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INDUSTRIAL ACCIDENTS AND HYGIENE SERIES

**RECORD OF INDUSTRIAL ACCIDENTS
IN THE UNITED STATES TO 1925**



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BULLETIN OF THE U. S. BUREAU OF LABOR STATISTICS

No. 425

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JANUARY, 1927

RECORD OF INDUSTRIAL ACCIDENTS IN THE UNITED STATES TO 1925

INTRODUCTION

The United States Bureau of Labor Statistics has issued three bulletins¹ bringing together as far as possible the important records of industrial accidents on a national scale. Two of these were prepared by Dr. Frederick L. Hoffman and were issued in 1908 and 1914. The third, prepared by the bureau staff, was published in 1923 and brought the data for the most part up to the year 1920.

In the introduction to the second bulletin Doctor Hoffman comments as follows: "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 for the iron and steel industries, mining, and the railways." As time has gone on, the three Federal agencies concerning themselves with accident statistics, namely, the Interstate Commerce Commission, the Bureau of Mines, and the Bureau of Labor Statistics, have so improved their methods of collecting and handling accident data that what they offer may be fairly claimed to be "trustworthy," though in the nature of the case it would be beyond reasonable expectation that they should be "entirely complete."

As compensation legislation spread rapidly over the several States there rose necessarily a new and insistent demand for accident statistics which would shed light on the various problems of compensation administration. In response to this demand there has been an immense accumulation of the raw material of statistics. It would appear to be a rather simple matter to combine the records of the several States and so produce a national compilation of much interest and utility. Unfortunately the States have adopted procedures sufficiently different to make it difficult and in many cases impossible to combine these records in a general exhibit. The primary reason for this is that the State agencies have found themselves so involved in the multiplied problems of compensation that they have been quite unable to give adequate attention to the really more important problems of accident prevention.

Ultimately it will be necessary for all States to do what some have already done, namely, to grapple with the matter of accident prevention. It is to be hoped that when this time comes there will be an intelligent correlation between the statistical service and the inspection service so that the statistical information may contribute its full share to the desired end.

It may be well, therefore, to restate the statistical items which are essential to an effective accident prevention program.

¹ United States Bureau of Labor Statistics Bul. No. 78: Industrial accidents; Bul. No. 157: Industrial accident statistics; and Bul. No. 339: Statistics of industrial accidents in the United States.

(1) *Exposure to hazard.*—A very large part of the statistical effort regarding accidents has been devoted to the mere sorting and recording of cases. That this gives little information which can be utilized for the purpose now under consideration may be established by a few illustrations. When the accidents for a 6-year period in Pennsylvania are grouped by industries it appears that coal mining has 300,524 accidents while metals and metal products have 343,163. A hasty inference from this result would be that the production of metals and metal products is more dangerous than coal mining. A little reflection will show the inaccuracy of that conclusion. While metals and metal products have more accident cases it may be that there are many more people employed therein than in coal mining. In other words, exposure to hazard in metals and metal products may be much greater both because more people are employed and because they work longer hours. Clearly, to understand the relation of these two groups something more is necessary than merely to know the number of accidents occurring in each.

This raises the question of an appropriate method of expressing this element of exposure to hazard. The Germans were the first to attack the problem. Their solution was to note the number of days during which each workman was employed. The sum of the days worked by all the workmen was then divided by 300 on the supposition that the usual working year was one of 300 days of 10 hours each. The quotient thus derived gave the number of 300-day or full-year workers. The number of accidents was then divided by this base and the quotient multiplied by 1,000 to avoid small decimals. The use of this theoretical 300-day worker as a base for calculating accident rates was adopted by the Bureau of Labor Statistics when it began its accident studies.

There were, however, troublesome difficulties in the use of this base and the International Association of Industrial Accident Boards and Commissions finally determined, at the instance of its committee on statistics and accident insurance cost, to cut loose from the idea of the number of workers and use instead the hours of employment.² It was agreed that accident frequency rates should be expressed as number of cases per 1,000,000 hours of exposure while accident severity rates should be expressed as number of days lost per 1,000 hours of exposure. The method of determining severity rates and days lost is discussed in a succeeding paragraph.

The importance of exposure as an element in the study of industrial accidents has become more and more recognized with the passage of time. The Bureau of Labor Statistics was the first to utilize it on an extended scale. For some years now the Bureau of Mines and the Interstate Commerce Commission have presented their facts on this basis and many sections of the National Safety Council develop their accident data in this way.

(2) *Number of accidents.*—Having secured information regarding exposure to hazard the next step is to secure a record of the number of cases of injury. A serious difficulty presents itself at once in the fact that the definition of an accident varies in the different States. The most widely used definition is that of a "tabulatable accident." This definition is "an accident causing death, permanent disability,

² See United States Bureau of Labor Statistics Bul. No. 276, pp. 17 and 68.

TABLE 1.—NATURE OF INFORMATION AS TO ACCIDENTS FROM 1920 TO 1924 SECURED FROM THE SEVERAL STATES—Continued

1923

| States reporting accidents by— | | | | | | Source of information |
|---|------------------|------------------------|-------------------------|---------------------------|-----------------|---|
| Number (40) | Industry (11) | Cause of injury (9) | Nature of injury (7) | Location of injury (6) | Exposure (1) | |
| Ala..... | Ala..... | Ala..... | | | | First Quadrennial Report of Workmen's Compensation Commissioner. Report of State Mine Inspector for 1923. |
| Ariz. ¹ Calif..... | | Ariz..... | Artz..... | Ariz..... |  |  | Report of Industrial Accident Commission for 1922-23. Report of Industrial Commission for 1923-24. Response to special request. |
| Colo..... Conn..... | | | | | | Do. Do. Do. |
| Del..... Idaho..... Ill..... | | | | | | Report of Department of Labor for 1922-23. Report of Industrial Commission for 1924. |
| Iowa..... | | | | | | Report of Workmen's Compensation Service for 1922. Report of Workmen's Compensation Board for 1921-22. Response to special request. |
| Ky..... | Ky..... | Ky..... | Ky..... | | | Report of State Industrial Accident Commission for 1922. Report of Department of Industrial Accidents for 1922-23. |
| Me..... Md..... | | | | | | Response to special request. Report of Bureau of Labor for 1921-22. Response to special request. |
| Mass..... | Mass..... | Mass..... | Mass..... | Mass..... | | Report of State Industrial Accident Commission for 1922. Report of Department of Industrial Accidents for 1922-23. |
| Mich..... Minn..... Mont..... Nebr..... | | | | | | Response to special request. Report of Industrial Commission for 1921-22. Response to special request. Report of Labor and Compensation Commissioner for 1924. Report of Industrial Commission for 1920-1922. |
| Nev..... | Nev..... | | | | Nev..... | Report of Bureau of Labor for 1921-22. Response to special request. Do. Do. |
| N. H..... N. J..... N. Mex..... N. Y..... N. Dak..... | | | | | | Report of Workmen's Compensation Board for 1922-23. Report of Department of Industrial Relations, 1923. Response to special request. Do. Do. Do. |
| Ohio..... | | | | | | Report of Industrial Commissioner for 1923. Report of Department of Labor for 1923. Response to special request. Do. |
| Okla..... Oreg..... Pa..... R. I..... | | | | | | Do. Do. Do. |
| S. Dak..... Tenn..... Tex..... Utah..... Vt..... | | | | | | Report of Industrial Commissioner for 1923. Report of Department of Labor for 1923. Response to special request. Do. Report of Commissioner of Industries for 1920-1922. |
| Va..... | | | | | | Response to special request. Report of Department of Labor and Industries for 1922-23. Response to special request. |
| Wash..... | Wash..... | | | | | Response to special request. Wisconsin Labor Statistics, November, 1925; response to special request. |
| W. Va..... Wis..... Wyo..... | | | | | | Report of Workmen's Compensation Department for 1922. |

¹ Mines only.

TABLE 1.—NATURE OF INFORMATION AS TO ACCIDENTS FROM 1920 TO 1924 SECURED FROM THE SEVERAL STATES—Continued

1923

| States reporting accidents by— | | | | | | Source of information |
|--------------------------------|------------------|----------------------------|----------------------------|-------------------------------|----------------------|---|
| Number (39) | Industry (13) | Cause of injury (14) | Nature of injury (8) | Location of injury (10) | Expo- sure (1) | |
| Ariz. | | Ariz. | Ariz. | Ariz. | | Report of State Mine Inspector for 1923. Response to special request. Report of Industrial Commission for 1923-24. Response to special request. Do. |
| Calif. | | | | | | |
| Colo. | | | | | | |
| Conn. | | | | | | |
| Del. | | | | | | |
| Ga. | | | | | | Report of Industrial Commission for 1923. Response to special request. Report of Department of Labor for 1923-24; response to special request. |
| Idaho | | | | | | |
| Ill. | Ill. | Ill. | Ill. | Ill. | | |
| Ind. | | | | | | Report of Industrial Commission for 1924. Response to special request. |
| Iowa | | | | | | |
| Kans. | Kans. | Kans. | | | | Report of Court of Industrial Relations for 1923. |
| Ky. | Ky. | Ky. | Ky. | Ky. | | Report of Workmen's Compensation Board for 1923. |
| Me. | | | | | | Response to special request. |
| Md. | Md. | Md. | Md. | Md. | | Report of State Industrial Accident Commission for 1923. |
| Mass. | Mass. | Mass. | Mass. | Mass. | | Report of Department of Industrial Accidents for 1923-24. |
| Mich. | | | | | | Response to special request. |
| Minn. | Minn. | Minn. | Minn. | Minn. | | Report of Industrial Commission for 1923-24. |
| Mont. | | | | | | Report of Industrial Accident Board for 1923. |
| Nebr. | | | | | | Report of Labor and Compensation Commissioner for 1924. |
| Nev. | Nev. | | | | Nev. | Report of Industrial Commission for 1922-1924. |
| N. H. | N. H. | N. H. | | | | Report of Bureau of Labor for 1924. |
| N. J. | | | | | | Response to special request. |
| N. Y. | N. Y. | N. Y. | N. Y. | N. Y. | | Special Bulletin No. 126 of Department of Labor. |
| N. Dak. | | N. Dak. | | | | Report of Workmen's Compensation Bureau for 1923. |
| Ohio | | | | | | Report of Department of Industrial Relations for 1923-24. |
| Okla. | | | | | | Response to special request. |
| Oreg. | | | | | | Do. |
| Pa. | | | | Pa. | | Report of Bureau of Workmen's Compensation for 1923. |
| R. I. | | | | | | Response to special request. |
| S. Dak. | | | | | | Report of Industrial Commissioner for 1923. |
| Tenn. | Tenn. | Tenn. | | | | Report of Department of Labor for 1923. |
| Tex. | | | | | | Report of Industrial Accident Board for 1923. |
| Utah | Utah | Utah | | | | Bulletin No. 3 of Industrial Commission. |
| Vt. | | Vt. | Vt. | | | Report of Commissioner of Industries for 1922-1924. |
| Va. | Va. | Va. | | Va. | | Report of Industrial Commission for 1923. |
| Wash. | | | | | | Department of Labor and Industries' Report to Governor, 1924. |
| W. Va. | | | | | | Response to special request. |
| Wis. | Wis. | | | Wis. | | Labor Statistics, October, 1924; November, 1925. |
| Wyo. | | | | | | Response to special request. |

1 Mines only.

STATE ACCIDENT RECORDS

TABLE 1.—NATURE OF INFORMATION AS TO ACCIDENTS FROM 1920 TO 1924 SECURED FROM THE SEVERAL STATES—Continued

1924

| States reporting accidents by— | | | | | | Source of information |
|--------------------------------|---------------------|----------------------------|----------------------------|------------------------------|----------------------|--|
| Number (39) | Industry (16) | Cause of injury (14) | Nature of injury (8) | Location of injury (7) | Expo- sure (1) | |
| Ariz. ¹ | | Ariz. | Ariz. | Ariz. | | Report of State Mine Inspector for 1924. Response to special request. Report of Industrial Commission for 1923-24. Response to special request. Do. Do. Do. Do. Report of Industrial Commission for 1924. Response to special request. Report of Court of Industrial Relations for 1924. Report of Workmen's Compensation Board for 1924. Response to special request. Report of State Industrial Accident Commission for 1924. Response to special request. Do. Report of Industrial Commission for 1923-24. Report of Industrial Accident Board for 1924. Report of Labor and Compensation Commissioner for 1924. Report of Industrial Commission for 1922-1924. State report of Bureau of Labor for 1924. Report of Department of Labor for 1924. Response to special request. Report of Workmen's Compensation Bureau for 1924-25. Report of Department of Industrial Relations for 1924. Report of State Industrial Commission for 1924. Response to special request. Report of Bureau of Workmen's Compensation for 1924. Response to special request. Report of Industrial Commissioner for 1924. Report of Department of Labor for 1924. Report of Industrial Board for 1924. Bulletin No. 3 of Industrial Commission for 1924. Report of Commissioner of Industries for 1922-1924. Response to special request. Summary of Accidents, 1924, Department of Labor and Industries (sheet). Report of State Compensation Commissioner for 1924. Report of Industrial Commission of Wisconsin, 1924; and Wisconsin Labor Statistics, November, 1926. Report of Workmen's Compensation Department for 1924. |
| Calif. | Calif. ² | Calif. ² | Calif. ² | Calif. ² | | |
| Colo. | | | | | | |
| Conn. | | | | | | |
| Del. | | | | | | |
| Ga. | | | | | | |
| Idaho | Idaho | | | | | |
| Ill. | | | | | | |
| Ind. | | | | | | |
| Iowa | | | | | | |
| Kans. | Kans. | Kans. | | | | |
| Ky. | Ky. | Ky. | Ky. | Ky. | | |
| Me. | | | | | | |
| Md. | Md. | Md. | | | | |
| Mass. | | | | | | |
| Mich. | | | | | | |
| Minn. | Minn. | Minn. | Minn. | Minn. | | |
| Mont. | | | | | | |
| Nebr. | | | | | | |
| Nev. | Nev. | | | | Nev. | |
| N. H. | N. H. | N. H. | | | | |
| N. J. | N. J. | N. J. | | | | |
| N. Y. | | | | | | |
| N. Dak. | | N. Dak. | | | | |
| Ohio | | | | | | |
| Okla. ³ | Okla. | | | Okla. | | |
| Oreg. | | | | | | |
| Pa. | Pa. | | | Pa. | | |
| R. I. | | | | | | |
| S. Dak. | | | | | | |
| Tenn. | Tenn. | Tenn. | Tenn. | | | |
| Tex. | | | | | | |
| Utah | Utah | Utah | | | | |
| Vt. | | Vt. | Vt. | | | |
| Va. | | | | | | |
| Wash. | Wash. | Wash. | Wash. | | | |
| W. Va. | W. Va. | W. Va. | W. Va. | W. Va. | | |
| Wis. | Wis. | | | | | |
| Wyo. | | | | | | |

¹ Mines only.

² Six months.

³ Fatal and nonfatal combined.

TABLE 2.—NUMBER OF FATAL AND NONFATAL ACCIDENTS AS REPORTED BY THE STATES, 1917 TO 1925, BY YEARS

| State | 1917 | | 1918 | | 1919 | | 1920 | | 1921 | | 1922 | | 1923 | | 1924 | | 1925 | |
|---------------------------------|------------------|------------------|-------|------------------|------------------|------------------|-------|------------------|-------|----------|------------------|----------|------------------|----------|------------------|----------|-------|----------|
| | Fatal | Nonfatal | Fatal | Nonfatal | Fatal | Nonfatal | Fatal | Nonfatal | Fatal | Nonfatal | Fatal | Nonfatal | Fatal | Nonfatal | Fatal | Nonfatal | Fatal | Nonfatal |
| Alabama ¹ | 106 | 31 | 110 | 36 | ..... | ..... | 135 | 7,144 | 144 | 4,155 | 231 | 5,538 | ..... | ..... | ..... | ..... | 235 | 6,458 |
| Arizona ² | 82 | 998 | 93 | 1,261 | 62 | 1,127 | 53 | 958 | 22 | 509 | 30 | 374 | 54 | 717 | 40 | 887 | 40 | 724 |
| Arkansas..... | ..... | 14 | 150 | (³) | (³) | (³) | 16 | 1,405 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| California..... | 628 | 59,055 | 709 | 57,014 | 580 | 57,991 | 592 | 69,813 | 453 | 61,814 | 708 | 84,028 | 710 | 92,744 | 645 | 101,633 | 307 | 104,361 |
| Colorado..... | 300 | 12,480 | 202 | 14,730 | 201 | 11,157 | 179 | 14,100 | 151 | 13,753 | 155 | 12,704 | 168 | 15,194 | 140 | 17,373 | 50 | 18,093 |
| Connecticut..... | ..... | 46,935 | ..... | 43,188 | ..... | 42,513 | ..... | 38,764 | 96 | 22,800 | ..... | 20,407 | ..... | 37,000 | ..... | 35,350 | ..... | ..... |
| Delaware..... | (³) | (³) | 41 | 6,107 | 34 | 4,853 | 36 | 2,611 | 18 | 3,882 | 19 | 4,987 | 12 | 6,011 | 22 | 4,827 | 15 | 4,637 |
| Georgia..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 32 | 11,696 | 92 | 17,429 | 109 | 22,319 | 109 | 26,770 | 125 | 28,555 |
| Idaho ¹ | 21 | 854 | 74 | 3,785 | 51 | 3,836 | 57 | 5,367 | 63 | 4,564 | 44 | 2,232 | 37 | 3,237 | 53 | 3,523 | 59 | 7,019 |
| Illinois ¹ | 492 | 36,238 | 629 | 37,618 | 535 | 37,754 | 897 | 49,988 | 498 | 43,024 | 534 | 46,238 | 675 | 61,135 | 646 | 53,000 | ..... | ..... |
| Indiana..... | 305 | 42,148 | 373 | 37,147 | 268 | 34,964 | 291 | 42,703 | 263 | 34,133 | 198 | 38,406 | 268 | 54,582 | 274 | 48,730 | 328 | 45,648 |
| Iowa..... | 159 | 24,520 | 187 | 15,420 | 181 | 10,926 | 154 | 14,283 | 113 | 14,839 | 77 | 11,410 | 112 | 13,834 | 119 | 12,610 | 69 | 13,266 |
| Kansas..... | 34 | 6,371 | 93 | 6,342 | 104 | 6,322 | 118 | 6,891 | 71 | 6,240 | ..... | ..... | 72 | 9,999 | 84 | 10,890 | 87 | 11,027 |
| Kentucky..... | ..... | 12,665 | 96 | 13,557 | 118 | 13,810 | 493 | 15,662 | 120 | 16,789 | 62 | 18,549 | 108 | 23,892 | 97 | 28,036 | 193 | 26,490 |
| Louisiana..... | (³) | 819 | 1 | 980 | ..... | 876 | ..... | (³) | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Maine..... | 63 | 14,738 | 83 | 16,557 | 52 | 18,666 | 60 | 18,463 | 49 | 12,778 | 62 | 14,781 | 64 | 16,311 | 38 | 14,168 | 59 | 13,844 |
| Maryland..... | 131 | 37,303 | 163 | 42,407 | 183 | 46,692 | 153 | 53,525 | 116 | 36,896 | 123 | 33,493 | 126 | 40,913 | 139 | 38,833 | 160 | 39,069 |
| Massachusetts..... | 484 | 78,308 | 438 | 77,067 | 356 | 66,884 | 378 | 65,112 | 296 | 53,017 | 308 | 50,799 | 330 | 64,560 | 336 | 61,640 | 309 | 58,771 |
| Michigan..... | 386 | 112,477 | 320 | 256,304 | 256 | 231,421 | 313 | 227,445 | 266 | 100,176 | 360 | 30,631 | 326 | 26,553 | 276 | 27,451 | 280 | 28,015 |
| Minnesota..... | 183 | 30,926 | 251 | 29,716 | 215 | 27,069 | 201 | 32,669 | 184 | 34,447 | 113 | 31,571 | 204 | 40,245 | 123 | 36,123 | 150 | 45,181 |
| Montana..... | 307 | 8,018 | 124 | 5,697 | 122 | 5,353 | 94 | 4,820 | 83 | 3,421 | 51 | 3,217 | 81 | 5,048 | 87 | 5,702 | 79 | 5,739 |
| Nebraska..... | 15 | 13,278 | 13 | 7,053 | 28 | 11,245 | 50 | 13,626 | 30 | 11,326 | 32 | 13,900 | 30 | 16,162 | 35 | 15,000 | 36 | 16,964 |
| Nevada..... | 52 | 1,958 | 39 | 1,960 | 35 | 1,177 | 33 | 1,143 | 20 | 1,247 | 24 | 1,377 | 31 | 1,113 | 31 | 1,346 | 36 | 1,494 |
| New Hampshire..... | 9 | 459 | 10 | 759 | ..... | ..... | 40 | 3,385 | 710 | 7,523 | 22 | 1,835 | 18 | 1,434 | 19 | 2,442 | 16 | 2,949 |
| New Jersey..... | 361 | 12,382 | 186 | 17,003 | 524 | 30,728 | 285 | 28,556 | 282 | 27,754 | 246 | 33,483 | 290 | 49,002 | 283 | 47,958 | 525 | 44,976 |
| New Mexico..... | ..... | ..... | 28 | 543 | 21 | (³) | 32 | (³) | 16 | ..... | 11 | 369 | ..... | 345,180 | 1,927 | 369,781 | 1,828 | 414,702 |
| New York..... | 1,570 | 311,836 | 1,504 | 285,367 | 1,815 | 286,629 | 1,236 | 344,436 | 1,177 | 298,262 | 1,421 | 292,423 | 1,665 | 345,180 | 1,927 | 369,781 | 1,828 | 414,702 |
| North Dakota..... | ..... | ..... | ..... | ..... | ..... | ..... | 4 | 730 | 9 | 1,206 | 7 | 1,192 | 11 | 1,654 | 13 | 1,809 | 10 | 2,100 |
| Ohio..... | 855 | 158,796 | 956 | 161,223 | 870 | 151,401 | 764 | 182,206 | 649 | 111,628 | 676 | 108,824 | 803 | 176,427 | 933 | 180,677 | 931 | 199,271 |
| Oklahoma..... | 141 | 15,027 | 195 | 19,723 | ..... | ..... | 130 | 22,584 | 85 | 22,779 | (³) | 25,636 | (³) | 34,908 | (³) | 46,617 | ..... | 52,000 |
| Oregon ¹ | 90 | 12,044 | 103 | 12,638 | 147 | 14,333 | 144 | 13,275 | 138 | 20,318 | 124 | 21,721 | 178 | 30,013 | 142 | 25,811 | 150 | 27,596 |
| Pennsylvania..... | 3,072 | 224,808 | 3,403 | 181,441 | 2,569 | 149,975 | 2,523 | 172,451 | 1,924 | 138,273 | 1,890 | 144,365 | 2,412 | 198,023 | 2,209 | 175,330 | 2,011 | 174,370 |
| Rhode Island ¹ | 27 | 3,053 | 49 | 3,133 | 28 | 2,666 | 28 | 2,951 | 24 | 2,952 | 26 | 3,482 | 31 | 4,098 | 31 | 3,758 | 38 | 28,367 |
| South Dakota..... | 27 | 583 | 20 | 1,750 | 23 | 2,228 | 21 | 2,230 | 23 | 2,701 | 25 | 3,282 | 18 | 3,455 | 17 | 4,518 | 22 | 4,364 |
| Tennessee..... | 26 | 1,465 | 49 | 1,613 | 30 | 1,190 | 109 | 17,455 | 96 | 17,093 | 67 | 18,557 | 90 | 25,008 | 142 | 21,222 | 161 | 25,406 |

