
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<sup>1</sup> Ergebnisse der Unfallstatistik der fünfjährigen Beobachtungsperiode 1902-1906, Zweiter Theil, pp. 123 ff. Wien, 1911.

<sup>2</sup> In this and in the titles numbered 25 to 35 the word "loss" indicates the separation of two phalanges.

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|--|---|
| <p>54. Stiffness of first joint of little finger of left hand.</p> <p>55. Stiffness of first joint of little finger of right hand.</p> <p>56. Other injuries of thumb of left hand.</p> <p>57. Other injuries of thumb of right hand.</p> <p>58. Other injuries of index finger of left hand.</p> <p>59. Other injuries of index finger of right hand.</p> <p>60. Other injuries of middle finger of left hand.</p> <p>61. Other injuries of middle finger of right hand.</p> <p>62. Other injuries of ring finger of left hand.</p> <p>63. Other injuries of ring finger of right hand.</p> <p>64. Other injuries of little finger of left hand.</p> <p>65. Other injuries of little finger of right hand.</p> <p>66. Injury of thumb and one or more fingers of left hand.</p> <p>67. Injury of thumb and one or more fingers of right hand.</p> <p>68. Injury of several fingers (not including thumb) of left hand.</p> <p>69. Injury of several fingers (not including thumb) of right hand.</p> <p>70. Loss of fingers accompanied by injury of other fingers of the same hand (left).</p> <p>71. Loss of fingers accompanied by injury of other fingers of the same hand (right).</p> <p>72. All injuries of fingers, left hand (titles designated by even numbers from 22 to 70).</p> <p>73. All injuries of fingers, right hand (titles designated by odd numbers from 23 to 71).</p> <p>74. All injuries of fingers, right and left hands (titles 22 to 71).</p> | <p>75. Injuries of fingers of both hands occurring at the same time.</p> <p>76. Loss of one leg.</p> <p>77. Loss of both legs.</p> <p>78. Fracture of upper leg.</p> <p>79. Fracture of lower leg.</p> <p>79a. Injury of knee or fracture of kneecap.</p> <p>80. Injury of ankle joint.</p> <p>81. Other injuries of leg or foot.</p> <p>82. Injuries of both legs.</p> <p>83. Loss of toes.</p> <p>84. Injuries of toes.</p> <p>85. Loss of or injury to legs and feet, including toes (titles 76 to 84).</p> <p>86. Loss of or injury to arm and leg in various combinations.</p> <p>87. Loss of one eye.</p> <p>88. Loss of one eye accompanied by injury of the other.</p> <p>89. Loss of both eyes.</p> <p>90. Injury of one eye.</p> <p>91. Injury of both eyes.</p> <p>92. All injuries of eyes (titles 87 to 91).</p> <p>93. Injury of the hand.</p> <p>94. Injury of shoulder, including those accompanied by injury of arm.</p> <p>95. Fractures of collar bone, including those accompanied by injury of arm.</p> <p>95a. Injury or fracture of spinal column.</p> <p>95b. Injury of hip.</p> <p>96. Fractures of ribs.</p> <p>97. Other injuries of trunk.</p> <p>98. Injuries of testicles.</p> <p>99. Ruptures.</p> <p>100. Injuries of several parts of the body.</p> <p>101. Internal injuries.</p> <p>102. Concussion of the brain.</p> <p>103. Miscellaneous (stroke, paralysis, insect bite, sunstroke, lightning, burns, etc.).</p> <p>103a. Injuries by electric currents.</p> <p>104. Traumatic neurosis following injuries.</p> <p>105. Suffocation.</p> <p>106. Drowning.</p> |
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**APPENDIX IX.—CLASSIFICATION OF INDUSTRIAL ACCIDENTS, BY NATURE OF INJURY AND DEGREE OF PHYSICAL IMPAIRMENT, PROPOSED BY THE WORKMEN'S COMPENSATION SERVICE BUREAU.**

*Arms injury.*

1. Loss of left arm (upper).
2. Loss of left arm (lower).
3. Loss of right arm (upper).
4. Loss of right arm (lower).
5. Loss of both upper arms.
6. Loss of both lower arms.
7. Fracture of left upper arm.
8. Fracture of left lower arm.
9. Fracture of right upper arm.
10. Fracture of right lower arm.
11. Fracture of both upper arms.
12. Fracture of both lower arms.
13. All other injuries to right upper arm.
14. All other injuries to left upper arm.
15. All other injuries to right lower arm.
16. All other injuries to left lower arm.

*Hand injury.*

21. Loss of left hand.
22. Loss of right hand.
23. Loss of both hands.
24. Fracture of bones of left hand.
25. Fracture of bones of right hand.
26. Fracture of bones of both hands.
27. All other injuries to left hand.
28. All other injuries to right hand.
29. All other injuries to both hands.

*Loss of thumb or finger.*

45. Thumb of left hand, both phalanges.
46. Index or first finger of left-hand, both phalanges.
47. Middle finger of left-hand, both phalanges.
48. Third or ring finger of left-hand, both phalanges.
49. Fourth or little finger of left-hand, both phalanges.
50. Thumb of right hand, both phalanges.

*Loss of thumb or finger—Continued.*

51. First finger right hand, both phalanges.
52. Middle finger right hand, both phalanges.
53. Third finger right hand, both phalanges.
54. Little finger right hand, both phalanges.
55. Thumb of both hands, both phalanges.
56. First finger of both hands, both phalanges.
57. Second finger of both hands, both phalanges.
58. Third finger of both hands, both phalanges.
59. Fourth finger of both hands, both phalanges.
65. Two fingers of left hand, both phalanges.
67. Two fingers of right hand, both phalanges.
68. Two fingers of both hands, both phalanges.
69. Three fingers of left hand, both phalanges.
70. Three fingers of right hand, both phalanges.
71. Three fingers of both hands, both phalanges.
72. Four fingers of left hand, both phalanges.
73. Four fingers of right hand, both phalanges.
74. Four fingers of both hands, both phalanges.
75. All fingers of left hand, both phalanges.
76. All fingers of right hand, both phalanges.
77. All fingers of both hands, both phalanges.