| | | | | | | | | | | | | | | | | | | |
|--|----------------------|-------------------------|----------------------|-------------------------|----------------------|-------------------------|----------------------|-------------------------|--------|-----------|--------|-----------|--------|-----------|--------|-----------|--------|-----------|
| Texas..... | | | 223 | 52,502 | | 400 | 65,600 | 308 | 94,256 | 214 | 95,109 | 253 | 86,482 | 299 | 92,613 | 357 | 91,065 | |
| Utah..... | (¹) | (²) | 90 | 11,782 | 73 | 8,818 | 99 | 10,084 | 91 | 9,932 | 60 | 8,388 | 84 | 13,137 | 281 | 13,919 | 112 | 14,203 |
| Vermont..... | 32 | | 49 | 7,160 | 28 | 6,258 | 32 | 8,048 | 29 | 7,724 | 24 | 6,564 | 35 | 9,356 | 43 | 10,507 | 32 | 9,497 |
| Virginia..... | ³ 68 | ⁴ 512 | ⁵ 41 | ⁶ 846 | 144 | 10,778 | 172 | 12,151 | 133 | 5,327 | 144 | 6,408 | 145 | 6,518 | 180 | 7,899 | 198 | 7,606 |
| Washington..... | 320 | 22,156 | 414 | 26,892 | 368 | 21,905 | 369 | 25,924 | 287 | 19,729 | 227 | 18,453 | 398 | 31,081 | 385 | 39,270 | 384 | 42,003 |
| West Virginia..... | 488 | 22,903 | 547 | 23,832 | (⁷) | (⁸) | (⁹) | (¹⁰) | 429 | 20,398 | 443 | 21,855 | 501 | 28,289 | 751 | 30,608 | 586 | 31,045 |
| Wisconsin..... | 219 | 20,341 | 163 | 19,198 | 244 | 18,204 | 171 | 18,270 | 181 | 18,806 | 191 | 20,750 | 168 | 22,099 | 134 | 25,062 | 246 | 20,891 |
| Wyoming..... | ¹¹ 37 | ¹² 726 | 24 | 571 | 36 | 605 | 43 | 776 | 51 | 2,042 | 33 | 1,198 | 82 | 1,719 | 88 | 1,689 | | |
| United States Compensation Commission..... | 227 | ¹³ 15,849 | 438 | 23,680 | 499 | 25,171 | 427 | 19,653 | 362 | 18,042 | 353 | 17,905 | 279 | 17,713 | 278 | 20,260 | 314 | 20,374 |
| Total..... | ¹⁴ 11,338 | ¹⁵ 1,363,060 | ¹⁶ 12,531 | ¹⁷ 1,545,787 | ¹⁸ 10,806 | ¹⁹ 1,365,520 | ²⁰ 11,062 | ²¹ 1,636,837 | 9,392 | 1,327,369 | 9,434 | 1,294,220 | 10,947 | 1,641,145 | 11,479 | 1,666,522 | 10,537 | 1,687,957 |

¹ Compensable cases.² Mines only.³ Not reported.⁴ Includes fatal accidents, the number of which is not reported.⁵ Estimated.⁶ March to December.⁷ Covers 10 months only.⁸ Includes fatal accidents, the number of which is not reported. Covers claims filed, for 11 months only.⁹ Figures for New Orleans Parish.¹⁰ Number of claims filed.¹¹ Covers 8 months only.¹² Coal mines only.¹³ Records destroyed by fire.¹⁴ Covers 15 months.¹⁵ Includes cases reported from Sept. 7, 1916, to Dec. 31, 1916.¹⁶ Fatal cases in Connecticut and Kentucky are included under nonfatal cases, not being reported separately.¹⁷ Includes fatal accidents in Connecticut and Kentucky, the number of which is not reported.¹⁸ Fatal cases in Connecticut are included under nonfatal cases, not being reported separately.¹⁹ Includes fatal cases in Connecticut, the number of which is not reported.

INDUSTRIAL ACCIDENT RATES FROM STATE DATA¹

For some time past the Bureau of Labor Statistics has been collecting from month to month for certain industries a report of the number of employees upon the pay rolls of selected concerns. This information, supplemented by a few additional items secured by special request from the firms, has made possible the determination of exposure in terms of man-hours for a group of companies, and for the same companies accident records have been obtained from the State accident agencies. Table 3 contains the resulting compilations. It should be noted, however, that the data here presented were derived from a small number of States and some of the industries have too small an exposure to be as authoritative as could be desired.

TABLE 3.—ACCIDENTS AND ACCIDENT RATES IN SELECTED ESTABLISHMENTS IN SPECIFIED INDUSTRIES, 1924

| Industry | Full-year workers | Number of cases | | | | Accident frequency rates (per 1,000,000 hours' exposure) | | | | Accident severity rates (per 1,000 hours' exposure) | | | |
|------------------------------------|-------------------|-----------------|-------------------------|-------------------------|--------|--|-------------------------|-------------------------|-------|---|-------------------------|-------------------------|-------|
| | | Death | Perma-nent dis-abil-ity | Tempo-rary dis-abil-ity | Total | Death | Perma-nent dis-abil-ity | Tempo-rary dis-abil-ity | Total | Death | Perma-nent dis-abil-ity | Tempo-rary dis-abil-ity | Total |
| Agricultural im-ple-ments..... | 3, 142 | | 19 | 361 | 380 | | 2.02 | 38.32 | 40.34 | | 0.68 | 1.62 | 2.30 |
| Automobiles..... | 5, 648 | | 17 | 495 | 512 | | 1.00 | 29.21 | 30.21 | | 1.00 | .55 | 1.55 |
| Auto tires..... | 5, 772 | 1 | 25 | 1, 741 | 1, 767 | 0.06 | 1.40 | 97.18 | 98.64 | 0.33 | 1.60 | 1.18 | 3.11 |
| Boots and shoes... | 1, 614 | | 1 | 23 | 24 | | .21 | 4.75 | 4.96 | | .06 | .11 | .17 |
| Brick..... | 3, 514 | 2 | 13 | 522 | 537 | .19 | 1.23 | 49.52 | 50.94 | 1.14 | .68 | .97 | 2.79 |
| Electrical machin-ery..... | 4, 626 | 1 | 46 | 364 | 411 | .07 | 3.31 | 26.23 | 29.61 | .43 | 2.99 | .34 | 3.76 |
| Flour..... | 2, 921 | 1 | 6 | 113 | 120 | .11 | .68 | 12.89 | 13.68 | .68 | .85 | .18 | 1.71 |
| Foundry and ma-chine shops..... | 17, 774 | 0 | 79 | 1, 928 | 2, 016 | .15 | 1.32 | 32.14 | 33.61 | .90 | 1.08 | .45 | 2.42 |
| Furniture..... | 5, 333 | 1 | 21 | 204 | 226 | .06 | 1.31 | 12.75 | 14.12 | .38 | .91 | .26 | 1.55 |
| Glass..... | 1, 283 | 1 | 5 | 289 | 295 | .26 | 1.30 | 75.07 | 76.63 | 1.56 | 1.36 | .83 | 3.75 |
| Lumber and plan-ing mills..... | 1, 852 | 2 | 15 | 128 | 145 | .36 | 2.70 | 23.04 | 26.10 | 2.16 | 5.17 | .71 | 8.04 |
| Paper and pulp..... | 1, 171 | 1 | 13 | 148 | 162 | .28 | 3.70 | 42.14 | 46.12 | 1.71 | 2.83 | .67 | 5.21 |
| Pottery..... | 953 | | 2 | 60 | 62 | | .70 | 21.00 | 21.70 | | .84 | .47 | 1.31 |
| Slaughtering and meat packing..... | 19, 911 | 11 | 98 | 1, 311 | 1, 420 | .18 | 1.64 | 21.95 | 23.77 | 1.10 | 1.21 | .70 | 3.01 |
| Stoves..... | 3, 278 | 3 | 3 | 325 | 331 | .31 | .31 | 33.05 | 33.67 | 1.83 | .24 | .31 | 2.38 |
| Machine tools..... | 3, 635 | 1 | 9 | 322 | 332 | .09 | .83 | 29.53 | 30.45 | .55 | .55 | .31 | 1.41 |
| Steam fittings..... | 1, 424 | | 3 | 272 | 275 | | .70 | 63.68 | 64.38 | | .49 | .79 | 1.28 |
| Structural iron work..... | 1, 187 | 1 | 6 | 303 | 310 | .28 | 1.68 | 85.06 | 87.02 | 1.68 | .94 | 1.04 | 3.67 |

The highest frequency rate (98.64) shown in this table is found in the manufacture of auto tires, followed by that in structural-iron work (87.02). The highest severity rate (8.04) is in lumber and planing mills. Both structural iron and planing mills have a rather small exposure and therefore too great significance should not be attached to these rates.

¹ When this section of the report was originally prepared the latest data available was for 1924. Subsequently data for 1925 became available and are presented on p. 93, and for purposes of comparison the 1924 figures are there repeated.

ACCIDENT RECORDS OF INDIVIDUAL STATES

These records include those assembled for Bulletin No. 339 and such later records as it has been possible to secure. For the most part this brings into comparison the year 1920 with some later year, most frequently the year 1924. While for some States the year 1925 is available it was thought better not to include it in the present presentation.

ALABAMA

In 1922 in Alabama, as in all States where coal mining is important, coal mining stood at the head in number of accidents both fatal (169) and nonfatal. Lumber and wood products (16), metals and products (14), and construction followed in order.

TABLE 4.—NUMBER OF ACCIDENTS IN ALABAMA, 1922, BY INDUSTRIES

| Industry | Death | Perma- nent disability | Tempo- rary disability | Total |
|--|-------|------------------------------|------------------------------|-------|
| Agriculture..... | | | 2 | 2 |
| Chemicals and products..... | 6 | 6 | 50 | 62 |
| Cement and products..... | | 1 | 67 | 68 |
| Clay, glass, and stone..... | 2 | 7 | 43 | 52 |
| Clothing..... | | 2 | 5 | 7 |
| Construction..... | 11 | 15 | 314 | 340 |
| Food products..... | | | 42 | 42 |
| Leather and products..... | | | 7 | 7 |
| Lumber and wood products..... | 16 | 85 | 462 | 563 |
| Mercantile..... | | 1 | 117 | 118 |
| Metals and products..... | 14 | 59 | 967 | 1,040 |
| Mines, coal..... | 169 | 115 | 1,831 | 2,115 |
| Mines (not coal) and quarries..... | 4 | 6 | 103 | 113 |
| Paper and products..... | | 1 | 5 | 6 |
| Printing and publishing..... | | 1 | 7 | 8 |
| Public utilities and transportation..... | 5 | 23 | 358 | 386 |
| Textiles..... | | 26 | 131 | 207 |
| Unclassified..... | 4 | 14 | 115 | 133 |
| Total..... | 231 | 362 | 5,176 | 5,769 |

¹ Compensable cases.

ARKANSAS

Table 5 contains the latest information regarding accidents in Arkansas which was available at the time this bulletin was prepared.

The notable item in Table 5, showing the fatal and nonfatal accidents in Arkansas reported for 1920, is that the largest number of deaths (11) was in the lumber and its remanufacture industry. It is probable that agriculture was responsible for a considerable number of deaths, but agriculture is not included under the compensation law.

TABLE 5.—NUMBER OF ACCIDENTS IN ARKANSAS, 1920, BY INDUSTRIES

| Industry | Number of accidents | | |
|-----------------------------------|---------------------|---------------|-------|
| | Fatal | Non- fatal | Total |
| Clay, glass, and stone..... | | 3 | 3 |
| Food..... | | 23 | 23 |
| Lumber and its remanufacture..... | 11 | 1,149 | 1,160 |
| Mercantile..... | | 5 | 5 |
| Mines (not coal)..... | 2 | 63 | 65 |
| Metals and products..... | | 13 | 13 |
| Printing and publishing..... | | 6 | 6 |
| Public service..... | 1 | 12 | 13 |
| Textiles..... | | 2 | 2 |
| All other..... | 2 | 128 | 130 |
| Total..... | 16 | 1,404 | 1,420 |

CALIFORNIA

Accident data for California for 1920 and for six months of 1924, are presented in Table 6. Assuming that the experience of the second six months of 1924 would be like that of the first, it appears that accidents were considerably more numerous in the later year. There is no means of determining whether this represents a real change for the worse or is simply due to greater industrial activity. In 1920 public service had the heaviest fatality (122), while in six months in 1924 construction had 65 cases.

TABLE 6.—NUMBER OF ACCIDENTS¹ IN CALIFORNIA, 1920, AND SIX MONTHS ENDING JUNE 30, 1924, BY INDUSTRIES

| Industry | Accidents resulting in— | | | | | | Total accidents | |
|--|-------------------------|-------------------------|----------------------|-------------------------|----------------------|-------------------------|-----------------|-------------------------|
| | Death | | Permanent disability | | Temporary disability | | 1920 | Jan. 1 to June 30, 1924 |
| | 1920 | Jan. 1 to June 30, 1924 | 1920 | Jan. 1 to June 30, 1924 | 1920 | Jan. 1 to June 30, 1924 | | |
| Agriculture..... | 59 | 21 | 125 | 38 | 4,102 | 2,241 | 4,286 | 2,300 |
| Chemicals..... | 11 | 6 | 43 | 13 | 1,964 | 1,039 | 2,018 | 1,068 |
| Clay, glass, and stone..... | 7 | 3 | 23 | 15 | 705 | 1,039 | 735 | 1,057 |
| Clothing..... | | | 6 | | 227 | | 233 | |
| Construction..... | 63 | 65 | 281 | 102 | 8,003 | 8,146 | 8,327 | 8,313 |
| Food products..... | 17 | 4 | 193 | 27 | 5,154 | 2,412 | 5,274 | 2,443 |
| Iron and steel..... | | 1 | | 3 | | 237 | | 241 |
| Laundries..... | | | 21 | 6 | 362 | 284 | 383 | 290 |
| Leather and rubber..... | 1 | | 14 | 5 | 462 | 224 | 477 | 229 |
| Lumber and wood..... | 60 | 31 | 268 | 127 | 4,649 | 3,391 | 4,977 | 3,549 |
| Metals and metal products..... | 14 | 10 | 287 | 85 | 6,880 | 3,357 | 7,181 | 3,452 |
| Mines (not coal) and quarries and oil..... | 60 | 44 | 170 | 31 | 4,191 | 3,664 | 4,721 | 3,789 |
| Paper and printing..... | 4 | | 54 | | 808 | | 806 | |
| Pulp and paper..... | | | | 3 | | 46 | | 49 |
| Printing..... | | | | 9 | | 296 | | 305 |
| Public service..... | 122 | 43 | 143 | 12 | 8,807 | 2,033 | 9,132 | 2,033 |
| Shipbuilding..... | 26 | 1 | 144 | 6 | 4,118 | 547 | 4,283 | 554 |
| Textiles and clothing..... | 1 | | 4 | 4 | 132 | 269 | 137 | 273 |
| All other..... | 147 | 78 | 263 | 151 | 16,900 | 14,178 | 17,370 | 14,407 |
| Total..... | 592 | 307 | 1,929 | 687 | 67,884 | 43,403 | 70,405 | 44,397 |

¹ Tabulatable accidents.

IDAHO

Lumbering and mining were responsible for the greatest number of fatalities in Idaho in 1920 and in 1924. In 1920 there were 43 deaths in lumbering and 13 in mines. The 1924 record is 56 deaths in lumbering and 45 in mines.

TABLE 7.—NUMBER OF ACCIDENTS IN IDAHO, YEARS ENDING OCTOBER 31, 1920 AND 1924, BY INDUSTRIES

| Industry | Accidents resulting in— | | | | | | Total accidents | |
|------------------------------------|-------------------------|---------|----------------------|---------|----------------------|---------|----------------------|---------|
| | Death | | Permanent disability | | Temporary disability | | 1919-20 ¹ | 1923-24 |
| | 1919-20 ¹ | 1923-24 | 1919-20 ¹ | 1923-24 | 1919-20 ¹ | 1923-24 | | |
| Agriculture and stock raising..... | 1 | | 6 | 9 | 113 | 124 | 120 | 143 |
| Construction..... | 12 | 20 | 36 | 87 | 665 | 1,617 | 713 | 1,724 |
| Lumber..... | 43 | 56 | 96 | 233 | 1,453 | 3,290 | 1,592 | 3,579 |
| Mines..... | 13 | 45 | 34 | 104 | 1,163 | 2,728 | 1,210 | 2,875 |
| Manufacture..... | | 2 | | 45 | | 770 | | 817 |
| Mercantile..... | 1 | 1 | 19 | 41 | 471 | 1,217 | 491 | 1,259 |
| Transportation and utility..... | | 10 | | 44 | | 737 | | 791 |
| Unclassified..... | 13 | 6 | 64 | 42 | 883 | 725 | 960 | 773 |
| Total..... | 83 | 140 | 255 | 605 | 4,748 | 11,210 | 5,086 | 11,961 |

¹ Compensation claims allowed.

ILLINOIS

In Illinois in the years 1920 and 1923 the coal mines had the greatest number of fatalities, 171 in 1920 and 155 in 1923. Metals and products came next (86) in 1920 with construction and public service following (68). In 1923 public service (74) and construction (80) rank next to coal mines. Agriculture shows few cases as compared with California, for example, because acceptance of the compensation law is optional for farmers, and in Illinois rather few have elected to come under the law.