*Loss of thumb or finger—Concluded.*

85. Phalanx of the thumb, left hand.
86. Phalanx of the first finger, left hand.
87. Phalanx of the second finger, left hand.
88. Phalanx of the third finger, left hand.
89. Phalanx of the fourth finger, left hand.
90. Phalanges of all fingers, left hand.
91. Phalanx of the thumb, right hand.
92. Phalanx of the first finger, right hand.
93. Phalanx of the second finger, right hand.
94. Phalanx of the third finger, right hand.
95. Phalanx of the fourth finger, right hand.
96. Phalanges of all fingers, right hand.
97. Two phalanges of the left hand.
98. Two phalanges of the right hand.
99. Three phalanges of the left hand.
100. Three phalanges of the right hand.
101. Four phalanges of the left hand.
102. Four phalanges of the right hand.
103. First phalanx of the left hand, all fingers.
104. First phalanx of the right hand, all fingers.

*Fracture of thumb or fingers.*

109. Fourth finger of the left hand.
110. Thumb of the left hand.
111. First finger of the left hand.
112. Second finger of the left hand.
113. Third finger of the left hand.
114. Thumb of the right hand.
115. First finger of the right hand.
116. Second finger of the right hand.
117. Third finger of the right hand.
118. Fourth finger of the right hand.
119. All fingers of the right hand
120. All fingers of the left hand.
121. Two fingers of the left hand.
122. Two fingers of the right hand.
123. Three fingers of the left hand.
124. Three fingers of the right hand.
125. Four fingers of the left hand.
126. Four fingers of the right hand.

*Stiffness of thumb or fingers.*

136. First joint of the thumb, left hand.
137. First joint of the thumb, right hand.
138. First joint of the thumb, both hands.
139. First joint of the first finger, left hand.
140. First joint of the first finger, right hand.
141. First joint of the first finger, both hands.
142. First joint of the second finger, left hand.
143. First joint of the second finger, right hand.
144. First joint of the second finger, both hands.
145. First joint of the third finger, left hand.
146. First joint of the third finger, right hand.
147. First joint of the third finger, both hands.
148. First joint of the fourth finger, left hand.
149. First joint of the fourth finger, right hand.
150. First joint of the fourth finger, both hands.

*All other injury to thumb or fingers.*

155. Thumb, left hand.
156. Thumb, right hand.
157. Thumb, both hands.
158. First finger, left hand.
159. First finger, right hand.
160. First finger, both hands.
161. Second finger, left hand.
162. Second finger, right hand.
163. Second finger, both hands.
164. Third finger, left hand.
165. Third finger, right hand.
166. Third finger, both hands.
167. Fourth finger, left hand.
168. Fourth finger, right hand.
169. Fourth finger, both hands.
170. All fingers, left hand.
171. All fingers, right hand.
172. All fingers, both hands.
180. Injury to finger.

*Injury to foot or leg.*

- 181. Loss of one leg.
- 182. Loss of both legs.
- 183. Fracture of one upper leg.
- 184. Fracture of both upper legs.
- 185. Fracture of one lower leg.
- 186. Fracture of both lower legs.
- 190. Injury to arch of one foot.
- 191. Injury to arch of both feet.
- 192. Injury to instep of one foot.
- 193. Injury to instep of both feet.
- 195. Other injuries to the right foot.
- 196. Other injuries to the left foot.
- 197. Other injuries to the right leg.
- 198. Other injuries to the left leg.
- 199. Other injuries to both legs.
- 200. Other injuries to both feet.
- 205. Loss of great toe, right foot.
- 206. Loss of great toe, left foot.
- 207. Loss of great toe, both feet.
- 208. Loss of one other toe, right foot.
- 209. Loss of one other toe, left foot.
- 210. Loss of two other toes, right foot.
- 211. Loss of two other toes, left foot.
- 212. Loss of three other toes, right foot.
- 213. Loss of three other toes, left foot.
- 214. Loss of four other toes, right foot.
- 215. Loss of four other toes, left foot.
- 216. Loss of all toes, right foot.
- 217. Loss of all toes, left foot.
- 220. Injury to great toe, right foot.
- 221. Injury to great toe, left foot.
- 222. Injury to all other toes, right foot.
- 223. Injury to all other toes, left foot.
- 226. Loss of right arm and right leg.
- 227. Loss of left arm and right leg.
- 228. Loss of both arms and both legs.

*Injury to eye.*

- 235. Loss of one eye.
- 236. Loss of both eyes.
- 237. Loss of one eye, injury to other.
- 238. Injury to both eyes.
- 239. Injury to one eye.
- 240. Loss of sight, one eye.
- 241. Loss of sight, both eyes.

*Injury to head.*

- 245. Injury to right side of head.
- 246. Injury to left side of head.
- 247. Injury to back of head.
- 248. Injury to front of head.
- 249. All other injury to head.
- 251. Deafness, one ear.
- 252. Deafness, both ears.
- 253. Injury to one ear.
- 254. Injury to both ears.
- 255. Injury to shoulder (with the arm).
- 256. Fracture of shoulder blade or scapula.
- 257. Fracture of collar bone.
- 258. Fracture of sternum or breastbone.
- 260. Fracture of ribs (one).
- 261. Fracture of ribs (several).
- 264. Injury to trunk.
- 265. Injury to penis.
- 266. Injury to testicles.
- 268. Rupture.
- 271. Injury to several parts of body.
- 275. Internal injuries.
- 280. Concussion of the brain.
- 285. Miscellaneous (stroke, hemorrhage, blood poison, sunstroke, etc.).
- 290. Suffocation.
- 295. Drowning.
- 300. Traumatic neurosis.
- 305. Facial disfigurement and injury.
- 306. Fracture of the nose.
- 309. Scalds, burns, etc., not located.
- 315. Fatal.