TABLE 8.—NUMBER OF ACCIDENTS¹ IN ILLINOIS, 1920 AND 1923, BY INDUSTRIES

| Industry | Accidents resulting in— | | | | | | Total accidents | |
|------------------------------------|-------------------------|------|----------------------|------|----------------------|--------|-----------------|--------|
| | Death | | Permanent disability | | Temporary disability | | 1920 | 1923 |
| | 1920 | 1923 | 1920 | 1923 | 1920 | 1923 | | |
| Agriculture..... | 8 | 3 | 28 | 1 | 245 | 288 | 281 | 209 |
| Chemicals and products..... | 25 | 35 | 155 | 9 | 1,144 | 1,060 | 1,324 | 1,104 |
| Clay, glass, and stone..... | 9 | 17 | 79 | 6 | 828 | 1,436 | 916 | 1,457 |
| Clothing..... | 1 | 5 | 50 | 5 | 530 | 736 | 581 | 746 |
| Construction..... | 68 | 80 | 455 | 66 | 3,190 | 5,105 | 3,715 | 5,251 |
| Food, beverage, and tobacco..... | 29 | 31 | 316 | 17 | 2,845 | 4,589 | 3,130 | 4,037 |
| Leather and rubber..... | 3 | 5 | 53 | 1 | 420 | 690 | 506 | 696 |
| Lumber and wood..... | 24 | 17 | 379 | 9 | 1,579 | 2,610 | 1,982 | 2,636 |
| Mercantile..... | 5 | 33 | 65 | 16 | 895 | 2,117 | 1,965 | 2,168 |
| Metals and metal products..... | 86 | 71 | 2,085 | 63 | 11,710 | 12,673 | 13,881 | 12,507 |
| Mines, coal..... | 171 | 155 | 3,680 | 274 | 9,398 | 14,170 | 13,249 | 14,599 |
| Mines (not coal) and quarries..... | 12 | 4 | 41 | 3 | 384 | 161 | 437 | 168 |
| Municipalities..... | 17 | 20 | 10 | 14 | 204 | 516 | 231 | 550 |
| Oil and gas-well operation..... | 4 | 7 | — | 8 | — | 312 | — | 327 |
| Paper and paper products..... | 4 | 6 | 95 | 1 | 519 | 602 | 613 | 606 |
| Printing and publishing..... | 2 | 7 | 109 | — | 594 | 818 | 705 | 825 |
| Public services..... | 68 | 74 | 246 | 28 | 2,357 | 3,175 | 2,671 | 3,277 |
| Textiles..... | 7 | 2 | 39 | 3 | 253 | 325 | 259 | 336 |
| Unclassified..... | 58 | 103 | 311 | 102 | 4,667 | 9,128 | 5,036 | 9,333 |
| Total..... | 597 | 675 | 8,226 | 620 | 41,762 | 60,509 | 50,585 | 61,810 |

¹ Compensable cases.

INDIANA

The form of the Indiana report makes a separation of the fatal and nonfatal accidents in the industries in that State impossible. In both years shown in Table 9—1920 and 1921—metal products had the greatest number of accidents, with coal mines and public service next in order and not far apart.

TABLE 9.—NUMBER OF ACCIDENTS IN INDIANA, 1920 AND 1921, BY INDUSTRIES

| Industry | Year ending September 30— | | Industry | Year ending September 30— | |
|-----------------------------|---------------------------|-------|------------------------------------|---------------------------|--------|
| | 1920 | 1921 | | 1920 | 1921 |
| Agriculture..... | 189 | 148 | Mines, coal..... | 4,222 | 4,851 |
| Chemicals..... | 156 | 91 | Mines (not coal) and quarries..... | 477 | 696 |
| Clay, glass, and stone..... | 1,614 | 1,253 | Municipal..... | 32 | 31 |
| Clothing..... | 135 | 196 | Paper products..... | 682 | 589 |
| Construction..... | 2,731 | 3,056 | Printing..... | 248 | 175 |
| Food..... | 2,452 | 3,112 | Public service..... | 4,843 | 4,248 |
| Leather and rubber..... | 454 | 427 | Textiles..... | 154 | 136 |
| Lumber..... | 3,355 | 2,274 | Unclassified..... | 2,973 | 3,156 |
| Mercantile..... | 1,176 | 1,272 | | | |
| Metal products..... | 17,101 | 9,683 | Total..... | 42,994 | 34,396 |

KANSAS

Three years, 1920, 1921, and 1924 are covered in Table 10, showing accident data for Kansas. The total for 1924 considerably exceeds that of the other years. Public service had the greatest number of fatalities in each of the years (57 in 1920, 24 in 1921, and 33 in 1924). Oil and gas, which do not appear in some of the State reports, are a considerable factor in Kansas accidents.

TABLE 10.—NUMBER OF ACCIDENTS IN KANSAS, 1920, 1921, AND 1924, BY INDUSTRIES

| Industry | Accidents resulting in— | | | | | | | | | Total accidents | | | | |
|------------------------------------|-------------------------|-----------|-----------|----------------------|-----------|------------|----------------------|--------------|---------------|-----------------|--------------|---------------|--|-------|
| | Death | | | Permanent disability | | | Temporary disability | | | 1920 | 1921 | 1924 | | |
| | 1920 | 1921 | 1924 | 1920 | 1921 | 1924 | 1920 | 1921 | 1924 | | | | | |
| Cement and products..... | | | 5 | | | 10 | | | | | 308 | | | 323 |
| Clay, glass, and stone..... | 1 | 1 | 1 | 3 | 1 | 2 | 99 | 82 | | 103 | 84 | | | 192 |
| Food products..... | 5 | 5 | 5 | 25 | 11 | 16 | 964 | 908 | 1,322 | 994 | 924 | | | 1,343 |
| Lumber..... | 4 | 1 | | 18 | 3 | 11 | 39 | 28 | | 47 | 32 | | | 163 |
| Metals and metal products..... | 4 | 3 | 11 | 10 | 7 | 24 | 958 | 509 | 1,779 | 978 | 519 | | | 1,814 |
| Mines, coal..... | 19 | 23 | 4 | 18 | 7 | 8 | 836 | 810 | 592 | 873 | 840 | | | 904 |
| Mines (not coal) and quarries..... | 2 | | | 6 | | 4 | 227 | 57 | 73 | 235 | 57 | | | 77 |
| Oil and gas..... | 13 | 7 | 9 | 24 | 19 | 31 | 1,205 | 1,245 | 1,298 | 1,242 | 1,271 | | | 1,338 |
| Public service..... | 57 | 24 | 33 | 13 | 24 | 39 | 1,844 | 1,609 | 2,281 | 1,944 | 1,637 | | | 2,353 |
| Unclassified..... | 17 | 7 | 16 | 14 | 21 | 47 | 562 | 899 | 2,404 | 583 | 927 | | | 2,467 |
| Total..... | 118 | 71 | 84 | 167 | 93 | 192 | 6,724 | 6,147 | 10,698 | 7,009 | 6,311 | 10,974 | | |

KENTUCKY

The coal mines of Kentucky furnished considerably more than half of its fatalities (64) in the year 1924, and nearly half of all recorded accidents were in connection with this industry. The lumber and wood products industry (6) stands next in number of fatalities.

TABLE 11.—NUMBER OF ACCIDENTS IN KENTUCKY, YEAR ENDING JUNE 30, 1920 AND 1924, BY INDUSTRIES

| Industry | Accidents in 1924 resulting in— | | | Total accidents | |
|------------------------------------|---------------------------------|--------------------------------|--------------------------------|-----------------|---------------|
| | Death | Perma- nent dis- ability | Tempo- rary dis- ability | 1920 | 1924 |
| Agriculture..... | | | 6 | | 6 |
| Chemicals and products..... | 1 | 4 | 95 | 88 | 100 |
| Cement and products..... | 1 | 1 | 67 | | 69 |
| Clay, glass, and stone..... | | 1 | 11 | 490 | 841 |
| Clothing..... | | | 85 | 70 | 85 |
| Construction..... | 2 | 116 | 4,027 | 878 | 4,145 |
| Food products..... | 2 | 11 | 767 | 1,428 | 770 |
| Leather products..... | | | 216 | 179 | 216 |
| Lumber and wood products..... | 6 | 26 | 2,115 | 1,294 | 2,147 |
| Mercantile..... | | 2 | 226 | 810 | 228 |
| Metals and products..... | 3 | 33 | 1,264 | 2,511 | 1,300 |
| Mines (coal)..... | 64 | 270 | 11,239 | 5,968 | 11,573 |
| Mines (not coal) and quarries..... | 1 | 7 | 414 | 160 | 422 |
| Oil and gas..... | | 9 | 567 | | 576 |
| Paper and products..... | | 2 | 110 | 34 | 112 |
| Printing and publishing..... | | | 88 | 102 | 88 |
| Public service..... | 1 | 5 | 342 | 309 | 348 |
| Textiles..... | | | 167 | 211 | 167 |
| Unclassified..... | 15 | 64 | 4,861 | 1,605 | 4,940 |
| Total..... | 97 | 561 | 27,475 | 16,155 | 28,133 |

MARYLAND

In both of the years shown for Maryland in Table 12 the fatalities were most numerous in construction, there being 56 in 1920 and 19 in 1924. The fact that shipbuilding is included under construction

accounts in part for these numbers. In 1920 metals and products were second (30) and public service third (20). In 1924 public service (16) was second and food products and metals (8) each were next.

TABLE 12.—NUMBER OF ACCIDENTS¹ IN MARYLAND, YEARS ENDING OCTOBER 31, 1920 AND 1924, BY INDUSTRIES

| Industry | 1919-20 | | | 1923-24: Accidents resulting in— | | | |
|------------------------------------|-----------------|---------------------|-------|----------------------------------|----------------------|----------------------|--------|
| | Fatal accidents | Non-fatal accidents | Total | Death | Permanent disability | Temporary disability | Total |
| Agriculture..... | | | | | 2 | 17 | 19 |
| Chemicals and products..... | 10 | 62 | 72 | 4 | 15 | 567 | 586 |
| Cement and products..... | | | | 2 | 4 | 96 | 101 |
| Clay, glass, and stone..... | 3 | 441 | 444 | 4 | 8 | 333 | 345 |
| Clothing..... | 12 | 29 | 41 | 1 | 5 | 329 | 335 |
| Construction ² | 56 | 2,438 | 2,494 | 19 | 78 | 2,444 | 2,541 |
| Food products..... | | 284 | 284 | 8 | 50 | 1,378 | 1,436 |
| Leather and rubber..... | | 210 | 210 | 1 | 18 | 243 | 262 |
| Lumber and wood products..... | 2 | 100 | 102 | 6 | 61 | 798 | 865 |
| Mercantile..... | | | | 2 | 16 | 490 | 508 |
| Metals and metal products..... | 30 | 1,188 | 1,218 | 8 | 156 | 2,420 | 2,584 |
| Mines (coal)..... | | | | 7 | 11 | 391 | 409 |
| Mines (not coal) and quarries..... | | | | 3 | 12 | 209 | 224 |
| Paper and paper products..... | 4 | 204 | 208 | 2 | 6 | 160 | 168 |
| Printing and publishing..... | 6 | 198 | 204 | | 8 | 181 | 169 |
| Public service..... | 20 | 510 | 530 | 16 | 31 | 1,684 | 1,731 |
| Textiles..... | | 126 | 126 | | 13 | 117 | 130 |
| Unclassified..... | 10 | 751 | 761 | 12 | 47 | 1,457 | 1,516 |
| Total..... | 153 | 6,541 | 6,694 | 95 | 541 | 13,283 | 13,919 |

¹ Compensation claims allowed, in 1920, and claims filed, in 1924.

² Includes shipbuilding.

MASSACHUSETTS

In the published records of accidents of Massachusetts the industrial groups are subdivided in great detail; for example, textiles are shown under the following heads: Carpet mills, cotton mills, dyeing, hemp and jute, knitting, lace, linen, print works, cordage, sails, silk mills, woolen mills, and unclassified.

Table 13 presents the data for the years 1920 and 1923. In 1920 public service had the greatest number (135) of fatalities, with construction (43) coming next. In 1923 construction (62) leads, followed by the mercantile group.

TABLE 13.—NUMBER OF ACCIDENTS IN MASSACHUSETTS, 1920 AND 1923, BY INDUSTRIES

| Industry | Accidents resulting in— | | | | | | Total accidents | |
|-------------------------------------|-------------------------|------|----------------------|-------|----------------------|--------|-----------------|--------|
| | Death | | Permanent disability | | Temporary disability | | 1920 | 1923 |
| | 1920 | 1923 | 1920 | 1923 | 1920 | 1923 | | |
| Agriculture..... | 2 | 3 | 3 | 8 | 191 | 328 | 196 | 339 |
| Chemicals and products..... | 8 | 9 | 13 | 11 | 760 | 611 | 781 | 631 |
| Cement and products..... | | 1 | | 2 | | 161 | | 164 |
| Clay, glass, and stone..... | 3 | 2 | 11 | 11 | 392 | 418 | 406 | 431 |
| Clothing..... | 1 | | 3 | 5 | 312 | 330 | 316 | 335 |
| Construction (building trades)..... | 43 | 62 | 98 | 106 | 4,891 | 6,350 | 5,032 | 6,518 |
| Food products..... | 7 | 8 | 49 | 29 | 2,023 | 1,977 | 2,079 | 2,014 |
| Leather and products..... | 12 | 8 | 148 | 89 | 4,604 | 3,534 | 4,684 | 3,631 |
| Lumber and wood products..... | 4 | 4 | 118 | 132 | 2,052 | 2,158 | 2,174 | 2,294 |
| Mercantile..... | 36 | 32 | 32 | 95 | 5,997 | 7,692 | 6,115 | 7,810 |
| Metals and products..... | 36 | 30 | 436 | 331 | 13,179 | 9,194 | 13,651 | 9,555 |
| Mines and quarries..... | 3 | 1 | 9 | 1 | 172 | 194 | 184 | 196 |
| Paper and products..... | 8 | 5 | 47 | 51 | 1,986 | 2,016 | 2,041 | 2,072 |
| Printing and publishing..... | 1 | 5 | 31 | 22 | 686 | 735 | 718 | 762 |
| Public service..... | 135 | 26 | 63 | 91 | 8,125 | 3,418 | 8,322 | 3,535 |
| Textiles..... | 37 | 19 | 288 | 253 | 10,921 | 9,782 | 11,246 | 10,064 |
| Unclassified..... | 40 | 115 | 223 | 207 | 7,300 | 14,218 | 7,563 | 14,540 |
| Total..... | 376 | 330 | 1,621 | 1,444 | 63,491 | 63,116 | 65,488 | 64,890 |

Table 14 discloses the relation in Massachusetts between cases of accident and losses due to such accidents. It appears on inspection that frequency and severity do not move together. For example, the cause group "vehicles" shows 6.3 per cent of the cases but 21.3 per cent of the loss, while "handling," with 36.5 per cent of the cases, has 16.6 per cent of the losses.

TABLE 14.—PER CENT OF ACCIDENTS IN MASSACHUSETTS IN 1920 DUE TO EACH SPECIFIED CAUSE AND OF DAYS LOST

| Accident cause | Per cent | |
|--------------------------------------|-----------|-----------|
| | Accidents | Days lost |
| Machinery..... | 23.4 | 20.1 |
| Vehicles..... | 6.3 | 21.3 |
| Explosives and hot substances..... | 4.6 | 7.7 |
| Falls of persons..... | 14.0 | 14.1 |
| Falling objects not handled..... | 3.7 | 4.2 |
| Handling objects..... | 29.2 | 13.0 |
| Handling tools..... | 7.5 | 3.6 |
| Stepping on or striking objects..... | 6.0 | 1.7 |
| Other causes..... | 5.5 | 5.3 |
| Total..... | 100.0 | 100.0 |

MINNESOTA

In Minnesota, in 1919-20, the iron mines had the largest number of deaths (56) from accident, with lumber (34) second, and construction (23) third. Food production, mainly in the manufacture of flour, had a considerable number of deaths (13). The deaths in 1921-22 are not separable from other accidents in that year.

TABLE 15.—NUMBER OF ACCIDENTS¹ IN MINNESOTA, YEARS ENDING JUNE 30, 1920 AND 1922, BY INDUSTRIES

| Industry | Accidents in 1919-20; resulting in— | | | Total accidents | |
|------------------------------------|-------------------------------------|--------------------------------|--------------------------------|-----------------|---------|
| | Death | Perma- nent dis- ability | Tempo- rary dis- ability | 1919-20 | 1921-22 |
| Agriculture..... | 1 | 1 | 43 | 45 | 96 |
| Chemicals and products..... | 1 | 14 | 123 | 138 | 128 |
| Clay, glass, and stone..... | 1 | 28 | 256 | 265 | 267 |
| Clothing..... | 1 | 1 | 37 | 38 | 51 |
| Construction..... | 22 | 120 | 1,447 | 1,589 | 1,306 |
| Food products..... | 13 | 154 | 1,444 | 1,611 | 1,308 |
| Leather and fur..... | 1 | 21 | 112 | 134 | 87 |
| Lumber and wood products..... | 34 | 214 | 1,223 | 1,471 | 1,050 |
| Mercantile..... | 0 | 52 | 653 | 714 | 1,398 |
| Metals and products..... | 13 | 195 | 1,430 | 1,638 | 611 |
| Mines (not coal) and quarries..... | 56 | 136 | 2,001 | 2,193 | 841 |
| Municipal..... | 6 | 19 | 181 | 206 | — |
| Paper and products..... | 3 | 26 | 217 | 246 | 265 |
| Printing and publishing..... | — | 18 | 115 | 133 | 130 |
| Public service..... | 15 | 27 | 427 | 469 | 499 |
| Textiles..... | — | 16 | 90 | 115 | 84 |
| Unclassified..... | 26 | 141 | 1,546 | 1,713 | 2,584 |
| Total..... | 201 | 1,183 | 11,354 | 12,738 | 10,657 |

¹ Compensation claims allowed.

MONTANA

In Table 16 accident data for Montana for a five-year period are consolidated. In these five years mining had 558 fatalities (an average of 112 per year), or more than two-thirds of all fatal accidents recorded in the State.

Metals and products (66), construction (41), and lumber (36) are other industries of high fatality hazard.

TABLE 16.—NUMBER OF ACCIDENTS IN MONTANA FOR 5-YEAR PERIOD, JULY 1, 1915, TO JUNE 30, 1920, BY INDUSTRIES

| Industry | Accidents resulting in— | | | Total accidents |
|------------------------------------|-------------------------|--------------------------------|--------------------------------|-----------------|
| | Death | Perma- nent dis- ability | Tempo- rary dis- ability | |
| Clay and stone..... | 2 | 1 | 65 | 68 |
| Construction..... | 41 | 59 | 2,036 | 2,136 |
| Food..... | 10 | 28 | 1,173 | 1,211 |
| Leather..... | 1 | 1 | 1 | 1 |
| Lumber..... | 36 | 82 | 1,629 | 1,747 |
| Mercantile..... | 1 | 10 | 304 | 815 |
| Metals and products..... | 66 | 109 | 2,960 | 3,135 |
| Mines, coal..... | 61 | 76 | 1,832 | 1,969 |
| Mines (not coal) and quarries..... | 497 | 287 | 17,926 | 18,710 |
| Municipal..... | 1 | 1 | 108 | 109 |
| Printing and publishing..... | 1 | 5 | 125 | 131 |
| Public service..... | 31 | 19 | 770 | 820 |
| Textiles..... | 1 | 1 | 7 | 7 |
| Unclassified..... | 35 | 22 | 898 | 955 |
| Total..... | 782 | 698 | 29,834 | 31,314 |

NEVADA

Metal mines in Nevada had 19 fatalities in 1919-20 and 18 in 1923-24. In each year the deaths in metal mines outnumber all others in the State.

TABLE 17.—NUMBER OF ACCIDENTS IN NEVADA, YEARS ENDING JUNE 30, 1920 AND 1924, BY INDUSTRIES

| Industry | Accidents resulting in— | | | | | | Total accidents | |
|------------------------------------|-------------------------|---------|----------------------|---------|----------------------|---------|-----------------|---------|
| | Death | | Permanent disability | | Temporary disability | | 1919-20 | 1923-24 |
| | 1919-20 | 1923-24 | 1919-20 | 1923-24 | 1919-20 | 1923-24 | | |
| Construction..... | | | 4 | | 14 | | 18 | |
| Food..... | 1 | | 2 | | 30 | | 33 | |
| Lumber..... | 3 | | 5 | | 46 | | 54 | |
| Metals and products..... | 3 | 3 | 16 | 5 | 111 | 33 | 130 | 41 |
| Mines (not coal) and quarries..... | 17 | 18 | 66 | 77 | 686 | 845 | 769 | 940 |
| Municipal..... | 3 | | 12 | | 43 | | 58 | |
| Public service..... | 2 | 1 | 2 | 2 | 37 | 28 | 41 | 31 |
| Unclassified..... | 1 | 9 | 9 | 17 | 63 | 339 | 73 | 365 |
| Total..... | 30 | 31 | 116 | 101 | 1,030 | 1,245 | 1,176 | 1,377 |

NEW HAMPSHIRE

In 1924 lumber and its products was most productive of fatalities (5 cases) in New Hampshire. Textiles, though an industry of relatively low hazard, had 4 cases of fatality.