*Dislocations.*

- 325. Shoulder joint.
- 326. Elbow joint.
- 327. Wrist joint.
- 328. One finger joint.
- 329. More than one finger.
- 330. Hip.
- 331. Knee.
- 332. Ankle.
- 333. One toe.
- 334. Two or more toes.
- 335. Vertebrae.

**APPENDIX X.—OFFICIAL CLASSIFICATION OF INDUSTRIAL ACCIDENTS,  
BY NATURE OF INJURY AND DEGREE OF PHYSICAL IMPAIRMENT—  
INDUSTRIAL ACCIDENT COMMISSION OF CALIFORNIA.**

Disability number.	Nature of disability.	Line.
<i>I. The skull.</i>		
I-1.	Aperture unfilled with new bone:	
	Slight.....	0
	Moderate.....	21
	Severe.....	59
I-2.	Aphasia:	
	Slight.....	6
	Moderate.....	41
	Severe.....	64
I-3.	Ataxia:	
	Slight.....	31
	Moderate.....	56
	Severe.....	64
I-4.	Epilepsy:	
	Slight.....	21
	Moderate.....	59
	Severe.....	64
I-5.	Insanity:	
	Slight.....	62
	Moderate.....	63
	Severe.....	64
I-6.	Paralysis:	
	Slight.....	16
	Moderate.....	56
	Severe.....	64
I-7.	Vertigo:	
	Slight.....	6
	Moderate.....	46
	Severe.....	64
I-8.	Weakening of the intellect:	
	Slight.....	16
	Moderate.....	46
	Severe.....	59
I-9.	Traumatic neurosis:	
	Slight.....	16
	Moderate.....	46
	Severe.....	57
<i>II. The eye.</i>		
II-1.	Complete loss of both eyes.....	64
II-2.	Complete loss of the sight of both eyes.....	64
II-3.	Complete loss of one eye.....	26
II-4.	Complete loss of the sight of one eye.....	21

Disability number.	Nature of disability.	Line.
II-5.	Complete loss of the sight of one eye, plus such impairment of the sight of the other as prevents reading or writing, but not the ability to find one's way:	
	Slight.....	58
	Moderate.....	60
	Severe.....	62
II-6.	Loss of the sight of one eye, leaving no scar or blemish such as would afford an observer evidence of such loss.....	16
II-7.	Permanent impairment of the vision of both eyes to the extent of rendering them useless for purposes of high visual requirement, but not for finding one's way:	
	Slight.....	57
	Moderate.....	59
	Severe.....	61
II-8.	Such a permanent impairment of the vision of one eye as renders it useless for purposes of high visual requirement, but not affecting one's ability to find one's way, the other eye being uninjured.....	6
II-9.	Hemorrhage of the eye, causing defective vision at times only.....	6
II-10.	Paralysis of the muscles of both eyes by reason of injury to the sockets causing double vision.....	41
II-11.	Paralysis of the muscles of one eye by reason of injury to the socket of that eye, causing immobility and double vision.....	21
II-12.	Injury to the eye socket, causing immobility of eyeball with attendant impairment of range of vision only.....	16
II-13.	Laceration of lachrymal duct, causing chronic overflow of tears.....	6

*III. The ear.*

III-1.	Complete deafness in both ears.....	36
III-2.	Complete deafness in one ear, other normal.....	6
III-3.	Such a degree of deafness in both ears as interferes with ability to compete, without otherwise substantially interfering with the performance of industrial duties.....	16
III-4.	Chronic inflammation of internal or middle ear with discharge.....	16

*IV. The face.*

	Such injuries to the nasal bones, cheek bones, or jaws as interfere in a positive degree with the performance of the normal functions of the:	
IV-1, a.	a. Nose.....	6
IV-1, b.	b. Mouth—	
	Slight.....	0
	Moderate.....	16
	Severe.....	26
IV-2.	Such injuries of the nose and face as, by reason of the disfigurement, make the injured person so repulsive as to interfere with his ability to compete in obtaining employment, there being no permanent functional impairment:	
	Slight.....	6
	Moderate.....	11
	Severe.....	16
IV-3.	Such irreparable injury to or loss of teeth as produces deficient mastication of foods and consequent malnutrition.....	11

Disability number.	Nature of disability.	Line.
<i>V. The neck.</i>		
V-1.	Such an injury to the throat as necessitates the constant wearing of a tracheal tube.....	46
V-2.	Loss of speech due to injury to vocal organs.....	26
V-3.	Such a difficulty in speaking as results in loss of ability to compete, through indistinct articulation.....	6
V-4.	Permanent contraction of larynx, resulting in difficult breathing.....	36
<i>VI. The chest.</i>		
VI-1.	Reduction in mobility of the chest by reason of injury:	
	Slight.....	6
	Moderate.....	26
	Severe.....	46
VI-2.	Chronic affections of the pulmonary tissues resulting from injury:	
	Slight.....	6
	Moderate.....	36
	Severe.....	59
VI-3.	Well marked dilation of the heart as a result of sudden violent and accidental exertion, resulting in permanent "heart disease".....	58
VI-4.	Rupture of the aortic valves as a result of sudden violent and accidental exertion, resulting in permanent "heart disease".....	58
VI-5.	Any other disease of the heart, induced by industrial accident, that becomes chronic and incurable, such as myocarditis and aneurysm.....	58
<i>VII. Shoulders and arms.</i>		
VII-1.	Irreducible fracture, or faulty union of collar bone, resulting in decided limitation of motion of major arm.....	16
VII-2.	Same as foregoing to minor arm.....	11
VII-3.	Ankylosis (stiffness) of the major shoulder joint, not permitting arm to be raised above a level with the shoulder.....	16
VII-4.	Same as foregoing to minor shoulder.....	11
VII-5.	Fixation of shoulder joint of major arm more severe than above described.....	26
VII-6.	Same, severe fixation of shoulder joint of minor arm.....	21
VII-7.	Habitual dislocation of either shoulder as a result of industrial injury..	21
VII-8.	Loss of major arm at shoulder or between shoulder and elbow.....	56
VII-9.	Loss of minor arm at shoulder or between shoulder and elbow.....	51
VII-10.	Loss of major arm at elbow joint.....	51
VII-11.	Loss of minor arm at elbow joint.....	46
VII-12.	Stiff elbow at full flexion, major arm (after operation).....	41
VII-13.	Stiff elbow at full flexion, minor arm (after operation).....	36
VII-14.	Stiff elbow joint at right angle flexion, major arm (after operation)....	31
VII-15.	Stiff elbow joint at right angle flexion, minor arm (after operation)....	26
VII-16.	Stiff elbow at full extension, major arm (after operation).....	41
VII-17.	Stiff elbow joint at full extension, minor arm (after operation).....	36
VII-18.	Loss of major arm between elbow and wrist.....	46
VII-19.	Loss of minor arm between elbow and wrist.....	41
VII-20.	Stiff wrist joint, major arm, severely involving fingers (after operation).	21
VII-21.	Stiff wrist joint, minor arm, severely involving fingers (after operation).	16
VII-22.	Severe limited motion in elbow and wrist joints, major arm (after operation).....	26

Disability number.	Nature of disability.	Line.
VII-23.	Severe limited motion in elbow and wrist joints, minor arm (after operation).....	21
VII-24.	Severe limited action, wrist of major arm (after operation).....	16
VII-25.	Severe limited action, wrist of minor arm (after operation).....	11
VII-26.	Loss of both arms at shoulder, or between shoulder and elbow.....	64
VII-27.	Loss of both arms at elbow joint.....	64
VII-28.	Loss of both arms between elbow and wrist.....	64

*VIII. The hands.*

VIII-1.	Loss of major hand at the wrist joint.....	41
VIII-2.	Loss of minor hand at the wrist joint.....	36
VIII-3.	Loss of both hands at the wrist joint.....	64

*IX. The thumbs.*

IX-1.	Loss of thumb of major hand, involving the metacarpal bone.....	12
IX-2.	Loss of thumb of minor hand, involving the metacarpal bone.....	11
IX-3.	Loss of thumbs of both hands, involving the metacarpal bones.....	26
IX-4.	Loss of end of thumb of major hand at distal joint.....	2
IX-5.	Loss of end of thumb of minor hand at distal joint.....	1
IX-6.	Loss of end of thumbs of both hands at distal joint.....	6
IX-7.	Loss of thumb of major hand at proximal joint.....	6
IX-8.	Loss of thumb of minor hand at proximal joint.....	5
IX-9.	Loss of thumbs of both hands at proximal joint.....	14
IX-10.	Immobility of the distal joint of thumb of major hand.....	2
IX-11.	Immobility of the distal joint of thumb of minor hand.....	1
IX-12.	Immobility of the distal joint of thumbs of both hands.....	6
IX-13.	Immobility of proximal joint of thumb of major hand.....	2
IX-14.	Immobility of proximal joint of thumb of minor hand.....	1
IX-15.	Immobility of proximal joint of thumbs of both hands.....	6
IX-16.	Immobility of both thumb joints of major hand.....	6
IX-17.	Immobility of both thumb joints of minor hand.....	5
IX-18.	Immobility of both thumb joints of both hands.....	14
IX-19.	Contracture of thumb on major hand.....	6
IX-20.	Contracture of thumb on minor hand.....	5
IX-21.	Contracture of thumb on both hands.....	14

*X. Index finger.*

X-1.	Loss of index finger at proximal joint, major hand.....	4
X-2.	Loss of index finger at proximal joint, minor hand.....	3
X-3.	Loss of index finger at proximal joint, both hands.....	11
X-4.	Loss of index finger at second joint, major hand.....	2
X-5.	Loss of index finger at second joint, minor hand.....	1
X-6.	Loss of index fingers at second joint, both hands.....	8
X-7.	Loss of index finger at distal joint, major hand.....	2
X-8.	Loss of index finger at distal joint, minor hand.....	1
X-9.	Loss of index finger at distal joint, both hands.....	4
X-10.	Immobility (ankylosis) of index finger, major hand.....	2
X-11.	Immobility of index finger, minor hand.....	1
X-12.	Immobility of index fingers, both hands.....	6

Disability number.	Nature of disability.	Line.
X-13.	Immobility of distal and middle joints of index finger, major hand...	2
X-14.	Immobility of distal and middle joints of index finger, minor hand...	1
X-15.	Immobility of distal and middle joints, both hands.....	4
X-16.	Immobility of distal joint of index finger, major hand.....	2
X-17.	Immobility of distal joint of index finger, minor hand.....	1
X-18.	Immobility of distal joint of index fingers, both hands.....	2