TABLE 18.—NUMBER OF ACCIDENTS IN NEW HAMPSHIRE, 1924, BY INDUSTRIES

| Industry | Fatal accidents | Nonfatal accidents | Total accidents |
|-------------------------------|-----------------|--------------------|-----------------|
| Clay, glass, and stone..... | 1 | 43 | 44 |
| Clothing..... | | 15 | 15 |
| Construction..... | 3 | 104 | 107 |
| Food products..... | | 26 | 26 |
| Leather and products..... | 1 | 90 | 91 |
| Lumber and wood products..... | 5 | 403 | 408 |
| Mercantile..... | | 56 | 56 |
| Metals and products..... | | 91 | 91 |
| Paper..... | 3 | 308 | 311 |
| Printing..... | | 14 | 14 |
| Public service..... | 1 | 19 | 20 |
| Textiles..... | 4 | 383 | 387 |
| Unclassified..... | 1 | 890 | 891 |
| Total..... | 19 | 2,442 | 2,461 |

NEW JERSEY

In New Jersey in 1920 chemicals had the severest fatality (47) while in 1921 and 1924 construction with 44 and 67, respectively, was the chief cause of fatal injury.

TABLE 19.—NUMBER OF ACCIDENTS IN NEW JERSEY, YEARS ENDING JUNE 30, 1920 AND 1921, BY INDUSTRIES

| Industry | Fatal accidents | | | Nonfatal accidents | | | Total accidents | | |
|------------------------------------|-----------------|------|------|--------------------|--------|--------|-----------------|--------|--------|
| | 1920 | 1921 | 1924 | 1920 | 1921 | 1924 | 1920 | 1921 | 1924 |
| Chemicals..... | 47 | 33 | 39 | 1,708 | 1,326 | 1,943 | 1,755 | 1,359 | 1,982 |
| Clay, glass, and stone..... | 6 | 5 | 8 | 414 | 349 | 1,011 | 420 | 354 | 1,019 |
| Clothing..... | | 1 | | 93 | 348 | 1,324 | 95 | 849 | 1,324 |
| Construction..... | 21 | 44 | 67 | 5,965 | 6,951 | 11,492 | 5,996 | 6,995 | 11,559 |
| Food products..... | 16 | 10 | 7 | 381 | 529 | 1,516 | 397 | 539 | 1,323 |
| Leather and leather goods..... | 12 | 8 | 8 | 586 | 676 | 277 | 593 | 684 | 280 |
| Lumber and wood products..... | | | 2 | | | 963 | | | 963 |
| Metals and metal products..... | 38 | 42 | 31 | 7,231 | 5,226 | 9,276 | 7,269 | 5,268 | 9,307 |
| Mines (not coal) and quarries..... | 1 | 11 | 12 | 83 | 215 | 434 | 84 | 226 | 446 |
| Paper and paper products..... | 5 | | 2 | 81 | 154 | 417 | 86 | 154 | 419 |
| Printing and bookbinding..... | | | | 65 | 67 | 91 | 65 | 67 | 91 |
| Rubber and composition goods..... | | | 2 | | | 726 | | | 729 |
| Shipbuilding..... | 25 | 23 | 5 | 2,792 | 1,907 | 874 | 2,817 | 2,020 | 379 |
| Textiles..... | 8 | 9 | 6 | 269 | 1,092 | 1,679 | 277 | 1,101 | 1,685 |
| Unclassified..... | 94 | 96 | 98 | 8,888 | 8,824 | 10,105 | 8,982 | 8,920 | 16,203 |
| Total..... | 285 | 282 | 283 | 28,556 | 27,754 | 47,958 | 23,841 | 28,036 | 43,241 |

NEW YORK

For some years the State of New York did not publish anything regarding its accident experience. The latest published information at the time of making this compilation is for the year 1923. Table 20 shows the distribution for that year. Naturally, construction, in a State where great structures are being erected as nowhere else in the country, leads in fatality (177), and public utilities and transportation comes next (164).

TABLE 20.—NUMBER OF ACCIDENTS¹ IN NEW YORK, 1923, BY INDUSTRIES

| Industry | Accidents resulting in— | | | Total accidents |
|--|-------------------------|--------------------------------|--------------------------------|-----------------|
| | Death | Perma- nent disa- bility | Tempo- rary disa- bility | |
| Agriculture..... | 5 | 79 | 269 | 353 |
| Chemicals..... | 9 | 219 | 853 | 1,081 |
| Clay, stone, and glass..... | 8 | 197 | 798 | 1,003 |
| Clothing..... | 8 | 203 | 1,759 | 1,970 |
| Construction..... | 177 | 1,646 | 8,407 | 10,230 |
| Food..... | 18 | 557 | 2,454 | 3,029 |
| Leather..... | 4 | 240 | 1,003 | 1,247 |
| Lumber and wood products..... | 23 | 808 | 1,898 | 2,699 |
| Mercantile (trade)..... | 49 | 704 | 3,997 | 4,750 |
| Metals and products..... | 52 | 2,204 | 6,854 | 9,110 |
| Mines and quarries..... | 15 | 92 | 511 | 618 |
| Paper and products..... | 15 | 366 | 1,204 | 1,585 |
| Printing..... | 3 | 217 | 807 | 1,027 |
| Public utilities and transportation..... | 164 | 1,266 | 9,543 | 10,973 |
| Rubber and composition goods..... | 4 | 93 | 335 | 432 |
| Textiles..... | 7 | 310 | 1,158 | 1,475 |
| Unclassified..... | 101 | 1,126 | 5,369 | 6,496 |
| Total..... | 662 | 10,327 | 47,189 | 58,078 |

¹ Compensable cases.

OKLAHOMA

The constitution of Oklahoma is so framed that fatal accident cases are excluded from the operation of the compensation law. While in 1920 and 1921 a record of such cases was published, from that time no record is available. In 1920 the oil and gas industry had 36 fatal cases, coal mines 25, and metal mines 15.

Table 21 shows a total of 22,714 nonfatal cases. In 1924 the total of nonfatal cases was 46,517, of which 22,187 were in the oil and gas industry. It would appear that from whatever point this industry is considered it is highly hazardous.

TABLE 21.—NUMBER OF ACCIDENTS IN OKLAHOMA, YEARS ENDING AUGUST 31, 1920 AND 1924, BY INDUSTRIES

| Industry | Accidents in 1919-20 re- sulting in— | | | Total accidents | |
|------------------------------------|---|--------------------------------|--------------------------------|-----------------|---------|
| | Death | Perma- nent disa- bility | Tempo- rary disa- bility | 1919-20 | 1923-24 |
| Cement and products..... | | | | | 137 |
| Clay, glass, and stone..... | | 5 | 612 | 617 | 959 |
| Clothing..... | | | | | 18 |
| Construction..... | 28 | 35 | 1,567 | 1,620 | 5,039 |
| Food products..... | | 8 | 805 | 813 | 589 |
| Leather..... | | | | | 1 |
| Lumber and wood products..... | 3 | 18 | 1,074 | 1,095 | 725 |
| Mercantile..... | 7 | 19 | 1,322 | 1,348 | 1,356 |
| Metals and products..... | 6 | 23 | 1,823 | 1,852 | 2,103 |
| Mines, coal..... | 25 | 42 | 1,045 | 1,112 | 1,216 |
| Mines (not coal) and quarries..... | 15 | 110 | 3,809 | 3,934 | 6,360 |
| Oil and gas..... | 36 | 166 | 7,619 | 7,821 | 22,187 |
| Paper and products..... | | | | | 1 |
| Printing and publishing..... | | 3 | 110 | 113 | 168 |
| Public service..... | 5 | 9 | 732 | 746 | 1,427 |
| Unclassified..... | 15 | 63 | 1,765 | 1,843 | 4,231 |
| Total..... | 130 | 501 | 22,083 | 22,714 | 46,517 |

OREGON

In 1920 Oregon worked out an exposure for each of the industrial groups shown in Table 22. Where the exposure is equivalent to 2,000 or more full-year workers frequency and severity are shown. The relations which appear between these rates emphasize again the importance of both rates to an understanding of the accident situation.

Of the 71,166 full-year workers which appear in the table, more than a third (29,584) were engaged in logging and lumbering operations. Of these logging had a fatality rate in 1920 of 6.93 cases per 1,000 full-year workers. This may be compared with 3.62 in coal mining for the whole country.

The severity rate for Oregon logging operations was 21.56, which may be compared with 25.9 in the erection of structural steel in that same year.

The operation of Oregon logging railways is more hazardous than average railway operation for the United States as is indicated by a fatality rate of 6.30 per 1,000 full-year workers, contrasted with 1.76 for railway trainmen. However, yard brakemen on all steam roads had a rate of 6.67.

Construction, with a severity rate of 9.11, is closely similar to this industrial group wherever it has been possible to compute rates.

TABLE 22.—NUMBER OF ACCIDENTS IN OREGON, 1920, BY INDUSTRIES

| Industry | Full-year workers | Accidents resulting in— | | | | Rates for industrial groups of 2,000 or over | |
|------------------------------------|-------------------|-------------------------|--------------------------------|--------------------------------|--------|---|--|
| | | Death | Perma- nent dis- ability | Tempo- rary dis- ability | Total | Frequency (per 1,000,000 hours' exposure) | Severity (per 1,000 hours' exposure) |
| Agriculture..... | 1,641 | ----- | 13 | 122 | 135 | ----- | ----- |
| Chemicals..... | 165 | ----- | 1 | 27 | 28 | ----- | ----- |
| Clay, glass, etc..... | 460 | ----- | 4 | 60 | 64 | ----- | ----- |
| Clothing..... | 319 | ----- | 1 | 21 | 22 | ----- | ----- |
| Construction..... | 10,068 | 16 | 112 | 1,670 | 1,798 | 59.53 | 9.11 |
| Food and allied products..... | 4,876 | 1 | 30 | 741 | 772 | 52.16 | 2.94 |
| Leather and rubber..... | 255 | ----- | 4 | 25 | 29 | ----- | ----- |
| Lumber and its remanufacture..... | 17,524 | 24 | 331 | 3,836 | 4,191 | 72.72 | 10.36 |
| Logging..... | 9,520 | 66 | 144 | 1,979 | 2,189 | 76.65 | 21.56 |
| Logging railways..... | 2,540 | 15 | 34 | 247 | 297 | 38.97 | 20.24 |
| Metals and metal products..... | 4,139 | 2 | 45 | 1,022 | 1,069 | 86.31 | 5.67 |
| Mercantile..... | 1,728 | ----- | 6 | 89 | 95 | ----- | ----- |
| Mines, coal..... | 65 | ----- | 2 | 22 | 24 | ----- | ----- |
| Mines (not coal) and quarries..... | 918 | 3 | 20 | 214 | 237 | ----- | ----- |
| Municipalities..... | 311 | ----- | 3 | 19 | 22 | ----- | ----- |
| Paper and printing..... | 2,380 | ----- | 17 | 401 | 418 | 58.33 | 2.30 |
| Public service..... | 1,507 | 5 | 4 | 142 | 151 | ----- | ----- |
| Shipbuilding..... | 4,223 | 6 | 47 | 1,069 | 1,062 | 83.82 | 6.09 |
| Textiles..... | 1,263 | ----- | 6 | 114 | 120 | ----- | ----- |
| Unclassified..... | 7,227 | 5 | 34 | 622 | 656 | ----- | ----- |
| Total..... | 71,166 | 144 | 858 | 12,387 | 13,399 | ----- | ----- |

Table 23 summarizes the accident experience of a five-year period, classified according to cause. The number and per cent of accidents and of workdays lost from each cause are shown, the percentages furnishing a comparison of the relative importance of each cause. For example, machinery which causes 22.8 per cent of the cases is responsible for 36 per cent of the loss of working time, while handling objects, with 24 per cent of the cases, gives rise to only 7.1 per cent of the lost time.

TABLE 23.—NUMBER OF ACCIDENTS, AND LOSS OF WORKDAYS, IN OREGON, IN THE FIVE-YEAR PERIOD ENDING 1923, BY CAUSES

| Cause | Accidents | | Workdays lost | |
|---|-----------|----------|---------------|----------|
| | Number | Per cent | Number | Per cent |
| Machinery..... | 12,094 | 22.8 | 2,437,181 | 86.0 |
| Falling and rolling objects..... | 4,927 | 9.3 | 999,166 | 14.8 |
| Falls of workmen..... | 7,816 | 14.8 | 936,671 | 13.8 |
| Vehicles..... | 2,577 | 4.8 | 657,292 | 9.7 |
| Handling objects..... | 12,708 | 24.0 | 479,665 | 7.1 |
| Miscellaneous (including drownings)..... | 998 | 1.9 | 378,969 | 5.6 |
| Using hand tools..... | 6,576 | 12.4 | 365,184 | 5.4 |
| Explosives, electricity, fires, hot substances..... | 1,798 | 3.4 | 281,517 | 4.2 |
| Stepping on or striking against objects..... | 2,972 | 5.6 | 84,968 | 1.3 |
| Animals..... | 465 | .9 | 84,413 | 1.2 |
| Boilers..... | 57 | .1 | 59,177 | .9 |
| Total..... | 52,988 | 100.0 | 6,764,203 | 100.0 |

PENNSYLVANIA

Table 24 shows the accident occurrence in Pennsylvania and the distribution thereof by industries each year from 1916 to 1924.

It so happens that the two largest industrial groups, metals and products and coal mines appear side by side in the State tabulations, which makes comparison easy. The metals group shows a very substantial decrease in accidents while in coal mining the number remains almost uniform. It would be a very natural inference that conditions have improved in the metal industry while in coal mining they have not changed greatly. It is known from other sources that marked improvement has occurred in the metal industry and that coal mining is definitely less hazardous, but unfortunately this conclusion can not be verified from these Pennsylvania figures because the exposure to hazard is not known.

TABLE 24.—NUMBER OF ACCIDENTS IN PENNSYLVANIA, 1916 TO 1924, BY YEARS AND INDUSTRIES

| Industry | 1916 | 1917 | 1918 | 1919 | 1920 | 1921 | 1922 | 1923 | 1924 |
|------------------------------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| Chemicals..... | 5,918 | 8,435 | 3,089 | 2,274 | 2,633 | 2,295 | 2,360 | 3,061 | 2,623 |
| Clay, glass, and stone..... | 7,179 | 7,012 | 4,727 | 4,242 | 5,736 | 4,128 | 5,558 | 6,669 | 5,999 |
| Clothing..... | 2,037 | 1,652 | 1,107 | 916 | 1,211 | 1,310 | 1,617 | 1,869 | 1,440 |
| Construction..... | 15,146 | 13,884 | 9,190 | 8,209 | 12,920 | 10,830 | 13,047 | 16,038 | 16,260 |
| Food..... | 5,101 | 4,300 | 2,991 | 3,219 | 3,318 | 3,549 | 4,016 | 4,624 | 4,700 |
| Leather and rubber..... | 2,329 | 1,939 | 1,424 | 1,655 | 1,930 | 1,566 | 1,773 | 1,934 | 1,452 |
| Lumber and its remanufactures..... | 4,955 | 4,433 | 3,118 | 3,160 | 3,593 | 2,782 | 3,491 | 4,253 | 4,216 |
| Mercantile..... | 4,798 | 4,129 | 2,970 | 2,888 | 3,854 | 4,203 | 4,627 | 5,732 | 4,482 |
| Metals and products..... | 95,986 | 75,131 | 57,134 | 40,558 | 49,793 | 24,561 | 32,719 | 44,475 | 47,488 |
| Mines (coal)..... | 52,537 | 55,128 | 50,249 | 44,067 | 47,787 | 50,756 | 36,613 | 59,882 | 54,449 |
| Mines (not coal) and quarries..... | 2,420 | 2,854 | 1,634 | 1,446 | 1,589 | 1,514 | 2,001 | 2,290 | 2,160 |
| Municipal..... | 983 | 1,258 | 968 | 1,026 | 1,173 | 1,935 | 2,665 | 2,781 | 2,576 |
| Printing and publishing..... | 3,514 | 2,534 | 1,878 | 1,897 | 2,369 | 1,982 | 2,318 | 2,922 | 2,604 |
| Public service..... | 30,571 | 37,553 | 32,625 | 26,025 | 28,916 | 20,547 | 23,905 | 32,299 | 18,272 |
| Textiles..... | 3,888 | 3,145 | 2,209 | 2,084 | 2,344 | 2,417 | 2,896 | 3,543 | 2,709 |
| Beverages..... | 1,682 | 1,453 | 877 | 689 | 477 | 512 | 403 | 494 | 305 |
| Hotels and restaurants..... | 1,125 | 968 | 669 | 583 | 712 | 738 | 734 | 979 | 1,119 |
| Jobbers and warehouses..... | 1,637 | 1,244 | 840 | 1,064 | 1,296 | 1,291 | 1,625 | 1,002 | 1,236 |
| Laundries..... | 436 | 247 | 233 | 163 | 161 | 181 | 233 | 275 | 242 |
| Tobacco..... | 197 | 187 | 136 | 142 | 216 | 225 | 217 | 276 | 325 |
| Other industries..... | 7,177 | 6,204 | 6,826 | 6,257 | 2,951 | 2,875 | 3,636 | 4,437 | 2,973 |
| Total..... | 255,616 | 227,880 | 184,844 | 162,544 | 174,979 | 140,197 | 146,255 | 200,435 | 177,539 |

Table 25 presents the causes of accident by industries for 1920 and for 1924. It is of interest to note that the injuries in coal mines due to falling bodies are very much in excess of those due to explosions which from time to time furnish spectacular evidence of coal mine hazards. The fact is that the day by day injuries from material falling from roof or face aggregate, in the course of a year, the most serious hazard in the mines. As a result the number of fatalities in the State in 1924, from falling bodies (553) was exceeded only by those from power vehicles (554).