*XI. Middle and ring fingers.*

XI-1.	Loss of either finger at proximal joint, major hand.....	2
XI-2.	Loss of either finger at proximal joint, minor hand.....	1
XI-3.	Loss of either finger at proximal joint, both hands.....	6
XI-4.	Loss of both fingers at proximal joint, major hand.....	6
XI-5.	Loss of both fingers at proximal joint, minor hand.....	5
XI-6.	Loss of both fingers at proximal joint, both hands.....	14
XI-7.	Loss of either finger at second joint, major hand.....	2
XI-8.	Loss of either finger at second joint, minor hand.....	1
XI-9.	Loss of either finger at second joint, both hands.....	2
XI-10.	Loss of both fingers at second joint, major hand.....	2
XI-11.	Loss of both fingers at second joint, minor hand.....	1
XI-12.	Loss of both fingers at second joint, both hands.....	6
XI-13.	Loss of either finger at the distal joint, major hand.....	1
XI-14.	Loss of either finger at the distal joint, minor hand.....	1
XI-15.	Loss of either finger at the distal joint, both hands.....	2
XI-16.	Loss of both fingers at the distal joint, major hand.....	2
XI-17.	Loss of both fingers at the distal joint, minor hand.....	1
XI-18.	Loss of both fingers at the distal joint, both hands.....	2
XI-19.	Immobility of either finger at proximal joint, major hand.....	2
XI-20.	Immobility of either finger at proximal joint, minor hand.....	1
XI-21.	Immobility of either finger at proximal joint, both hands.....	6
XI-22.	Immobility of both fingers at proximal joint, major hand.....	6
XI-23.	Immobility of both fingers at proximal joint, minor hand.....	5
XI-24.	Immobility of both fingers at proximal joint, both hands.....	12
XI-25.	Immobility of either finger at second joint, major hand.....	2
XI-26.	Immobility of either finger at second joint, minor hand.....	1
XI-27.	Immobility of either finger at second joint, both hands.....	5
XI-28.	Immobility of both fingers at second joint, major hand.....	5
XI-29.	Immobility of both fingers at second joint, minor hand.....	4
XI-30.	Immobility of both fingers at second joint, both hands.....	11
XI-31.	Immobility of either finger at distal joint, major hand.....	1
XI-32.	Immobility of either finger at distal joint, minor hand.....	1
XI-33.	Immobility of either finger at distal joint, both hands.....	1
XI-34.	Immobility of both fingers at distal joint, major hand.....	2
XI-35.	Immobility of both fingers at distal joint, minor hand.....	2
XI-36.	Immobility of both fingers at distal joint, both hands.....	2
XI-37.	Curvature of either finger, major hand.....	1
XI-38.	Curvature of either finger, minor hand.....	2
XI-39.	Curvature of either finger, both hands.....	2
XI-40.	Curvature of both fingers, major hand.....	2
XI-41.	Curvature of both fingers, minor hand.....	1
XI-42.	Curvature of both fingers, both hands.....	6

Disability number.	Nature of disability.	Line.
<i>XII. The little finger.</i>		
XII-1.	Loss of little finger at proximal joint, major hand.....	2
XII-2.	Loss of little finger at proximal joint, minor hand.....	1
XII-3.	Loss of little finger at proximal joint, both hands.....	2
XII-4.	Loss of little finger at second joint, major hand.....	2
XII-5.	Loss of little finger at second joint, minor hand.....	1
XII-6.	Loss of little finger at second joint, both hands.....	2
XII-7.	Loss of little finger at distal joint, major hand.....	1
XII-8.	Loss of little finger at distal joint, minor hand.....	1
XII-9.	Loss of little finger at distal joint, both hands.....	1
XII-10.	Immobility of little finger, major hand.....	2
XII-11.	Immobility of little finger, minor hand.....	1
XII-12.	Immobility of little finger, both hands.....	2
XII-13.	Curvature of little finger, major hand.....	2
XII-14.	Curvature of little finger, minor hand.....	1
XII-15.	Curvature of little finger, both hands.....	2
<i>XIII. Thumb and forefinger.</i>		
XIII-1.	Loss of thumb and forefinger at proximal joints, major hand.....	26
XIII-2.	Loss of thumb and forefinger at proximal joints, minor hand.....	23
XIII-3.	Loss of thumb and forefinger at proximal joints, both hands.....	51
XIII-4.	Loss of forefinger at second joint, thumb at distal joint, major hand...	11
XIII-5.	Loss of forefinger at second joint, thumb at distal joint, minor hand...	8
XIII-6.	Loss of forefinger at second joint, thumb at distal joint, both hands...	21
XIII-7.	Loss of forefinger and thumb at distal joints, major hand.....	8
XIII-8.	Loss of forefinger and thumb at distal joints, minor hand.....	5
XIII-9.	Loss of forefinger and thumb at distal joints, both hands.....	16
XIII-10.	Immobility of forefinger and thumb, major hand.....	16
XIII-11.	Immobility of forefinger and thumb, minor hand.....	13
XIII-12.	Immobility of forefinger and thumb, both hands.....	31
XIII-13.	Curvature of forefinger and thumb, major hand.....	14
XIII-14.	Curvature of forefinger and thumb, minor hand.....	11
XIII-15.	Curvature of forefinger and thumb, both hands.....	21
<i>XIV. Thumb, forefinger, and middle finger.</i>		
XIV-1.	Loss of, at proximal joints, major hand.....	31
XIV-2.	Loss of, at proximal joints, minor hand.....	29
XIV-3.	Loss of, at proximal joints, both hands.....	61
XIV-4.	Loss of forefinger and middle finger at second joints, thumb at distal joint, major hand.....	21
XIV-5.	Loss of forefinger and middle finger at second joints, thumb at distal joint, minor hand.....	19
XIV-6.	Loss of forefinger and middle finger at second joints, thumb at distal joint, both hands.....	41
XIV-7.	Loss of, at distal joints, major hand.....	16
XIV-8.	Loss of, at distal joints, minor hand.....	14
XIV-9.	Loss of, at distal joints, both hands.....	31
XIV-10.	Immobility of, major hand.....	21
XIV-11.	Immobility of, minor hand.....	19
XIV-12.	Immobility of, both hands.....	41
XIV-13.	Curvature of, major hand.....	18
XIV-14.	Curvature of, minor hand.....	16
XIV-15.	Curvature of, both hands.....	31

Disability number.	Nature of disability.	Line.
<i>XV. Thumb and all the fingers.</i>		
XV-1.	Loss of, at or above second joints, thumb at proximal joint, major hand.	36
XV-2.	Loss of, at or above second joints, thumb at proximal joint, minor hand.....	34
XV-3.	Loss of, at or above second joints, thumb at proximal joint, both hands.....	58
XV-4.	Loss of, at distal joints, major hand.....	21
XV-5.	Loss of, at distal joints, minor hand.....	19
XV-6.	Loss of, at distal joints, both hands.....	36
XV-7.	Immobility of, major hand.....	31
XV-8.	Immobility of, minor hand.....	29
XV-9.	Immobility of, both hands.....	58
XV-10.	Curvature of, major hand.....	31
XV-11.	Curvature of, minor hand.....	29
XV-12.	Curvature of, both hands.....	57
<i>XVI. All the fingers, not including thumb.</i>		
XVI-1.	Loss of, at or above second joints, major hand.....	34
XVI-2.	Loss of, at or above second joints, minor hand.....	32
XVI-3.	Loss of, at or above second joints, both hands.....	56
XVI-4.	Loss of, at distal joints, major hand.....	21
XVI-5.	Loss of, at distal joints, minor hand.....	19
XVI-6.	Loss of, at distal joints, both hands.....	41
XVI-7.	Immobility of, major hand.....	26
XVI-8.	Immobility of, minor hand.....	24
XVI-9.	Immobility of, both hands.....	56
XVI-10.	Curvature of, major hand.....	23
XVI-11.	Curvature of, minor hand.....	21
XVI-12.	Curvature of, both hands.....	46
<i>XVII. Injuries to different fingers on both hands.</i>		
XVII-1.	Loss of thumb and index finger, or the use thereof, of one hand and the middle, ring and little fingers of the other.....	41
XVII-2.	Loss of thumb, index and middle fingers, or the use thereof, of one hand, and the thumb and index finger of the other.....	58
XVII-3.	Loss of the middle, index and ring fingers, or the use thereof, of one hand, and the index and middle fingers of the other.....	36
XVII-4.	Loss of all the fingers of one hand, except the index, or the use thereof, and the thumb of the other.....	56
XVII-5.	Loss of thumb and index finger, or the use thereof, of one hand, and the little finger of the other.....	26
XVII-6.	Loss of thumb, ring and little fingers, or the use thereof, of the one hand, and ring and little fingers of the other.....	36
<i>XVIII. The spine.</i>		
XVIII-1.	Such fracture or dislocation of one or more vertebræ as, without attendant injury to the spinal cord, proves irreducible and results in deformity:	
	Slight.....	16
	Moderate.....	31
	Severe.....	56

Disability number.	Nature of disability.	Line.
XVIII-2.	Loss of mobility of the spinal column:	
	Slight.....	26
	Moderate.....	46
	Severe.....	64
XVIII-3.	Such injury to the coccyx as produces chronic neuralgia:	
	Slight.....	0
	Moderate.....	6
	Severe.....	46
XVIII-4.	Such injury to the spinal cord as produces paralysis of the extremities..	64
XVIII-5.	Such injury to the spinal cord as produces chronic incontinence of urine or feces.....	64

*XIX. The abdomen.*

XIX-1.	Chronic disease of any of the abdominal organs, arising from industrial injury and resulting in permanent derangement of their functions, or impairment of nutrition:	
	Slight.....	16
	Moderate.....	46
	Severe.....	60
XIX-2.	Laceration of abdominal muscles, resulting in constant danger of hernia as a consequence of overstrain:	
	Slight.....	6
	Moderate.....	26
	Severe.....	46
XIX-3.	Chronic intestinal obstruction, consequent upon peritonitis arising from industrial injury:	
	Slight.....	6
	Moderate.....	26
	Severe.....	46
XIX-4.	Permanent adhesions of organs to wall of abdomen, or to other organs, consequent upon peritonitis arising from industrial injury:	
	Slight.....	6
	Moderate.....	36
	Severe.....	58
XIX-5.	Rupture, must indubitably be the result of accident:	
	Congenital inguinal.....	6
	Direct inguinal.....	6
	Oblique inguinal.....	6
XIX-6.	Rupture, old, rendered irreducible through accident.....	6
XIX-7.	Bladder, chronic inflammation of, following accident.....	26
XIX-8.	Bladder, stone in, following accidental rupture.....	26

*XX. The pelvis.*

XX-1.	Such fracture of the pelvic ring as leaves deformity and lameness and permanent incapacity for the performance of arduous employment:	
	Slight.....	46
	Moderate.....	59
	Severe.....	64