TABLE 25.—NUMBER OF ACCIDENTS IN PENNSYLVANIA, 1920 AND 1924, BY INDUSTRIES AND CAUSES

| Industry | Accidents due to specified cause— | | | | | | | | | | | | | | | |
|---|-----------------------------------|---------------|----------------|--------------|-----------------|---------------|------------------|---------------|---------------------------|---------------|----------------|---------------|---------------|---------------|----------------|----------------|
| | Machinery | | Hot substances | | Falling objects | | Falls of persons | | Handling tools or objects | | Power vehicles | | Miscellaneous | | Total | |
| | 1920 | 1924 | 1920 | 1924 | 1920 | 1924 | 1920 | 1924 | 1920 | 1924 | 1920 | 1924 | 1920 | 1924 | 1920 | 1924 |
| Chemicals and allied products..... | 292 | 322 | 210 | 357 | 176 | 127 | 449 | 389 | 919 | 876 | 152 | 152 | 435 | 390 | 2,633 | 2,623 |
| Clay, glass, and stone products..... | 606 | 692 | 216 | 313 | 582 | 501 | 632 | 626 | 2,672 | 2,282 | 369 | 494 | 659 | 1,091 | 5,736 | 5,999 |
| Clothing manufacture..... | 494 | 582 | 30 | 56 | 32 | 27 | 180 | 189 | 305 | 397 | 25 | 18 | 145 | 171 | 1,211 | 1,440 |
| Construction..... | 1,184 | 1,563 | 396 | 739 | 1,733 | 1,689 | 2,664 | 3,171 | 4,467 | 5,375 | 633 | 826 | 1,843 | 2,897 | 12,920 | 16,260 |
| Food products..... | 593 | 623 | 141 | 235 | 183 | 185 | 567 | 553 | 1,278 | 1,568 | 207 | 207 | 349 | 699 | 3,318 | 4,070 |
| Leather and rubber goods..... | 510 | 424 | 56 | 84 | 103 | 59 | 228 | 169 | 731 | 474 | 54 | 31 | 248 | 211 | 1,930 | 1,452 |
| Lumber and its remanufacture..... | 1,351 | 1,331 | 32 | 70 | 222 | 277 | 374 | 348 | 1,200 | 1,482 | 130 | 147 | 284 | 561 | 3,593 | 4,216 |
| Mercantile..... | 485 | 353 | 66 | 115 | 176 | 219 | 986 | 962 | 1,252 | 1,645 | 336 | 416 | 553 | 872 | 3,854 | 4,482 |
| Metals and metal products..... | 10,170 | 10,457 | 3,877 | 3,750 | 4,018 | 3,148 | 4,257 | 3,733 | 20,858 | 16,743 | 2,016 | 3,805 | 4,597 | 5,852 | 49,793 | 47,488 |
| Mines, coal..... | 1,829 | 1,965 | 2,039 | 2,249 | 12,697 | 14,837 | 3,220 | 3,039 | 15,793 | 14,675 | 7,704 | 12,713 | 4,505 | 4,971 | 47,787 | 54,449 |
| Mines (not coal) and quarries..... | 165 | 288 | 68 | 87 | 286 | 317 | 165 | 197 | 617 | 784 | 151 | 303 | 137 | 193 | 1,589 | 2,169 |
| Municipalities..... | 60 | 128 | 45 | 147 | 90 | 184 | 367 | 447 | 244 | 558 | 167 | 389 | 200 | 738 | 1,173 | 2,576 |
| Paper and printing..... | 980 | 897 | 60 | 153 | 124 | 118 | 286 | 303 | 715 | 623 | 80 | 93 | 224 | 317 | 2,369 | 2,504 |
| Public service..... | 1,425 | 420 | 1,177 | 720 | 1,617 | 531 | 4,104 | 1,856 | 11,873 | 3,763 | 5,924 | 7,938 | 2,796 | 3,045 | 28,916 | 18,272 |
| Textiles..... | 864 | 1,043 | 78 | 152 | 95 | 88 | 409 | 403 | 548 | 607 | 42 | 95 | 308 | 321 | 2,344 | 2,709 |
| Liquor and beverages..... | 72 | 50 | 25 | 16 | 20 | 13 | 103 | 49 | 172 | 110 | 28 | 26 | 57 | 41 | 477 | 306 |
| Hotels and restaurants..... | 58 | 96 | 74 | 178 | 24 | 25 | 207 | 245 | 238 | 416 | 10 | 14 | 101 | 145 | 712 | 1,119 |
| Jobbers and wholesalers..... | 148 | 123 | 20 | 26 | 65 | 66 | 240 | 196 | 543 | 463 | 134 | 119 | 146 | 243 | 1,296 | 1,236 |
| Laundries..... | 59 | 87 | 10 | 22 | 8 | 8 | 31 | 35 | 27 | 38 | 8 | 16 | 18 | 36 | 161 | 242 |
| Tobacco..... | 84 | 158 | | | 5 | 9 | 30 | 27 | 73 | 70 | 6 | 9 | 13 | 42 | 216 | 325 |
| Miscellaneous..... | 606 | 549 | 101 | 210 | 122 | 175 | 638 | 768 | 868 | 1,010 | 193 | 164 | 373 | 727 | 2,951 | 3,603 |
| Total..... | 21,935 | 22,151 | 8,721 | 9,679 | 22,378 | 22,613 | 20,187 | 17,614 | 65,398 | 53,959 | 18,369 | 27,975 | 17,991 | 23,548 | 174,979 | 177,539 |
| DEGREE OF INJURY | | | | | | | | | | | | | | | | |
| Fatal..... | 273 | 228 | 345 | 390 | 647 | 553 | 236 | 185 | 98 | 103 | 758 | 554 | 171 | 196 | 2,528 | 2,209 |
| Nonfatal..... | 93 | 21,923 | 21 | 9,289 | 18 | 22,060 | 13 | 17,429 | 49 | 63,856 | 102 | 27,421 | 21 | 23,352 | 317 | 175,330 |
| Permanent disability..... | | | | | | | | | | | | | | | | |
| Temporary disability, compensable..... | 13,067 | | 5,035 | | 13,089 | | 11,862 | | 22,099 | | 10,514 | | 7,615 | | 93,281 | |
| Temporary disability, noncompensable..... | 8,502 | | 3,320 | | 8,624 | | 8,076 | | 23,152 | | 6,995 | | 10,184 | | 78,833 | |

STATE ACCIDENT RECORDS—PENNSYLVANIA

In Table 26 the accidents of 1924 are classified by industry. Coal mines lead in fatal accidents with 932 cases, public service (374), metals and metal products (264), and construction (217) coming next in order.

TABLE 26.—NUMBER OF FATAL AND NONFATAL ACCIDENTS IN PENNSYLVANIA, 1924, BY INDUSTRIES

| Industry | Fatal accidents | Nonfatal accidents | Total accidents |
|---|-----------------|--------------------|-----------------|
| Chemicals and products..... | 51 | 2,372 | 2,623 |
| Clay, glass and stone products..... | 57 | 5,912 | 5,969 |
| Clothing..... | 9 | 1,438 | 1,447 |
| Construction and building..... | 217 | 16,043 | 16,260 |
| Food and kindred products..... | 19 | 4,061 | 4,079 |
| Laundries..... | 1 | 241 | 242 |
| Leather, rubber, and composition goods..... | 9 | 1,443 | 1,452 |
| Lumber and its remanufacture..... | 26 | 4,190 | 4,216 |
| Mercantile..... | 40 | 4,442 | 4,482 |
| Metals and metal products..... | 264 | 47,224 | 47,488 |
| Mines, coal..... | 932 | 53,517 | 54,449 |
| Mines (not coal) and quarries..... | 34 | 2,135 | 2,169 |
| Paper and printing..... | 15 | 2,489 | 2,504 |
| Public service and transportation..... | 374 | 17,898 | 18,272 |
| Textiles..... | 18 | 2,691 | 2,709 |
| Unclassified..... | 150 | 9,014 | 9,164 |
| Total..... | 2,209 | 175,330 | 177,539 |

WASHINGTON

In 1921 the State of Washington published an industrial accident table which analyzed the accident experience of the State in considerable detail, and this table is reproduced below as Table 27. It shows 127 deaths in logging, 43 deaths in the manufacture of lumber, 18 deaths in coal mines and 17 deaths in construction.

TABLE 27.—NUMBER OF ACCIDENTS IN WASHINGTON, YEAR ENDING SEPTEMBER 30, 1921, BY INDUSTRIES

| Industry | Accidents resulting in— | | | Total accidents |
|----------------------|-------------------------|--------------------------------|--------------------------------|-----------------|
| | Death | Perma- nent dis- ability | Tempo- rary dis- ability | |
| Chemicals..... | 1 | 3 | 18 | 22 |
| Clay..... | 1 | 6 | 27 | 34 |
| Construction..... | 17 | 140 | 560 | 717 |
| Food..... | 3 | 99 | 492 | 594 |
| Logging..... | 127 | 462 | 1,733 | 2,322 |
| Lumber..... | 48 | 665 | 2,158 | 3,193 |
| Mercantile..... | 2 | 16 | 39 | 56 |
| Metals..... | 9 | 142 | 561 | 712 |
| Mines, coal..... | 15 | 79 | 348 | 445 |
| Mines, not coal..... | 3 | 25 | 79 | 107 |
| Municipal..... | 11 | 63 | 366 | 440 |
| Paper..... | 1 | 35 | 92 | 128 |
| Printing..... | 1 | 23 | 35 | 59 |
| Public service..... | 8 | 23 | 150 | 181 |
| Shipbuilding..... | 10 | 87 | 252 | 349 |
| Textiles..... | 1 | 20 | 54 | 75 |
| Unclassified..... | 26 | 82 | 351 | 459 |
| Total..... | 287 | 1,909 | 7,315 | 9,511 |

For 1924 the analysis is less extended, covering only the 4 industries which in 1920 had the highest fatalities, namely, logging (211), the manufacture of lumber (42), construction (32), and coal mines (24).

TABLE 28.—NUMBER OF ACCIDENTS IN WASHINGTON (CLOSED CASES), BY INDUSTRIES, 1924

| Industry | Fatal accidents | Nonfatal accidents | Total accidents |
|--------------------|-----------------|--------------------|-----------------|
| Construction..... | 32 | 1,500 | 1,532 |
| Logging..... | 211 | 5,205 | 5,416 |
| Mining (coal)..... | 24 | 643 | 667 |
| Sawmills..... | 42 | 4,019 | 4,061 |
| Miscellaneous..... | 98 | 7,617 | 7,715 |
| Total..... | 407 | 18,984 | 19,391 |

WEST VIRGINIA

Table 29 contains the 1924 accident experience of West Virginia. Naturally coal mining is far in excess of any other industry both in fatal (593) and nonfatal (12,152) cases. Other industries with large numbers of fatalities are lumber (29), public service (25), construction (24), and metal and products (21).

TABLE 29.—NUMBER OF ACCIDENTS IN WEST VIRGINIA, YEAR ENDING JUNE 30, 1924, BY INDUSTRIES

| Industry | Fatal accidents | Nonfatal accidents | Total accidents |
|-----------------------------|-----------------|--------------------|-----------------|
| Chemicals and products..... | 2 | 377 | 379 |
| Clay products..... | 3 | 2,503 | 2,506 |
| Construction..... | 24 | 2,347 | 2,371 |
| Food products..... | 5 | 391 | 396 |
| Lumber..... | 29 | 1,691 | 1,720 |
| Metals and products..... | 21 | 7,122 | 7,143 |
| Mines (coal)..... | 593 | 12,152 | 12,745 |
| Mines (not coal)..... | 7 | 465 | 472 |
| Paper and printing..... | | 316 | 316 |
| Public service..... | 25 | 1,450 | 1,475 |
| Textiles..... | 4 | 339 | 343 |
| Unclassified..... | 16 | 1,455 | 1,471 |
| Total..... | 729 | 30,608 | 31,336 |

WISCONSIN

In 1920 Wisconsin reported separately only five industries, which appear in Table 30. The fatalities in these are in order, wood industries 38, construction 30, metals and products 22, paper and products 10, and mines and quarries 3.

The classification in 1922 to 1924 is more extended but does not separate the fatal and nonfatal, but the figures are important because they show so clearly the increase in number of accidents which occurred between 1922 and 1923, the increase continuing in a lesser degree into 1924.

The comment of the Wisconsin statistician on this increase is significant: "The increase in the number of cases in 1924 over the number of cases in 1923 is by itself not an indication of a change in the actual accident frequency rate for the industry. The employee exposure factor for the two periods is lacking." The essential character of this "employee-exposure factor" to the rational understanding of accident statistics can not be too often or too urgently asserted.

TABLE 30.—NUMBER OF ACCIDENTS¹ IN WISCONSIN, 1920 TO 1924, BY YEARS AND INDUSTRIES

| Industry | 1920: Accidents resulting in— | | | Total accidents | | | |
|------------------------------------|-------------------------------|--------------------------------|--------------------------------|-----------------|--------|--------|--------|
| | Death | Perma- nent dis- ability | Tempo- rary dis- ability | 1920 | 1922 | 1923 | 1924 |
| Agriculture..... | | | | | 271 | 275 | 400 |
| Chemicals..... | | | | | 212 | 263 | 209 |
| Clay, glass, and stone..... | | | | | 170 | 233 | 266 |
| Construction..... | 30 | 174 | 1,510 | 1,714 | 2,517 | 2,993 | 3,734 |
| Food products..... | | | | | 1,144 | 1,256 | 1,430 |
| Leather and rubber..... | | | | | 530 | 791 | 596 |
| Lumber and products..... | | | | | 2,863 | 3,232 | 4,334 |
| Mercantile..... | | | | | 1,176 | 1,507 | 1,628 |
| Metals and products..... | 22 | 532 | 4,005 | 4,559 | 1,600 | 2,372 | 2,447 |
| Mines (not coal) and quarries..... | 3 | 24 | 307 | 334 | 251 | 438 | 515 |
| Paper and paper products..... | 10 | 87 | 929 | 1,026 | | | |
| Paper and printing..... | | | | | 1,208 | 1,361 | 1,183 |
| Public service..... | | | | | 1,813 | 2,104 | 2,049 |
| Textiles..... | | | | | 216 | 296 | 238 |
| Wood industries..... | 38 | 306 | 2,543 | 2,837 | | | |
| Unclassified..... | | | | 7,921 | 2,682 | 3,800 | 3,549 |
| Total..... | | | | 18,441 | 16,703 | 20,941 | 22,760 |

¹ Compensable cases closed.

The Wisconsin statistical organization has carried out a more extended and elaborate study of various accident problems than has been attempted by any other State. Table 31 is a condensed presentation of the data regarding accident causes for the six-year period 1915 to 1920 and for 1924. In the six-year period machinery was much the most important cause of death (232 cases), vehicles coming next (176). Among machines hoisting apparatus exceeds any three other causes. The nature of the disclosure by time losses is indicated by the showing for machinery and handling. Machinery has 21,205 cases of injury and handling has 28,364, while the average time loss in machine accidents is 221 days per case and that in accidents due to handling is 63 days per case.

The indications from the data for the year 1924 are not materially different from those of the 5-year period except that falls of persons, with 32 cases of fatality, leads machinery, with 29.

TABLE 31.—NUMBER OF COMPENSABLE ACCIDENTS AND TIME LOST THEREBY, IN WISCONSIN, 1915 TO 1920 AND 1924, BY CAUSES

| Accident cause | Accidents resulting in— | | | | | | Total acci- dents | | Total days lost | | Aver- age days lost per case |
|-----------------------------------|-------------------------|------|--------------------------------|-------|-------------------------|--------|----------------------|--------|-----------------|-----------|---|
| | Death | | Perman- ent dis- ability | | Temporary disability | | | | | | |
| | 1915- 1920 | 1924 | 1915- 1920 | 1924 | 1915- 1920 | 1924 | 1915- 1920 | 1924 | 1915-1920 | 1924 | |
| Machinery | 232 | 293 | 991 | 978 | 16,982 | 3,331 | 21,203 | 4,388 | 4,691,400 | 912,463 | 221.24 |
| Engines and motors | 9 | — | 68 | 13 | 960 | 59 | 737 | 72 | 118,069 | 13,190 | 100.20 |
| Hoisting apparatus | 108 | 11 | 385 | 84 | 2,728 | 556 | 3,221 | 651 | 1,105,672 | 148,237 | 343.27 |
| Leather working | 2 | 1 | 165 | 43 | 585 | 96 | 752 | 140 | 122,542 | 34,604 | 162.69 |
| Metal working | 24 | 11 | 439 | 280 | 5,111 | 864 | 6,874 | 1,145 | 1,106,139 | 200,970 | 168.26 |
| Punch presses | 2 | — | 545 | 85 | 762 | 113 | 1,809 | 186 | 329,358 | 62,065 | 251.61 |
| Paper | 7 | 2 | 204 | 47 | 1,271 | 189 | 1,462 | 238 | 225,843 | 58,375 | 182.39 |
| Textiles | 1 | — | 55 | 13 | 389 | 79 | 445 | 92 | 80,795 | 13,007 | 181.36 |
| Transmission | 31 | 4 | 83 | 20 | 428 | 89 | 542 | 113 | 318,666 | 42,312 | 587.76 |
| Woodworking | 25 | 7 | 1,164 | 328 | 4,125 | 776 | 5,314 | 1,111 | 1,065,719 | 272,431 | 198.29 |
| Saws | 12 | 4 | 547 | 169 | 1,824 | 427 | 2,383 | 600 | 622,735 | 139,839 | 219.36 |
| Unclassified | 25 | 3 | 428 | 150 | 1,685 | 623 | 2,138 | 776 | 560,256 | 129,337 | 262.05 |
| Hot substances, electricity, etc. | 151 | 18 | 185 | 37 | 5,382 | 880 | 5,718 | 935 | 1,279,182 | 175,842 | 223.71 |
| Falling objects | 152 | 10 | 283 | 75 | 7,405 | 1,189 | 7,840 | 1,266 | 1,423,182 | 145,122 | 181.58 |
| Falls of persons | 160 | 32 | 303 | 123 | 10,860 | 2,818 | 11,332 | 2,978 | 1,695,767 | 365,071 | 149.64 |
| Handling objects and tools | 80 | 12 | 1,225 | 451 | 27,059 | 7,572 | 28,364 | 5,035 | 1,781,827 | 507,995 | 62.82 |
| Vehicles | 176 | 20 | 256 | 92 | 5,108 | 1,378 | 5,540 | 1,690 | 1,624,010 | 252,719 | 275.09 |
| Unclassified | 103 | 34 | 525 | 133 | 8,809 | 3,360 | 9,437 | 3,527 | 1,402,689 | 423,944 | 148.64 |
| Total | 1,054 | 155 | 6,768 | 1,889 | 31,614 | 20,722 | 89,436 | 22,766 | 13,798,057 | 2,783,156 | 154.28 |

WYOMING

Coal mining in Wyoming, as wherever it is an important industry, is a prolific source of casualty, there being 28 fatalities in 1920 and 55 in 1924. Oil and gas are next in order with 6 fatalities in 1920 and 21 in 1924. It is probable that the marked increase in fatalities in 1924 over 1920 is in considerable degree due to expansion of industry.

TABLE 32.—NUMBER OF ACCIDENTS IN WYOMING, 1920 AND 1924, BY INDUSTRIES

| Industry | Accidents resulting in— | | | | | | Total accidents | |
|-------------------------------------|-------------------------|------|-------------------------|------|-------------------------|-------|--------------------|-------|
| | Death | | Permanent disability | | Temporary disability | | 1920 | 1924 |
| | 1920 | 1924 | 1920 | 1924 | 1920 | 1924 | | |
| Cement and products | — | — | — | — | 1 | — | 8 | 9 |
| Clay, glass, and stone | 2 | — | — | — | — | 2 | — | 4 |
| Construction | 2 | 2 | 21 | 23 | 51 | 124 | 74 | 149 |
| Food products | — | 1 | 8 | 2 | 12 | 31 | 20 | 34 |
| Lumber and wood products | — | 1 | 4 | 1 | 9 | 72 | 13 | 74 |
| Mercantile | 1 | — | 4 | — | 8 | — | 13 | — |
| Metals and products | 1 | — | 3 | — | 4 | 2 | 8 | 2 |
| Mines, coal | 28 | 55 | 64 | 43 | 375 | 577 | 467 | 675 |
| Mines (not coal) and quarries | 2 | 1 | — | — | 4 | 23 | 6 | 24 |
| Municipal | — | — | — | — | 1 | — | — | 1 |
| Oil and gas | 6 | 21 | 41 | 26 | 106 | 444 | 183 | 491 |
| Printing | — | — | — | — | 1 | 2 | — | 3 |
| Public service | 1 | — | 1 | — | 18 | 21 | 15 | 21 |
| Unclassified | — | 7 | 10 | 17 | 32 | 248 | 42 | 272 |
| Total | 43 | 88 | 158 | 113 | 618 | 1,556 | 819 | 1,757 |

SUMMARY OF STATE REPORTS, 1920 AND 1924

In Tables 33 to 36 an effort has been made to compare the State accident data, by principal classification groups and by individual States, for the years 1920 and 1924. In those cases where 1924 data were lacking the latest available data have been used. As already noted, some of the States make no accident reports, and very few classify their data at all completely.

CLASSIFICATION BY INDUSTRIES

Table 33 gives for the years 1920 and 1924, respectively, the number of accidents for the States which classify their accidents according to industry. An attempt has been made, with a fair degree of success, to use a uniform classification.

The 1920 compilation records 597,215 accident cases and the 1924 compilation 696,369. The States covered, however, are not absolutely the same. The 1920 compilation relates to 21 States, while the 1924 compilation covers only 20 States and includes the important State of New York which was not included in 1920. Therefore, no inference can be drawn that the increase in accident cases represents an increasing hazard. On the whole, indeed, this table gives no definite answer to the question, "Is accident hazard increasing?" Nor can an answer be expected until the factor of employee exposure is more exactly known than is at present the case.

It is much to be desired that other compensation States should classify their accident cases in accordance with the comparatively simple classification here used, and particularly is it a matter of regret that the important State of Ohio must be omitted in these compilations because of the lack of such a classification.

TABLE 33.—NUMBER OF ACCIDENTS IN SPECIFIED STATES IN 1920 AND 1924,¹ BY INDUSTRIES

| Industry | Ala- bama, 1922 ² | Ark- ansas, 1920 | California | | Idaho ⁴ | | Illinois ² | | Indiana | | Kansas | | Kentucky | | Maryland | | Massa- chusetts | | Minnesota ⁴ | | Mon- tana, 1916- 1920 | Nev- ada, 1920 |
|-------------------------------------|------------------------------------|------------------------|---------------|--|--------------------|---------------|-----------------------|---------------|---------------|---------------|--------------|---------------|---------------|---------------|-------------------|-------------------|--------------------|---------------|------------------------|---------------|--------------------------------|----------------------|
| | | | 1920 | Jan. 1 to June 30, 1924 ³ | 1920 | 1924 | 1920 | 1923 | 1920 | 1921 | 1920 | 1924 | 1920 | 1924 | 1920 ⁴ | 1924 ⁴ | 1920 | 1923 | 1920 | 1922 | | |
| | | | | | | | | | | | | | | | | | | | | | | |
| Agriculture..... | 2 | | 4,286 | 2,300 | 120 | 143 | 281 | 292 | 189 | 148 | | | | 6 | | 19 | 196 | 339 | 45 | 98 | | |
| Chemicals..... | 62 | | 2,018 | 1,058 | | | 1,324 | 1,104 | 156 | 91 | | | 88 | 100 | 72 | 686 | 781 | 631 | 138 | 128 | | |
| Clay, glass, and stone..... | 52 | 3 | 735 | 1,057 | | | 916 | 1,457 | 1,614 | 1,258 | 103 | 192 | 490 | 841 | 444 | 345 | 406 | 431 | 285 | 267 | | 68 |
| Clothing..... | 7 | | 233 | | | | 681 | 746 | 135 | 198 | | | 79 | 85 | 41 | 335 | 316 | 335 | 38 | 51 | | |
| Construction..... | 340 | | 8,327 | 8,313 | 713 | 1,724 | 3,713 | 5,251 | 2,731 | 3,056 | | | 878 | 4,145 | 2,494 | 2,541 | 5,032 | 6,518 | 1,589 | 1,306 | 2,136 | 18 |
| Food products (including beverages) | 42 | 28 | 5,274 | 2,443 | | | 3,190 | 4,637 | 2,452 | 2,112 | 994 | 1,343 | 1,428 | 770 | 284 | 1,438 | 2,079 | 2,014 | 1,611 | 1,308 | 1,211 | 33 |
| Leather and rubber..... | 7 | | 477 | 229 | | | 506 | 606 | 454 | 427 | | | 179 | 216 | 210 | 262 | 4,664 | 3,631 | 134 | 57 | 1 | |
| Lumber and its remanufacture..... | 563 | 1,160 | 4,977 | 3,549 | 1,592 | 3,579 | 1,982 | 2,636 | 3,355 | 2,274 | 47 | 163 | 1,294 | 2,147 | 102 | 865 | 2,174 | 2,294 | 1,471 | 1,050 | 1,747 | 54 |
| Lumber: Logging..... | | | | | | | | | | | | | | | | | | | | | | |
| Lumber: Logging railways..... | | | | | | | | | | | | | | | | | | | | | | |
| Mercantile..... | 118 | 5 | | | 491 | 1,259 | 965 | 2,166 | 1,176 | 1,272 | | | 810 | 228 | | | 508 | 6,115 | 7,819 | 714 | 1,398 | 315 |
| Metals and metal products..... | 1,040 | 13 | 7,181 | 3,452 | | | 13,881 | 12,807 | 17,101 | 9,683 | 978 | 1,814 | 2,511 | 1,300 | 1,218 | 2,684 | 13,651 | 9,555 | 1,638 | 611 | 3,135 | 130 |
| Mines, coal..... | 2,115 | | | | | | 13,249 | 14,599 | 4,222 | 4,851 | 873 | 904 | 5,968 | 11,573 | | 409 | | | | | 1,969 | |
| Mines (not coal) and quarries..... | 113 | 65 | 4,721 | 3,789 | 1,210 | 2,875 | 437 | 168 | 477 | 696 | 235 | 77 | 169 | 422 | | 224 | 184 | 196 | 2,193 | 841 | 18,710 | 769 |
| Municipal..... | | | | | | | 231 | 550 | 32 | 31 | | | | | | | | | 206 | | 109 | 58 |
| Oil and gas..... | | | | | | | | 327 | | | 1,242 | 1,338 | | 576 | | | | | | | | |
| Paper and products..... | 6 | | 419 | 49 | | | 618 | 609 | 682 | 589 | | | 34 | 112 | 208 | 168 | 2,041 | 2,072 | 246 | 265 | | |
| Printing and publishing..... | 8 | 6 | 447 | 305 | | | 705 | 825 | 248 | 175 | | | 102 | 88 | 204 | 159 | 718 | 762 | 133 | 130 | 131 | |
| Public service..... | 886 | 13 | 9,132 | 2,088 | | 791 | 2,671 | 3,277 | 4,843 | 4,248 | 1,944 | 2,353 | 309 | 348 | 530 | 1,731 | 8,322 | 3,535 | 469 | 499 | 820 | 41 |
| Shipbuilding..... | | | 4,288 | 554 | | | | | | | | | | | | | | | | | | |
| Textiles..... | 207 | 2 | 137 | 273 | | | 299 | 330 | 164 | 136 | | | 211 | 167 | 128 | 130 | 11,246 | 10,054 | 115 | 64 | 7 | |
| Unclassified..... | 201 | 130 | 17,753 | 14,938 | 960 | 1,590 | 5,036 | 9,333 | 2,973 | 3,156 | 593 | 2,790 | 1,605 | 5,009 | 701 | 1,617 | 7,563 | 14,704 | 1,713 | 2,584 | 955 | 73 |
| Total..... | 5,769 | 1,420 | 70,405 | 44,397 | 5,086 | 11,961 | 50,585 | 61,810 | 42,994 | 34,396 | 7,009 | 10,974 | 16,155 | 28,133 | 6,694 | 13,919 | 65,488 | 64,890 | 12,738 | 10,657 | 31,314 | 1,176 |

¹ Where 1924 data were not available, the latest available data are given.
² Compensable cases.

³ Tabulatable accidents.
⁴ Compensation claims allowed.

⁵ Claims filed.
⁶ Includes shipbuilding.

TABLE 33.—NUMBER OF ACCIDENTS IN SPECIFIED STATES IN 1920 AND 1924, BY INDUSTRIES—Continued

| Industry | Nevada, 1924 | New-Hampshire, 1924 | New Jersey | | New York, 1923 ¹ | Oklahoma | | Oregon, 1920 | Pennsylvania | | South Dakota, 1921 | Tennessee, 1921 | Washington | | West Virginia, 1924 | Wisconsin ⁷ | | Wyoming ⁴ | | Total | | | |
|------------------------------------|-----------------|------------------------|------------|--------|--------------------------------|----------|--------|-----------------|--------------|---------|-----------------------|--------------------|------------|--------|------------------------|------------------------|--------|----------------------|------|-------|-----------|---------|--------|
| | | | 1920 | 1924 | | 1920 | 1924 | | 1920 | 1924 | | | 1920 | 1924 | | 1920 | 1924 | 1920 | 1924 | 1920 | 1924 | 1920 | 1924 | 1920 | 1924 | 1920^{3} com- pila- tion | 1924^{5} com- pila- tion |
| Agriculture..... | | | | | 353 | | | 135 | | | 102 | | | | | | 400 | | | | 5,354 | 4,100 | |
| Chemicals..... | | | 1,755 | 1,982 | 1,061 | | | 28 | 2,633 | 2,623 | | 375 | 22 | | 379 | | 209 | | | | 9,390 | 10,034 | |
| Clay, glass, and stone..... | | | 44 | 420 | 1,019 | 617 | 959 | 64 | 5,736 | 5,999 | | 504 | 34 | | 2,505 | | 260 | | 4 | 6 | 12,443 | 17,686 | |
| Clothing..... | | | 15 | 95 | 1,324 | 1,970 | | 18 | 22 | 1,211 | 1,440 | | 67 | | | | | | | | 2,818 | 6,522 | |
| Construction..... | | | 107 | 5,996 | 11,559 | 10,230 | 1,620 | 5,039 | 1,795 | 12,920 | 16,200 | 501 | 1,360 | 717 | 1,532 | 2,371 | 1,714 | 3,734 | 74 | 149 | 54,337 | 84,175 | |
| Food products..... | | | 26 | 397 | 1,823 | 3,029 | 613 | 589 | 772 | 3,795 | 4,375 | 630 | 1,481 | 594 | | 396 | | 1,450 | 20 | 34 | 26,891 | 27,927 | |
| Leather and rubber..... | | | 91 | 598 | 280 | 1,679 | | 1 | 29 | 1,936 | 1,452 | | 295 | | | | 706 | | | | 9,477 | 9,634 | |
| Lumber and its remanufacture..... | | | 408 | | 985 | 2,099 | 1,095 | 725 | 4,191 | 3,593 | 4,216 | 47 | 3,005 | 5,193 | 4,061 | 1,720 | 2,887 | 4,584 | 13 | 74 | 39,979 | 38,602 | |
| Lumber: Logging..... | | | | | | | | 2,189 | | | | | | 2,322 | 5,416 | | | | | | | 5,416 | |
| Lumber: Logging, railways..... | | | | | | | | 297 | | | | | | | | | | | | | | | |
| Mercantile..... | | 56 | | | 4,750 | 1,348 | 1,356 | | 95 | 3,854 | 4,482 | 59 | 1,229 | 56 | | | 1,520 | | 13 | | 17,245 | 26,938 | |
| Metals and metal products..... | 41 | 91 | 7,269 | 9,307 | 9,110 | 1,852 | 2,103 | 1,069 | 49,793 | 47,488 | 45 | 2,885 | 712 | | 7,143 | 4,559 | 2,447 | | 8 | | 2,129,620 | 120,578 | |
| Mines, coal..... | | | | | | 1,112 | 1,216 | 24 | 47,787 | 54,449 | | 1,256 | 445 | 667 | 12,745 | | | | 467 | 675 | 77,372 | 104,203 | |
| Mines (not coal) and quarries..... | 940 | | 84 | 446 | 618 | 3,934 | 6,360 | 237 | 1,589 | 2,169 | 688 | 211 | 107 | | 472 | 334 | 515 | | 6 | 24 | 36,360 | 20,947 | |
| Municipal..... | | | | | | | | 22 | 1,173 | 2,576 | | | 440 | | | | | | | | 2,272 | 3,157 | |
| Oil and gas..... | | | | | | 7,821 | 22,187 | | | | | | | | | | | | | 153 | 491 | 9,216 | 24,919 |
| Paper and products..... | | | 311 | 86 | 419 | 1,585 | | 1 | | | | 306 | 128 | | 316 | 1,026 | 1,183 | | | | 5,794 | 7,685 | |
| Printing and publishing..... | | | 14 | 65 | 91 | 1,027 | 113 | 168 | 418 | 2,369 | 2,504 | 46 | 183 | 59 | | | | | 3 | | 5,944 | 6,256 | |
| Public service..... | 31 | | 20 | | 10,973 | 746 | 1,427 | | 151 | 28,916 | 18,272 | 137 | 442 | 181 | | 1,475 | | 2,049 | 15 | 21 | 59,682 | 54,024 | |
| Shipbuilding..... | | | 2,817 | 379 | | | | 1,062 | | | | | 349 | | | | | | | | 8,516 | 9,933 | |
| Textiles..... | | | 387 | 277 | 1,635 | 1,475 | | | 120 | 2,344 | 2,709 | | 641 | 75 | | 343 | | 258 | | | 15,754 | 13,218 | |
| Unclassified..... | 365 | | 891 | 8,982 | 16,932 | 6,496 | 1,843 | 4,368 | 666 | 5,336 | 6,525 | 475 | 2,943 | 459 | 7,715 | 1,471 | 7,921 | 3,549 | 42 | 281 | 68,752 | 104,515 | |
| Total..... | 1,377 | 2,461 | 28,841 | 48,241 | 58,078 | 22,714 | 46,517 | 13,389 | 174,979 | 177,539 | 2,724 | 17,189 | 9,571 | 19,391 | 31,336 | 18,441 | 22,766 | | 819 | 1,757 | 597,215 | 666,369 | |

³ Compensable cases.⁴ Compensation claims allowed.⁷ Compensable cases closed.¹ Includes also data for Montana for 1915 to 1920 and for South Dakota, Tennessee, and Washington for 1921.⁵ Includes also data for Indiana for 1921, for Alabama and Minnesota for 1922, for Illinois, Massachusetts, and New York for 1923, and for California for first six months of 1924.

CAUSE OF INJURY

In the 1920 compilation there were 18 States whose accidents were recorded according to a cause classification. The number of the accidents so classified was 714,023.

For 1924 such a classification could be made for 17 States and four others were available for the years 1922 and 1923. The total accident cases for 1924 so classified are 647,495 and for 1922 and 1923 are 190,547, making a grand total of 838,042 for the later period.

The handling of tools and objects gives rise to the greatest number of accidents shown in Table 34, there being a total of 472,805 cases in the two periods. Machinery comes next, with a total of 294,951. In this table hoisting apparatus is considered as a form of machinery. Not giving cranes and other hoisting and carrying apparatus a separate classification tends to obscure the continued importance of machinery as a cause of accident. If it were possible to show these cases on a severity basis the high importance of machinery as an industrial hazard would be still more strikingly evident.

TABLE 34.—NUMBER OF ACCIDENTS IN THE SPECIFIED STATES, 1920 AND 1924, BY CAUSE OF INJURY

| State | Accidents due to specified cause | | | | | | | Total |
|-------------------------------|----------------------------------|----------------|-----------------|------------------|---------------------------|----------|--------------|---------|
| | Machinery | Hot substances | Falling objects | Falls of persons | Handling tools or objects | Vehicles | Unclassified | |
| 1920 | | | | | | | | |
| California..... | 8,410 | 4,283 | 5,688 | 9,465 | 24,445 | 6,867 | 11,247 | 70,405 |
| Idaho ¹ | 495 | 116 | 1,471 | 752 | 1,813 | 222 | 588 | 4,967 |
| Illinois ¹ | 7,240 | 2,928 | 8,204 | 5,799 | 12,276 | 4,683 | 9,455 | 50,585 |
| Indiana..... | 1,101 | 1,856 | 6,187 | 5,384 | 9,304 | 1,772 | 8,792 | 34,396 |
| Kentucky ¹ | 1,232 | 842 | 3,820 | 625 | 5,733 | ----- | 3,903 | 16,155 |
| Maryland..... | 1,036 | 795 | 1,150 | 1,087 | 1,284 | 589 | 1,184 | 6,694 |
| Massachusetts..... | 15,307 | 3,029 | 2,412 | 9,176 | 23,931 | 4,149 | 7,484 | 65,488 |
| Minnesota ¹ | 2,475 | 608 | 1,068 | 1,769 | 4,282 | 1,351 | 1,170 | 12,738 |
| New Jersey ¹ | 2,986 | 1,014 | 6,446 | 2,424 | 7,652 | 2,905 | 4,609 | 28,036 |
| North Dakota..... | 173 | 74 | 114 | 148 | 498 | 147 | 177 | 1,231 |
| Ohio..... | 79,043 | 12,442 | 6,404 | 8,417 | 58,551 | 4,391 | 13,722 | 182,970 |
| Oregon..... | 2,979 | 431 | 1,335 | 1,888 | 4,755 | 769 | 1,232 | 13,369 |
| Pennsylvania..... | 21,935 | 8,721 | 22,378 | 20,187 | 65,398 | 18,369 | 17,991 | 174,979 |
| Tennessee ¹ | 675 | 1,302 | 2,877 | 3,009 | 2,666 | 465 | 6,195 | 17,189 |
| Vermont..... | 971 | 200 | 2,057 | 669 | 2,613 | 26 | 1,544 | 8,060 |
| Washington ¹ | 1,615 | 278 | 1,865 | 1,588 | 2,824 | 558 | 843 | 9,871 |
| Wisconsin..... | 3,986 | 986 | 1,063 | 1,826 | 5,245 | 577 | 2,565 | 16,248 |
| Wyoming ¹ | 91 | 53 | 273 | 95 | 156 | 74 | 70 | 812 |
| Total..... | 151,750 | 39,553 | 74,832 | 74,308 | 232,926 | 47,913 | 92,741 | 714,023 |

¹ Compensation claims allowed.

² Compensable cases only.

³ Data for year ending June 30, 1921.

⁴ Data for 1921.

TABLE 34.—NUMBER OF ACCIDENTS IN THE SPECIFIED STATES, 1920 AND 1924, BY CAUSE OF INJURY—Continued

| State | Accidents due to specified cause | | | | | | | Total |
|-----------------------------------|----------------------------------|------------------------|--------------------|---------------------|--------------------------------------|---------------|-------------------|---------|
| | Ma- chinery | Hot sub- stances | Falling objects | Falls of persons | Hand- ling tools or objects | Vehi- cles | Unclas- sified | |
| 1924 | | | | | | | | |
| Alabama ¹ | 764 | 792 | 894 | 427 | 1,452 | 909 | 531 | 5,769 |
| Arizona ² | 88 | 52 | 353 | 86 | 154 | 77 | 115 | 927 |
| California ³ | 7,216 | 3,170 | 3,259 | 5,896 | 15,057 | 5,098 | 4,701 | 44,397 |
| Illinois ⁴ | 5,598 | 3,652 | 11,940 | 7,505 | 14,486 | 3,791 | 14,775 | 61,810 |
| Kansas..... | 1,392 | 650 | 1,568 | 893 | 3,272 | 727 | 2,572 | 10,974 |
| Kentucky..... | 132 | 671 | 13,068 | 1,274 | 7,631 | 1,667 | 3,790 | 28,133 |
| Maryland ⁵ | 2,147 | 647 | 1,215 | 1,191 | 2,614 | 1,551 | 4,554 | 13,919 |
| Massachusetts ⁶ | 11,806 | 2,926 | 3,651 | 9,219 | 24,304 | 4,548 | 8,936 | 64,890 |
| Minnesota..... | 1,915 | 649 | 1,184 | 2,778 | 5,774 | 1,324 | 2,057 | 15,681 |
| New Hampshire..... | 604 | 55 | 92 | 260 | 404 | 72 | 974 | 2,461 |
| New Jersey..... | 8,708 | 1,393 | 11,413 | 3,096 | 12,263 | 2,750 | 8,595 | 48,218 |
| New York ¹⁰ | 11,289 | 2,646 | 3,881 | 9,217 | 18,785 | 4,653 | 7,010 | 58,078 |
| North Dakota ¹¹ | 198 | 94 | 137 | 215 | 630 | 213 | 322 | 1,809 |
| Ohio ¹² | 57,744 | 8,794 | 9,838 | 8,221 | 54,141 | 6,626 | 16,680 | 162,044 |
| Oklahoma..... | 1,340 | 1,852 | 6,762 | 2,577 | 6,198 | 2,396 | 25,398 | 46,517 |
| Pennsylvania..... | 22,151 | 7,720 | 22,613 | 17,614 | 53,569 | 34,480 | 18,902 | 177,539 |
| Tennessee..... | 2,077 | 1,068 | 5,217 | 3,070 | 3,099 | 963 | 5,772 | 21,364 |
| Utah..... | 1,510 | 1,001 | 2,753 | 1,396 | 4,353 | 1,856 | 1,331 | 14,200 |
| Vermont ¹³ | 1,379 | 329 | 3,001 | 709 | 3,258 | ..... | 1,731 | 10,507 |
| West Virginia ¹⁴ | 1,408 | 1,983 | 6,564 | 1,433 | ..... | 3,994 | 10,655 | 26,039 |
| Wisconsin ¹⁵ | 4,338 | 1,018 | 1,623 | 2,976 | 8,035 | 1,690 | 3,082 | 22,706 |
| Total..... | 143,201 | 41,172 | 111,133 | 80,205 | 239,879 | 79,284 | 143,163 | 838,042 |

¹ Compensation claims allowed.

² Data for 1922—compensable cases only.

³ Data for mines only.

⁴ Data for first six months of 1924.

⁵ Data for 1923—compensable cases.

⁶ Compensation claims filed—data does not include 13 fatal cases.

¹⁰ Data for 1923—compensable cases only.

¹¹ Compensation claims filed.

¹² Data does not include self-insured.

¹³ Data does not include 43 fatal cases.

¹⁴ Compensable cases closed.

NATURE OF INJURY

In the 1920 compilation 12 States were found to have classified their accidents by the nature of the injury. For 1924, 6 States had such a record and for 1923 such classified data were available for 3 States.

The figures in the groups "Bruises" and "Cuts, lacerations and punctures," taken together, are much in excess of those in all others.

Several States do not indicate the nature of the injury in fatal cases. There seems to be no good reason for this omission.