Disability number.	Nature of disability. <i>XXI. Lower extremities.</i>	Line.
XXI-1.	Loss of both legs at or above knee joint.....	62
XXI-2.	Loss of one leg at or above knee joint.....	46
XXI-3.	Failure of fracture of hips to unite (false joint), both hips.....	63
XXI-4.	Failure of fracture of hip to unite (false joint), one hip.....	59
XXI-5.	Irregular union of fracture in the thigh or leg, with considerable short- ening of limb.....	16
XXI-6.	Irregular union of fracture, with such limitation of motion as produces permanent lameness.....	21
XXI-7.	Complete immobility of hip joint in extension of the thigh.....	21
XXI-8.	Complete immobility of hip joint in flexion of the thigh.....	56
XXI-9.	Loss of both legs at or above ankle and below knee joint.....	60
XXI-10.	Loss of one leg at or above ankle and below knee joint.....	36
XXI-11.	Complete immobility of knee joint in extension.....	16
XXI-12.	Complete immobility of knee joint in slight flexion, obtuse angle....	14
XXI-13.	Complete immobility of knee joint in strong flexion, in an acute angle..	36
XXI-14.	Loose knee joint.....	16
XXI-15.	Such a stretching of the ligaments of the knee as results in chronic instability of the joint.....	16
XXI-16.	Loss of both feet, in tarsus.....	56
XXI-17.	Loss of both feet, in metatarsus.....	36
XXI-18.	Loss of one foot, in tarsus.....	21
XXI-19.	Loss of one foot, in metatarsus.....	16
XXI-20.	Loose ankle joint.....	11
XXI-21.	Complete immobility of ankle joint, one foot.....	11
XXI-22.	Complete immobility of ankle joints, both feet.....	26
XXI-23.	Fixation of ankle with foot at right angle to leg.....	6
XXI-24.	Fixation of ankle with foot at oblique angle to leg.....	6
XXI-25.	Loss of great toes of both feet.....	11
XXI-26.	Loss of great toe of one foot.....	4
XXI-27.	Loss of all toes of both feet, including great toes.....	21
XXI-28.	Loss of all toes of one foot, including great toe.....	11

**APPENDIX XI.—OFFICIAL CLASSIFICATION OF INDUSTRIAL ACCIDENTS,  
BY DEGREE OR KIND OF DISABILITY, OR PART OR PORTION OF  
BODY INJURED—INDUSTRIAL COMMISSION OF WISCONSIN.**

*I. General character of injury.*

- 0. Loss or amputation.
- 1. Loss of function.
- 2. Fracture.
- 3. Dislocation.
- 4. Sprain or strain.
- 5. Laceration or abrasion.
- 6. Cut or puncture.
- 7. Bruise or contusion.
- 8. Burn or scald.
- 9. Infection.
- X. Rupture.
- Y. All other.

*II. Part of body affected.*

a. Head:

- 00. Skull or scalp.
- 01. Nose.
- 02. Jaw or chin.
- 03. Teeth.
- 04. Eye.
- 05. Second eye.
- 06. Both eyes.
- 07. Ear.
- 08. Second ear.
- 09. Both ears.

0X. Other part of face or neck.

b. Trunk:

- 10. Chest.
- 11. Back.
- 12. Small of back.
- 13. Abdomen.
- 14. Groin.
- 15. Sternum.
- 16. Ribs.
- 17. Vertebrae.
- 18. Pelvis.
- 19. Genitals.
- 1X. Viscera.

Hernia:

- X13. Umbilical.
- X19. Inguinal.
- X14. Femoral or crural.

c. Upper extremities:

- 20. Clavicle.
- 21. Scapula.

*II. Part of body affected—Continued.*

c. Upper extremities—Concluded.

- 22. Arm, upper, right.
- 23. Arm, upper, left.
- 24. Arm, upper, both.
- 25. Arm, lower, right.
- 26. Arm, lower, left.
- 27. Arm, lower, both.
- 28. Wrist, right.
- 29. Wrist, left.
- 2X. Wrist, both.
- 2Y. Multiple arm injuries, n. o. c.

d. Lower extremities:

- 30. Leg, upper.
- 31. Leg, upper, both.
- 32. Knee.
- 33. Both knees.
- 34. Leg, lower.
- 35. Leg, lower, both.
- 36. Foot.
- 37. Both feet.
- 39. Leg and foot injuries, multiple,  
n. o. c.
- 3X. Multiple leg and arm injuries,  
n. o. c.

e. Hand:

- 40. Palm, right.
- 41. Palm, left.
- 42. Palm, both.
- 43. First metacarpal, right.
- 44. First metacarpal, left.
- 45. First metacarpal, both.
- 46. Thumb at proximal, right.
- 47. Thumb at proximal, left.
- 48. Thumb at proximal, both.
- 49. Thumb at second or distal, right.
- 4X. Thumb at second or distal, left.
- 4Y. Thumb at second or distal, both.
- 50. Second metacarpal, right.
- 51. Second metacarpal, left.
- 52. Second metacarpal, both.
- 53. Index finger at proximal, right.
- 54. Index finger at proximal, left.
- 55. Index finger at proximal, both.
- 56. Index finger at distal, right.
- 5X. Index finger at distal, left.

II. *Part of body affected*—Continued.

## e. Hand—Continued.

- 5Y. Index finger at distal, both.
- 60. Third metacarpal, right.
- 61. Third metacarpal, left.
- 62. Middle finger at proximal, right.
- 63. Middle finger at proximal, left.
- 64. Middle finger at proximal, both.
- 65. Middle finger at second, right.
- 66. Middle finger at second, left.
- 67. Middle finger at second, both.
- 68. Middle finger at distal, right.
- 69. Middle finger at distal, left.
- 6X. Middle finger at distal, both.
- 70. Fourth metacarpal, right.
- 71. Fourth metacarpal, left.
- 72. Ring finger at proximal, right.
- 73. Ring finger at proximal, left.
- 74. Ring finger at second.
- 75. Ring finger at distal.
- 76. Fifth metacarpal, right.
- 77. Fifth metacarpal, left.
- 78. Little finger at proximal, right.
- 79. Little finger at proximal, left.
- 7X. Little finger at second.
- 7Y. Little finger at distal.
- 80. Four fingers, right hand.
- 81. Four fingers, left hand.
- 82. Four fingers, both hands.
- 83. Thumb and index fingers, right hand.
- 84. Thumb and index fingers, left hand.
- 85. Thumb and index fingers, both hands.
- 86. Index and little finger, right hand.

II. *Part of body affected*—Concluded.

## e. Hand—Concluded.

- 87. Index and little finger, left hand.
- 88. Index and little finger, both hands.
- 89. Finger or fingers, n. o. c. (minor injuries only).
- 8X. Multiple finger injuries, n. o. c.

## f. Toes:

- 90. Great toe and metatarsal.
- 91. Great toe at second or distal.
- 92. Lesser toe and metatarsal.
- 93. Lesser toe at proximal.
- 94. Lesser toe at second or distal.
- 95. Metatarsal.
- 96. All toes, one foot.
- 97. All toes, both feet.
- 98. Both great toes.
- 99. Great toe and one lesser toe, same foot.
- 9X. Multiple toe injuries, n. o. c.

III. *General result of injury.*

- 000. Death.
- 001. Permanent total disability.
- 002. Permanent partial disability.
- 003. Temporary disability.

*Degree of permanent partial disability.*

- 004. 0 to 10 per cent.
- 005. 11 to 20 per cent.
- 006. 21 to 40 per cent.
- 007. 41 to 60 per cent.
- 008. 61 to 80 per cent.
- 009. Over 80 per cent.

*Distribution of temporary disabilities by duration of disability.*

- Trivial, not over 1 day.
- Minor, 1 to 7 days.
- One to 2 weeks, 8 to 14 days.
- Two to 3 weeks, 15 to 21 days.
- Three to 4 weeks, 22 to 28 days.
- Four to 6 weeks, 29 to 42 days.
- Six to 8 weeks, 43 to 56 days.
- Eight to 13 weeks, 57 to 91 days.
- Three to 6 months, 92 to 182 days.
- Over 6 months, over 182 days.

**APPENDIX XII.—STANDARD FORM FOR REPORTING INDUSTRIAL DISEASES USED BY NEW YORK STATE DEPARTMENT OF LABOR.**

NEW YORK STATE DEPARTMENT OF LABOR—BUREAU OF LABOR STATISTICS.

CERTIFICATE OF INDUSTRIAL DISEASE.

Name of patient .....

Address: Street and No..... City or village.....

Personal and statistical particulars.

Sex.	Age.	Color.	Country of birth.
------	------	--------	-------------------

Single, married, widowed or divorced (*write the word*).

Occupation.

(a) Present trade, profession, or work.....

Particular kind of work in such trade, etc.....

Date of entering present occupation.....

Employer's name.....

Address.....

Business (kind of goods made or work done).....

(b) Previous occupations.

Name of occupation.	Entered (year.)	Left (year.)
---------------------	-----------------	--------------

Previous illnesses, if any, due to occupation.

Disease or illness.	Year.
---------------------	-------

Medical certificate of disease.

Diagnosis of present illness.....

Chief symptoms and conditions..

Date first symptoms appear.....

Complicating diseases (such as alcoholism, syphilis, tuberculosis, etc.)

Additional facts.....

Date of diagnosis....., 191..

(Signed)....., M. D.

....., 191...

(Address).....

Mail to Bureau of Labor Statistics, Albany, New York.

(over)

WRITE PLAINLY WITH INK—THIS IS A PERMANENT RECORD.

N. B.—Every item of information should be carefully supplied. The exact statement of occupation is very important. Physicians should state diagnosis in plain terms. See instructions on back of certificate.

## NEW YORK STATE DEPARTMENT OF LABOR.

## BUREAU OF LABOR STATISTICS.

ALBANY, N. Y.

By section 58 of the labor law (added by chapter 258, Laws of 1911) every medical practitioner attending a patient suffering from poison by *lead, phosphorus, arsenic, or mercury, or their compounds, or from anthrax, or from compressed-air illness*, contracted as a result of the patient's employment is required to report such cases to the Commissioner of Labor with such information in relation thereto as may be required by him. The cooperation of the medical profession is sought by the Commissioner of Labor, however, for the reporting not only of these industrial diseases reportable by law, but also of *any other* cases of illness due, in the physician's opinion, to the nature of the patient's employment.

These forms are furnished by the Department of Labor and should be used for all reports. In filling out, note carefully the instructions below.

## INSTRUCTIONS FOR FILLING OUT CERTIFICATE.

*In general.*—The *medical certificate* on the right-hand side the physician alone can furnish. The *personal and statistical particulars* on the left-hand side must be secured by the physician either from the patient, or, in fatal cases, from the family precisely as for similar information in certificates of death sent to boards of health.

*Present occupation.*—*Precise* statement of occupation is very important so that the relative healthfulness of various pursuits may be known. It is necessary to know both general trade or profession (for example, *printer or brass worker*) and also the particular kind of work or branch of the trade (as *hand compositor or linotype operator* for a printer, or *polisher or buffer* for a brass worker).

*Date of entering present occupation* is important to determine how long the worker may have been exposed to the hazard before contracting the disease.

*Employer's name, address and business* are necessary to ascertain distribution of occupation diseases by industries, many trades (e. g., machinists) being common to different industries.

*Previous occupations* need to be known, if possible, because present illness may be due to a former, rather than present occupation, and industrial disease is frequently

a cause of change of occupation. Give simply the name of each distinct occupation which the patient may have followed, with the year he entered, and the year he left, each one.

*Previous illnesses.*—This refers either to previous attacks of present disease, or to any other disease, *due to occupation*. All that is required is the name of each such disease or illness with the year in which it occurred. Such information, when it can be secured, will show whether the case reported is the first attack or not, and when combined with statement of previous occupations, will afford an outline history of the patient as to occupational disease.

*Medical certificate.*—Only the last two items specified for this require any explanation. In making these reports it is necessary to consider the possible influence of factors other than occupation as causes of the disease. For this reason any *complicating diseases* should be noted, such, for example, as alcoholism or syphilis in connection with arteriosclerosis in cases of lead or other metal poisoning. The possible effect of other factors, such as poor hygienic conditions in the home, or other personal conditions, must be considered, and when discoverable should be noted under *additional facts*.

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