TABLE 35.—NUMBER OF ACCIDENTS IN SPECIFIED STATES, 1920 AND 1924, BY NATURE OF INJURY

| State | Accidents, classified by nature of injury | | | | | | | | Total |
|----------------------------------|---|---------------|-------------|---------|----------------------------------|-----------|--------------------------|--------------|---------|
| | Amputations | Asphyxiations | Burns, etc. | Bruises | Cuts, lacerations, and punctures | Fractures | Sprains and dislocations | Unclassified | |
| 1920 | | | | | | | | | |
| California..... | 1,285 | | 3,145 | 17,987 | 20,232 | 7,641 | 12,549 | 7,566 | 70,403 |
| Idaho ¹ | 24 | | 139 | 1,280 | 2,144 | 657 | 624 | 261 | 5,129 |
| Illinois ² | 2,156 | | 3,043 | 12,344 | 16,287 | 5,877 | 7,204 | 8,674 | 50,585 |
| Indiana..... | 622 | | 1,891 | 8,785 | 6,351 | 2,780 | 3,680 | 9,997 | 34,396 |
| Kentucky ³ | 256 | | 477 | 2,153 | 3,275 | 1,191 | 1,194 | 1,044 | 9,590 |
| Maryland..... | 393 | | 535 | 1,809 | 1,075 | 876 | 955 | 1,851 | 6,694 |
| Massachusetts..... | 1,538 | | 3,147 | 16,907 | 21,819 | 4,357 | 11,305 | 6,415 | 65,488 |
| Minnesota..... | 313 | 26 | 625 | 3,773 | 3,446 | 2,288 | 1,822 | 445 | 12,738 |
| Montana..... | | | 122 | 1,560 | 1,566 | 465 | 429 | 752 | 4,914 |
| Pennsylvania..... | 1,566 | 287 | 11,569 | 71,123 | 51,606 | 14,816 | 20,682 | 3,025 | 174,979 |
| Tennessee ⁴ | 185 | | 1,233 | 4,076 | 5,837 | 903 | 1,440 | 3,515 | 17,139 |
| Wyoming ⁵ | | | 30 | 412 | (?) | 184 | 84 | 52 | 812 |
| Total..... | 8,338 | 312 | 26,006 | 141,694 | 133,958 | 42,046 | 61,968 | 38,507 | 452,919 |
| 1924 | | | | | | | | | |
| California ⁶ | 1,652 | | 2,403 | 11,140 | 13,328 | 5,713 | 8,948 | 1,813 | 44,397 |
| Illinois ⁷ | 2,252 | | 3,359 | 18,749 | 15,272 | 7,614 | 9,724 | 4,810 | 61,810 |
| Kentucky..... | 124 | | 592 | 18,638 | 6,242 | 506 | 1,405 | 628 | 28,133 |
| Maryland ⁸ | 387 | 20 | 776 | 3,767 | 4,016 | 1,188 | 2,122 | 1,545 | 13,824 |
| Massachusetts ⁹ | 1,430 | | 2,846 | 15,959 | 19,970 | 4,738 | 12,810 | 7,137 | 64,890 |
| Minnesota ¹⁰ | 153 | 107 | 663 | 5,172 | 4,264 | 2,416 | 2,513 | 3,373 | 15,681 |
| New York ¹¹ | | | 3,044 | 116,963 | 23,427 | 113,196 | | 2,446 | 58,078 |
| Vermont ¹² | | | 361 | 4,348 | 3,170 | 1,277 | 51 | 1,310 | 10,507 |
| Washington ¹³ | 539 | | 419 | 5,087 | 5,535 | 3,268 | 2,636 | 1,327 | 19,391 |
| Total..... | 5,967 | 127 | 14,456 | 100,403 | 94,244 | 39,918 | 40,209 | 21,387 | 316,711 |

¹ Compensation claims allowed.² Compensable cases.³ Data for 1921.⁴ Including cuts, lacerations, and punctures.⁵ Included under "Bruises."⁶ Data for first 6 months of 1924—tabular data cases.⁷ Data for 1923.⁸ Data does not include 95 fatal cases.⁹ Closed cases.¹⁰ Data for 1923—compensated cases.¹¹ Includes sprains.¹² Includes amputations and dislocations.¹³ Data does not include 43 fatal cases.

LOCATION OF INJURY

Table 36 records the accident experience of certain States in the matter of location of injury. The 1920 compilation covered 11 States and 460,534 cases and the 1924 compilation 10 States with 341,099 cases.

The location of injury has no great significance from an accident-prevention standpoint except as regards eye injuries. It can not, of course, be assumed that because there are instances where the adoption of protective measure has been followed by the reduction of eye injuries to zero the same result can always be secured. It must, however, be strongly suspected that the major portion of the 48,502 injuries to the eyes recorded in this table were needless. It may also be urged that some progress has been made when it is noted that the earlier compilation records 29,663 cases and the later 18,839. If this change represents, as it very well may, a larger use of protective devices, there is hope that eye injuries may ultimately cease altogether.

As might be anticipated, the upper extremities are most often damaged, there being shown a total of 333,195 such cases. It is quite certain that an examination of these cases from the standpoint of severity would show other locations with greater severity rates.

TABLE 36.—NUMBER OF ACCIDENTS IN SPECIFIED STATES, 1920 AND 1924, BY LOCATION OF INJURY

| State | Accidents, classified by location of injury | | | | | | Total |
|----------------------------------|---|---------------|---------------|-------------------|-------------------|---------------|----------------|
| | Head, face, and neck | Eyes | Trunk | Upper extremities | Lower extremities | Unclassified | |
| 1920 | | | | | | | |
| California..... | 4,023 | 5,204 | 9,937 | 29,469 | 19,741 | 2,031 | 70,405 |
| Idaho ¹ | 423 | 393 | 725 | 1,970 | 1,545 | 80 | 5,136 |
| Illinois ² | 3,067 | 2,439 | 7,401 | 22,752 | 14,926 | — | 50,585 |
| Indiana ³ | 2,390 | 2,813 | 4,103 | 13,498 | 9,783 | 1,800 | 34,396 |
| Kentucky..... | 2,173 | — | 2,949 | 7,113 | 4,352 | — | 16,587 |
| Maryland ⁴ | 394 | 240 | 557 | 2,603 | 2,070 | 830 | 6,694 |
| Massachusetts..... | 3,645 | 3,446 | 8,870 | 31,667 | 17,091 | 1,069 | 65,488 |
| Minnesota..... | 527 | 434 | 2,487 | 6,681 | 3,551 | 58 | 12,738 |
| Oklahoma..... | 2,008 | 3,084 | 2,747 | 9,071 | 5,202 | 602 | 22,714 |
| Pennsylvania..... | 15,354 | 11,597 | 30,235 | 64,862 | 52,931 | — | 174,979 |
| Wyoming ⁵ | 102 | 13 | 102 | 254 | 307 | 34 | 812 |
| Total..... | 34,100 | 29,063 | 69,813 | 188,940 | 131,499 | 6,513 | 460,534 |
| 1924 | | | | | | | |
| Arizona..... | 38 | 61 | 117 | 365 | 260 | 46 | 887 |
| California ⁶ | 2,345 | 2,639 | 6,980 | 18,086 | 12,551 | 1,776 | 44,397 |
| Idaho..... | 811 | 996 | 1,802 | 4,574 | 3,467 | 311 | 11,961 |
| Illinois ⁷ | 3,708 | 2,623 | 9,717 | 27,918 | 17,844 | — | 61,810 |
| Kentucky..... | 1,166 | 2,570 | 3,352 | 13,213 | 7,796 | 36 | 28,133 |
| Maryland..... | 552 | 490 | 2,007 | 6,088 | 4,196 | 586 | 13,919 |
| Massachusetts ⁸ | 6,284 | — | 11,933 | 29,187 | 17,436 | — | 64,890 |
| New York..... | 2,461 | 1,519 | 8,791 | 27,665 | 15,320 | 2,322 | 58,078 |
| Oklahoma..... | 2,967 | 6,109 | 4,435 | 12,200 | 8,043 | 12,763 | 46,517 |
| Vermont ⁹ | 698 | 1,812 | 935 | 4,959 | 2,103 | — | 10,507 |
| Total..... | 21,030 | 18,830 | 50,069 | 144,255 | 89,066 | 17,840 | 341,099 |

¹ Compensable cases.

² Compensation claims allowed.

³ Data for 1921.

⁴ Data for first 6 months of 1924.

⁵ Data for 1923.

⁶ Data does not include fatal cases.

STEAM RAILWAYS

The Interstate Commerce Commission publishes at regular intervals accident bulletins giving very detailed information regarding the accident experience of American steam railways. The data in the tables which follow are derived from these bulletins.

Table 37 presents summary figures showing the number killed and injured during the period from 1888 to 1924. For no other American industry has accident experience been recorded for so long a time with equal completeness.

The greatly lessened hazard is shown very conclusively by the figures for passenger casualty. The peak of passenger fatality was in 1907 when 610 were killed. The high year for passenger injuries was 1913 with 15,130 cases. From this point there has been an irregular decline until 1924, when 153 passengers were killed and 6,023 injured.

The data for employees show the peak of fatality (4,534) also in 1907, the peak of injury (176,923) being in 1916. By 1924 fatalities had declined to 1,479 and injuries to 124,655.

The peak for "other persons" was in 1913, with 6,899 killed and 13,761 injured.

If the data for recent years could be put on a rate basis the decline in casualty would be much more striking.

TABLE 37.—NUMBER OF PASSENGERS, EMPLOYEES, AND OTHER PERSONS KILLED OR INJURED IN REPORTABLE STEAM RAILWAY ACCIDENTS OF ALL KINDS IN THE UNITED STATES, 1888 TO 1924, BY YEARS¹

| Year ending— | Passengers | | Employees | | Other persons | | Total | |
|---------------|------------|---------|-----------|---------|---------------|---------|--------|---------|
| | Killed | Injured | Killed | Injured | Killed | Injured | Killed | Injured |
| June 30, 1888 | 315 | 2,138 | 2,070 | 20,148 | 2,897 | 3,602 | 5,282 | 25,888 |
| June 30, 1889 | 310 | 2,146 | 1,972 | 20,028 | 3,541 | 4,135 | 6,823 | 26,309 |
| June 30, 1890 | 286 | 2,425 | 2,451 | 22,396 | 3,598 | 4,206 | 6,335 | 29,027 |
| June 30, 1891 | 293 | 2,972 | 2,660 | 26,140 | 4,076 | 4,769 | 7,029 | 33,881 |
| June 30, 1892 | 276 | 3,227 | 2,554 | 28,267 | 4,217 | 5,158 | 7,147 | 36,652 |
| June 30, 1893 | 299 | 3,229 | 2,727 | 31,729 | 4,320 | 5,435 | 7,346 | 40,393 |
| June 30, 1894 | 324 | 3,034 | 1,823 | 23,422 | 4,300 | 5,433 | 6,447 | 31,889 |
| June 30, 1895 | 170 | 2,375 | 1,811 | 25,696 | 4,155 | 5,677 | 6,136 | 33,748 |
| June 30, 1896 | 181 | 2,873 | 1,861 | 29,969 | 4,406 | 5,845 | 6,448 | 38,687 |
| June 30, 1897 | 222 | 2,795 | 1,693 | 27,667 | 4,522 | 6,269 | 6,437 | 36,731 |
| June 30, 1898 | 221 | 2,945 | 1,658 | 31,761 | 4,680 | 6,176 | 6,859 | 40,882 |
| June 30, 1899 | 239 | 3,442 | 2,210 | 34,923 | 4,674 | 6,255 | 7,123 | 44,620 |
| June 30, 1900 | 249 | 4,128 | 2,550 | 39,643 | 5,066 | 6,549 | 7,865 | 50,320 |
| June 30, 1901 | 282 | 4,988 | 2,675 | 41,142 | 5,498 | 7,209 | 8,455 | 53,339 |
| June 30, 1902 | 345 | 6,683 | 2,969 | 50,524 | 5,274 | 7,455 | 8,588 | 64,662 |
| June 30, 1903 | 355 | 8,231 | 3,606 | 60,481 | 5,879 | 7,841 | 9,840 | 76,553 |
| June 30, 1904 | 441 | 9,111 | 3,632 | 67,067 | 5,973 | 7,977 | 10,046 | 81,155 |
| June 30, 1905 | 537 | 10,467 | 3,361 | 66,833 | 5,805 | 8,718 | 9,703 | 86,008 |
| June 30, 1906 | 359 | 10,764 | 3,929 | 76,701 | 6,330 | 10,241 | 10,618 | 97,706 |
| June 30, 1907 | 610 | 13,041 | 4,534 | 87,644 | 6,695 | 10,331 | 11,839 | 111,016 |
| June 30, 1908 | 381 | 11,556 | 3,405 | 82,487 | 6,402 | 10,187 | 10,188 | 104,280 |
| June 30, 1909 | 253 | 10,311 | 2,610 | 75,006 | 5,859 | 10,309 | 8,722 | 95,626 |
| June 30, 1910 | 324 | 12,451 | 3,382 | 95,671 | 5,976 | 11,385 | 9,682 | 119,507 |
| June 30, 1911 | 299 | 12,042 | 3,602 | 126,039 | 6,495 | 12,078 | 10,396 | 150,169 |
| June 30, 1912 | 283 | 14,938 | 3,635 | 142,442 | 6,667 | 12,158 | 10,585 | 169,533 |
| June 30, 1913 | 350 | 15,130 | 3,716 | 171,417 | 6,899 | 13,761 | 10,964 | 200,308 |
| June 30, 1914 | 232 | 13,887 | 3,269 | 165,212 | 6,811 | 13,563 | 10,302 | 192,662 |
| June 30, 1915 | 199 | 10,914 | 2,152 | 138,092 | 6,270 | 13,034 | 8,621 | 162,040 |
| June 30, 1916 | 239 | 7,488 | 2,687 | 160,663 | 6,438 | 12,224 | 9,364 | 180,375 |
| Dec. 31, 1916 | 246 | 7,162 | 2,941 | 176,923 | 6,814 | 12,647 | 10,001 | 196,722 |
| Dec. 31, 1917 | 301 | 7,582 | 3,199 | 174,247 | 6,587 | 12,976 | 10,087 | 194,805 |
| Dec. 31, 1918 | 471 | 7,316 | 3,419 | 156,013 | 5,396 | 11,246 | 9,286 | 174,575 |
| Dec. 31, 1919 | 273 | 7,456 | 2,138 | 131,018 | 4,567 | 10,579 | 6,978 | 149,053 |
| Dec. 31, 1920 | 229 | 7,591 | 2,578 | 149,414 | 4,151 | 11,304 | 6,958 | 168,309 |
| Dec. 31, 1921 | 205 | 5,584 | 1,446 | 104,530 | 4,345 | 10,571 | 5,996 | 120,685 |
| Dec. 31, 1922 | 200 | 6,153 | 1,648 | 116,757 | 4,477 | 11,961 | 6,325 | 134,871 |
| Dec. 31, 1923 | 143 | 6,463 | 1,940 | 151,960 | 5,302 | 13,289 | 7,385 | 171,712 |
| Dec. 31, 1924 | 153 | 6,023 | 1,479 | 124,655 | 4,985 | 13,061 | 6,617 | 143,739 |

¹ Figures for years 1911 to 1915 include industrial and other nontrain accidents to employees only; and for years 1908 to 1910 do not cover switching and terminal roads; otherwise, the statement covers all reportable accidents.

Table 38 shows for the years 1917 to 1924 a summary of train and train service accidents for various classes of persons.

TABLE 38.—ACCIDENTS ON STEAM RAILWAYS OF ALL CLASSES IN THE UNITED STATES, 1917 TO 1924, BY YEARS AND CLASSES OF PERSONS INJURED

| Class | 1917 | | 1918 | | 1919 | | 1920 | | 1921 | | 1922 | | 1923 | | 1924 | |
|---|--------|---------|--------|---------|--------|---------|--------|---------|--------|---------|--------|---------|--------|---------|--------|---------|
| | Killed | Injured | Killed | Injured | Killed | Injured | Killed | Injured | Killed | Injured | Killed | Injured | Killed | Injured | Killed | Injured |
| Train and train service accidents | | | | | | | | | | | | | | | | |
| TRESPASSERS | | | | | | | | | | | | | | | | |
| Employees..... | 149 | 207 | 74 | 98 | 133 | 193 | 89 | 189 | 72 | 123 | 73 | 139 | 105 | 195 | 90 | 170 |
| Other persons..... | 4,094 | 3,622 | 3,181 | 2,707 | 2,420 | 2,465 | 2,077 | 2,179 | 2,409 | 2,948 | 2,357 | 2,705 | 2,674 | 2,852 | 2,466 | 2,693 |
| Total trespassers..... | 4,243 | 3,829 | 3,255 | 2,805 | 2,553 | 2,658 | 2,166 | 2,368 | 2,481 | 3,071 | 2,430 | 2,844 | 2,779 | 3,047 | 2,556 | 2,863 |
| NONRESPASSEES | | | | | | | | | | | | | | | | |
| Employees on duty: | | | | | | | | | | | | | | | | |
| Trainmen..... | 1,492 | 47,887 | 1,606 | 42,944 | 984 | 32,844 | 1,285 | 42,840 | 658 | 25,968 | 719 | 29,311 | 937 | 36,196 | 672 | 29,224 |
| Other employees..... | 1,124 | 4,349 | 1,153 | 4,017 | 709 | 3,436 | 842 | 4,080 | 438 | 2,556 | 522 | 2,890 | 625 | 3,281 | 520 | 2,950 |
| Employees not on duty..... | 165 | 544 | 169 | 595 | 96 | 321 | 91 | 314 | 41 | 223 | 57 | 243 | 82 | 258 | 54 | 227 |
| Passengers..... | 301 | 7,582 | 471 | 7,316 | 273 | 7,456 | 229 | 7,591 | 205 | 5,584 | 200 | 6,153 | 138 | 5,847 | 149 | 5,354 |
| Persons carried under contract..... | 42 | 792 | 48 | 766 | 28 | 691 | 35 | 865 | 21 | 560 | 25 | 651 | 21 | 674 | 20 | 567 |
| Other nontrespassers..... | 2,200 | 5,987 | 1,995 | 5,701 | 1,882 | 5,195 | 1,867 | 5,728 | 1,743 | 5,362 | 1,898 | 5,907 | 2,339 | 7,162 | 2,244 | 7,206 |
| Total nontrespassers..... | 5,324 | 67,141 | 5,442 | 61,339 | 3,942 | 49,943 | 4,329 | 61,418 | 3,106 | 40,253 | 3,421 | 45,145 | 4,143 | 53,417 | 3,659 | 45,518 |
| Grand total..... | 9,567 | 70,970 | 8,697 | 64,144 | 6,495 | 52,601 | 6,495 | 63,786 | 5,587 | 43,324 | 5,851 | 47,989 | 6,922 | 56,464 | 6,215 | 48,371 |
| Nontrain accidents | | | | | | | | | | | | | | | | |
| Employees not concerned with operation of trains..... | 418 | 121,467 | 491 | 108,457 | 379 | 94,417 | 380 | 102,180 | 309 | 75,783 | 359 | 84,763 | 381 | 112,944 | 297 | 92,918 |
| Other persons..... | 102 | 2,308 | 98 | 1,974 | 104 | 2,035 | 83 | 2,343 | 100 | 1,578 | 115 | 2,119 | 82 | 2,304 | 105 | 2,450 |
| Total..... | 520 | 123,835 | 589 | 110,431 | 483 | 96,452 | 463 | 104,523 | 409 | 77,361 | 474 | 86,882 | 463 | 115,248 | 402 | 95,368 |

CASUALTIES TO TRAINMEN ON CLASS I RAILROADS,¹ 1916 TO 1924

Table 39 is drawn from Accident Bulletin No. 93 of the Interstate Commerce Commission (p. 112). The table has been rearranged to permit comparisons which are somewhat difficult to make in the original form. The rates have also been recalculated on the basis of 1,000,000 hours' exposure rather than of 1,000 men employed. This renders them fairly comparable with rates computed for other industries. It is an important step toward general comparability that the Interstate Commerce Commission has in recent years required exposure to be reported in terms of man-hours.

The table is of particular interest in view of recent discussion of the question "Are accidents increasing?" In the course of such discussion it has become quite evident that our accident statistics are as yet neither sufficiently extended nor sufficiently precise to make possible a general answer to this question. There is a strong tendency to draw conclusions from current experiences, and if the present year shows higher rates or greater cost than the preceding year to suspect that this is an indication of a general tendency.

The showing of the railway accident statistics is accordingly important because they have been kept long enough and are of such a degree of accuracy as to justify regarding their indications as dependable. They afford an opportunity for testing the immediate impression by the trend disclosed by a longer interval.

In this case, as always, the really informative figures are those of rates for fatality and for injury. If the number of trainmen, of fatalities, and of injuries be considered separately it will be difficult, if not impossible, to see clearly what the figures indicate. It is only when it is possible to unite the exposure with the number of cases or with the loss of time expressed in days and so to produce frequency or severity rates that the significance becomes evident. In this railway group it is not possible to determine severity rates.

The following observations regarding accident frequency on the railroads are suggested by inspection of the tables:

1. There was a marked drop from 1916 to 1924, this downward tendency being evident in each of the occupational groups. The fatality frequency for all trainmen declined 49 per cent and the injury frequency 40 per cent.

2. There are two years during the period—1920 and 1923—in which there was a decided upward tendency as compared with the preceding years. For all trainmen fatalities rose 19 per cent from 1919 to 1920 and 14 per cent from 1922 to 1923. Rates for injury rose 23 per cent from 1919 to 1920 and 9 per cent from 1922 to 1923.

3. As a rule there was a drop from 1916 to 1920 and a further drop from 1920 to 1923.

4. In fatalities the lowest rates are found in 1924, while the lowest year in injuries is 1921.

These figures are quite conclusive that whatever may be true of other industries, American railways have maintained a successful fight against conditions which tend toward increased accident rates.

¹ Class I roads are those roads whose annual operating revenues are above \$1,000,000.

TABLE 39.—NUMBER OF TRAINMEN IN SERVICE ON CLASS I RAILROADS, NUMBER OF FATALITIES AND OF INJURIES AND FREQUENCY RATES (PER 1,000,000 HOURS' EXPOSURE) FOR FATALITIES AND INJURIES AMONG TRAINMEN, 1916 TO 1924, BY YEARS AND OCCUPATIONS

| NUMBER OF TRAINMEN IN SERVICE | | | | | | | | | |
|--------------------------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| Occupation | 1916 | 1917 | 1918 | 1919 | 1920 | 1921 | 1922 | 1923 | 1924 |
| Yard service: | | | | | | | | | |
| Engineers..... | 15, 678 | 18, 933 | 21, 310 | 19, 625 | 21, 363 | 16, 929 | 18, 703 | 22, 142 | 20, 593 |
| Firemen..... | 16, 160 | 19, 516 | 21, 979 | 20, 031 | 21, 549 | 17, 343 | 19, 249 | 22, 664 | 21, 106 |
| Conductors..... | 15, 362 | 18, 703 | 20, 823 | 19, 325 | 20, 236 | 16, 745 | 18, 039 | 22, 002 | 20, 545 |
| Brakemen..... | 40, 175 | 48, 451 | 53, 790 | 49, 303 | 50, 799 | 42, 721 | 46, 953 | 55, 301 | 51, 776 |
| Total..... | 87, 605 | 105, 603 | 117, 902 | 108, 284 | 113, 047 | 93, 738 | 103, 544 | 122, 109 | 114, 019 |
| Road freight service: | | | | | | | | | |
| Engineers..... | 31, 675 | 34, 155 | 34, 969 | 30, 907 | 33, 594 | 28, 317 | 29, 372 | 34, 137 | 31, 015 |
| Firemen..... | 33, 637 | 36, 826 | 38, 102 | 32, 638 | 33, 756 | 30, 317 | 31, 507 | 36, 504 | 33, 346 |
| Conductors..... | 25, 430 | 27, 152 | 27, 670 | 25, 181 | 27, 287 | 22, 598 | 23, 254 | 26, 901 | 24, 864 |
| Brakemen..... | 63, 285 | 67, 818 | 69, 048 | 61, 989 | 67, 127 | 56, 620 | 57, 746 | 65, 760 | 60, 539 |
| Total..... | 154, 027 | 165, 953 | 169, 819 | 151, 015 | 163, 774 | 137, 852 | 141, 879 | 163, 292 | 149, 764 |
| Road passenger service: | | | | | | | | | |
| Engineers..... | 13, 429 | 13, 297 | 12, 709 | 12, 442 | 12, 930 | 12, 924 | 12, 710 | 13, 042 | 12, 977 |
| Firemen..... | 13, 131 | 13, 105 | 12, 419 | 12, 112 | 12, 630 | 12, 768 | 12, 491 | 12, 754 | 12, 674 |
| Conductors..... | 10, 633 | 10, 055 | 10, 444 | 10, 382 | 10, 788 | 10, 546 | 11, 380 | 11, 756 | 11, 730 |
| Brakemen..... | 14, 800 | 14, 854 | 14, 423 | 14, 904 | 15, 849 | 15, 315 | 14, 350 | 14, 558 | 14, 969 |
| Baggagemen..... | 5, 618 | 5, 524 | 5, 371 | 5, 442 | 5, 661 | 5, 751 | 5, 729 | 5, 871 | 5, 846 |
| Total..... | 57, 611 | 57, 435 | 55, 366 | 55, 282 | 57, 858 | 57, 304 | 56, 060 | 57, 951 | 57, 596 |
| All trainmen..... | 299, 243 | 328, 991 | 343, 067 | 314, 581 | 335, 579 | 288, 894 | 302, 083 | 343, 332 | 321, 379 |

FATALITIES AMONG TRAINMEN

| Occupation | Number | | | | | | | | |
|--------------------------------|---------------|---------------|---------------|------------|---------------|------------|------------|------------|------------|
| | 1916 | 1917 | 1918 | 1919 | 1920 | 1921 | 1922 | 1923 | 1924 |
| Yard service: | | | | | | | | | |
| Engineers..... | 11 | 16 | 11 | 15 | 9 | 11 | 12 | 12 | 7 |
| Firemen..... | 22 | 23 | 27 | 14 | 18 | 7 | 5 | 17 | 5 |
| Conductors..... | 71 | 78 | 73 | 50 | 67 | 39 | 43 | 59 | 45 |
| Brakemen..... | 341 | 401 | 397 | 235 | 363 | 169 | 202 | 263 | 195 |
| Total..... | 445 | 518 | 509 | 314 | 457 | 226 | 262 | 351 | 252 |
| Road freight service: | | | | | | | | | |
| Engineers..... | 70 | 72 | 84 | 66 | 63 | 32 | 46 | 55 | 37 |
| Firemen..... | 107 | 122 | 132 | 70 | 84 | 36 | 44 | 59 | 43 |
| Conductors..... | 72 | 88 | 104 | 63 | 62 | 48 | 37 | 60 | 47 |
| Brakemen..... | 432 | 478 | 527 | 310 | 396 | 186 | 201 | 262 | 168 |
| Total..... | 681 | 760 | 847 | 509 | 605 | 302 | 328 | 436 | 295 |
| Road passenger service: | | | | | | | | | |
| Engineers..... | 45 | 56 | 50 | 50 | 69 | 37 | 40 | 44 | 32 |
| Firemen..... | 52 | 49 | 50 | 51 | 52 | 36 | 39 | 45 | 31 |
| Conductors..... | 6 | 5 | 11 | 6 | 6 | 9 | 3 | 7 | 4 |
| Brakemen..... | 8 | 18 | 25 | 17 | 16 | 10 | 9 | 10 | 13 |
| Baggagemen..... | 2 | 8 | 5 | 4 | 4 | 2 | 6 | 3 | 1 |
| Total..... | 113 | 136 | 150 | 128 | 147 | 94 | 97 | 109 | 81 |
| All trainmen..... | 1, 239 | 1, 414 | 1, 505 | 951 | 1, 209 | 622 | 637 | 896 | 628 |

TABLE 39.—NUMBER OF TRAINMEN IN SERVICE ON CLASS I RAILROADS, NUMBER OF FATALITIES AND OF INJURIES AND FREQUENCY RATES (PER 1,000,000 HOURS' EXPOSURE) FOR FATALITIES AND INJURIES AMONG TRAINMEN, 1916 TO 1924, BY YEARS AND OCCUPATIONS—Continued

FATALITIES AMONG TRAINMEN—Continued

| Occupation | 1916 | 1917 | 1918 | 1919 | 1920 | 1921 | 1922 | 1923 | 1924 |
|--|-------------|-------------|-------------|-------------|-------------|------------|------------|------------|------------|
| Frequency rates (per 1,000,000 hours' exposure) | | | | | | | | | |
| Yard service: | | | | | | | | | |
| Engineers..... | 0.23 | 0.28 | 0.17 | 0.25 | 0.14 | 0.22 | 0.21 | 0.18 | 0.11 |
| Firemen..... | .45 | .39 | .41 | .23 | .28 | .13 | .09 | .25 | .08 |
| Conductors..... | 1.54 | 1.39 | 1.17 | .86 | 1.10 | .78 | .77 | .89 | .73 |
| Brakemen..... | 2.83 | 2.76 | 2.46 | 1.59 | 2.38 | 1.32 | 1.43 | 1.59 | 1.26 |
| Total..... | 1.69 | 1.64 | 1.44 | .97 | 1.34 | .50 | .84 | .96 | .74 |
| Road freight service: | | | | | | | | | |
| Engineers..... | .74 | .70 | .80 | .71 | .63 | .38 | .52 | .54 | .40 |
| Firemen..... | 1.06 | 1.10 | 1.15 | .71 | .78 | .40 | .47 | .54 | .48 |
| Conductors..... | .94 | 1.08 | 1.25 | .83 | .76 | .71 | .53 | .74 | .63 |
| Brakemen..... | 2.28 | 2.35 | 2.54 | 1.67 | 1.97 | 1.09 | 1.16 | 1.33 | .93 |
| Total..... | 1.47 | 1.53 | 1.66 | 1.12 | 1.23 | .73 | .77 | .89 | .66 |
| Road passenger service: | | | | | | | | | |
| Engineers..... | 1.12 | 1.40 | 1.55 | 1.34 | 1.78 | .95 | 1.05 | 1.12 | .82 |
| Firemen..... | 1.32 | 1.25 | 1.34 | 1.40 | 1.37 | .94 | 1.04 | 1.18 | .82 |
| Conductors..... | .19 | .16 | .35 | .19 | .19 | .28 | .09 | .20 | .11 |
| Brakemen..... | .18 | .40 | .58 | .38 | .34 | .22 | .21 | .23 | .30 |
| Baggagemen..... | .12 | .48 | .31 | .25 | .24 | .12 | .35 | .17 | .06 |
| Total..... | .65 | .79 | .90 | .77 | .85 | .55 | .57 | .63 | .47 |
| All trainmen..... | 1.38 | 1.43 | 1.46 | 1.01 | 1.20 | .72 | .76 | .87 | .66 |

INJURIES AMONG TRAINMEN

| | Number | | | | | | | | |
|--------------------------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| Yard service: | | | | | | | | | |
| Engineers..... | 1,078 | 1,032 | 908 | 680 | 1,023 | 546 | 746 | 835 | 727 |
| Firemen..... | 1,644 | 1,905 | 1,708 | 1,171 | 1,691 | 854 | 1,082 | 1,561 | 1,104 |
| Conductors..... | 1,993 | 1,815 | 1,440 | 1,249 | 1,607 | 1,094 | 1,414 | 1,630 | 1,498 |
| Brakemen..... | 12,209 | 12,004 | 10,472 | 8,296 | 11,666 | 6,711 | 7,562 | 10,223 | 8,328 |
| Total..... | 16,924 | 16,756 | 14,528 | 11,896 | 15,987 | 9,205 | 10,804 | 14,249 | 11,657 |
| Road freight service: | | | | | | | | | |
| Engineers..... | 2,360 | 2,578 | 2,547 | 1,888 | 2,130 | 1,404 | 1,649 | 1,832 | 1,370 |
| Firemen..... | 5,145 | 6,232 | 5,706 | 3,945 | 5,085 | 2,791 | 3,274 | 4,036 | 2,747 |
| Conductors..... | 3,051 | 3,069 | 2,832 | 2,253 | 2,593 | 1,921 | 2,227 | 2,501 | 2,209 |
| Brakemen..... | 13,115 | 13,074 | 11,938 | 8,329 | 11,439 | 7,012 | 7,613 | 9,409 | 7,629 |
| Total..... | 23,671 | 25,003 | 23,023 | 16,915 | 21,347 | 13,128 | 14,763 | 17,778 | 13,955 |
| Road passenger service: | | | | | | | | | |
| Engineers..... | 714 | 738 | 777 | 660 | 804 | 602 | 715 | 761 | 617 |
| Firemen..... | 1,245 | 1,444 | 1,253 | 1,176 | 1,535 | 997 | 1,144 | 1,295 | 1,017 |
| Conductors..... | 298 | 327 | 304 | 263 | 274 | 209 | 282 | 304 | 302 |
| Brakemen..... | 718 | 699 | 674 | 579 | 688 | 570 | 570 | 639 | 587 |
| Baggagemen..... | 361 | 368 | 283 | 292 | 344 | 269 | 308 | 316 | 303 |
| Total..... | 3,336 | 3,576 | 3,291 | 2,970 | 3,645 | 2,647 | 3,019 | 3,315 | 2,826 |
| All trainmen..... | 43,921 | 45,335 | 40,842 | 31,281 | 40,979 | 24,980 | 28,536 | 35,342 | 28,438 |

TABLE 39.—NUMBER OF TRAINMEN IN SERVICE ON CLASS I RAILROADS, NUMBER OF FATALITIES AND OF INJURIES AND FREQUENCY RATES (PER 1,000,000 HOURS' EXPOSURE) FOR FATALITIES AND INJURIES AMONG TRAINMEN, 1916 TO 1924, BY YEARS AND OCCUPATIONS—Continued

INJURIES AMONG TRAINMEN—Continued

| Occupation | 1916 | 1917 | 1918 | 1919 | 1920 | 1921 | 1922 | 1923 | 1924 |
|---|--------|-------|-------|-------|-------|-------|-------|-------|-------|
| Frequency rates (per 1,000,000 hours' exposure) | | | | | | | | | |
| Yard service: | | | | | | | | | |
| Engineers..... | 22.63 | 18.17 | 14.20 | 11.55 | 15.96 | 10.75 | 13.30 | 12.57 | 11.77 |
| Firemen..... | 33.85 | 32.54 | 25.96 | 19.49 | 26.16 | 13.41 | 18.74 | 22.97 | 17.44 |
| Conductors..... | 43.25 | 32.85 | 23.05 | 21.54 | 26.47 | 21.78 | 25.29 | 24.69 | 24.30 |
| Brakemen..... | 101.90 | 82.59 | 64.89 | 56.09 | 76.55 | 52.36 | 53.68 | 61.62 | 53.61 |
| Total..... | 64.40 | 52.89 | 41.07 | 35.08 | 46.77 | 32.73 | 34.78 | 38.90 | 34.08 |
| Road freight service: | | | | | | | | | |
| Engineers..... | 24.83 | 25.16 | 24.26 | 20.36 | 21.13 | 16.53 | 18.71 | 17.90 | 14.72 |
| Firemen..... | 50.99 | 58.41 | 49.91 | 39.92 | 47.40 | 30.69 | 34.64 | 36.85 | 27.46 |
| Conductors..... | 39.99 | 38.05 | 34.10 | 29.81 | 32.89 | 23.34 | 31.92 | 20.99 | 29.61 |
| Brakemen..... | 69.03 | 64.36 | 57.63 | 47.48 | 56.80 | 41.28 | 43.95 | 47.70 | 42.01 |
| Total..... | 51.23 | 50.22 | 45.19 | 37.34 | 43.45 | 31.74 | 34.68 | 36.29 | 31.06 |
| Road passenger service: | | | | | | | | | |
| Engineers..... | 17.72 | 18.50 | 20.38 | 17.69 | 20.73 | 15.53 | 18.75 | 19.45 | 15.85 |
| Firemen..... | 31.60 | 36.73 | 33.03 | 32.36 | 40.51 | 26.03 | 30.53 | 33.87 | 26.75 |
| Conductors..... | 9.34 | 10.23 | 9.70 | 8.44 | 8.47 | 6.61 | 8.26 | 8.62 | 8.58 |
| Brakemen..... | 16.17 | 15.69 | 15.58 | 12.95 | 14.47 | 12.41 | 13.24 | 14.63 | 13.62 |
| Baggage-men..... | 21.42 | 22.21 | 17.56 | 17.89 | 20.26 | 15.56 | 17.92 | 17.94 | 17.28 |
| Total..... | 19.30 | 20.75 | 19.81 | 17.91 | 21.09 | 15.40 | 17.43 | 19.06 | 16.36 |
| All trainmen..... | 48.94 | 45.93 | 39.68 | 33.15 | 40.70 | 28.82 | 31.54 | 34.31 | 29.50 |

Tables 40 and 41 show the number of train accidents of specified kinds and the number due to specified causes. These tables are chiefly interesting in that they show that the improved condition on American railways is a pervasive change, as in whatever way the accident data is analyzed it will appear that improvement has taken place. For example, in 1911 collisions caused 297 deaths and in 1924 only 85; and injuries from collisions declined over the same period from 3,071 to 709. In 1911 there were 209 deaths from coupling cars and in 1924 there were only 72 deaths.

TABLE 40.—NUMBER OF TRAIN ACCIDENTS, 1911 TO 1924, BY YEARS AND KINDS OF ACCIDENT

| Year ending— | Collisions | Derailments | Locomotive boiler accidents | Other locomotive accidents | Miscellaneous | Total |
|--------------------|------------|-------------|-----------------------------|----------------------------|---------------|-------|
| Fatalities | | | | | | |
| June 30, 1911..... | 297 | 249 | 56 | (1) | 18 | 620 |
| June 30, 1912..... | 275 | 244 | 64 | (5) | 13 | 596 |
| June 30, 1913..... | 280 | 227 | 41 | (1) | 9 | 557 |
| June 30, 1914..... | 224 | 211 | 11 | (5) | 6 | 452 |
| June 30, 1915..... | 76 | 127 | 13 | (1) | 5 | 221 |
| June 30, 1916..... | 139 | 131 | 24 | ----- | 10 | 304 |
| Dec. 31, 1916..... | 169 | 154 | 25 | ----- | 9 | 357 |
| Dec. 31, 1917..... | 235 | 155 | 44 | ----- | 4 | 439 |
| Dec. 31, 1918..... | 274 | 218 | 41 | ----- | 14 | 547 |
| Dec. 31, 1919..... | 136 | 159 | 40 | ----- | 22 | 359 |
| Dec. 31, 1920..... | 182 | 160 | 50 | ----- | 24 | 422 |
| Dec. 31, 1921..... | 54 | 101 | 29 | ----- | 11 | 195 |
| Dec. 31, 1922..... | 103 | 119 | 24 | ----- | 7 | 253 |
| Dec. 31, 1923..... | 112 | 115 | 42 | ----- | 6 | 275 |
| Dec. 31, 1924..... | 85 | 97 | 24 | ----- | 10 | 216 |

¹ Included under "Miscellaneous".

TABLE 40.—NUMBER OF TRAIN ACCIDENTS, 1911 TO 1924, BY YEARS AND KINDS OF ACCIDENT—Continued

| Year ending— | Collisions | Derailments | Locomotive boiler accidents | Other locomotive accidents | Miscellaneous | Total |
|--------------------|------------|-------------|-----------------------------|----------------------------|---------------|-------|
| Injuries | | | | | | |
| June 30, 1911..... | 3,071 | 1,748 | 1,092 | (1) | 690 | 6,601 |
| June 30, 1912..... | 3,060 | 2,390 | 986 | (1) | 722 | 7,098 |
| June 30, 1913..... | 3,367 | 2,243 | 1,002 | (1) | 293 | 6,905 |
| June 30, 1914..... | 3,250 | 1,920 | 680 | (1) | 123 | 4,823 |
| June 30, 1915..... | 1,360 | 1,348 | 443 | (1) | 211 | 3,371 |
| June 30, 1916..... | 1,630 | 1,230 | 296 | (1) | 196 | 3,352 |
| Dec. 31, 1916..... | 1,963 | 1,249 | 346 | (1) | 183 | 3,731 |
| Dec. 31, 1917..... | 2,388 | 1,320 | 323 | 58 | 122 | 4,214 |
| Dec. 31, 1918..... | 2,257 | 1,433 | 294 | 49 | 146 | 4,179 |
| Dec. 31, 1919..... | 1,276 | 1,083 | 203 | 49 | 344 | 2,955 |
| Dec. 31, 1920..... | 1,607 | 1,240 | 246 | 57 | 235 | 3,385 |
| Dec. 31, 1921..... | 559 | 606 | 54 | 18 | 59 | 1,296 |
| Dec. 31, 1922..... | 872 | 709 | 47 | 29 | 54 | 1,711 |
| Dec. 31, 1923..... | 940 | 539 | 57 | 15 | 98 | 1,939 |
| Dec. 31, 1924..... | 709 | 652 | 45 | 13 | 58 | 1,477 |

¹ Included under "Miscellaneous."

TABLE 41.—NUMBER OF TRAIN SERVICE ACCIDENTS, 1911 TO 1924, BY CAUSES OF ACCIDENT

| Year ending— | Coupling cars | Coupling air hose | Operating locomotives | Operating hand brakes | Operating switches | Striking fixed structures | Getting on or off | Highway crossings | Struck or run over | Miscellaneous | Total |
|--------------------|---------------|-------------------|-----------------------|-----------------------|--------------------|---------------------------|-------------------|-------------------|--------------------|---------------|--------|
| Fatalities | | | | | | | | | | | |
| June 30, 1911..... | 269 | | | | | 76 | 160 | 20 | 1,197 | 539 | 2,251 |
| June 30, 1912..... | 193 | | | | | 77 | 164 | 1 | 1,264 | 626 | 2,324 |
| June 30, 1913..... | 195 | | | | | 94 | 154 | | 1,296 | 643 | 2,382 |
| June 30, 1914..... | 171 | | | | | 89 | 113 | | 1,132 | 560 | 2,071 |
| June 30, 1915..... | 90 | | | | | 45 | 81 | | 722 | 435 | 1,373 |
| June 30, 1916..... | 123 | | | | | 59 | 94 | | 925 | 467 | 1,668 |
| Dec. 31, 1916..... | 133 | | | | | 63 | 106 | | 1,033 | 515 | 1,853 |
| Dec. 31, 1917..... | 166 | 48 | | | | 96 | 109 | | 1,222 | 337 | 2,177 |
| Dec. 31, 1918..... | 161 | 44 | | | | 83 | 131 | | 1,229 | 561 | 2,212 |
| Dec. 31, 1919..... | 108 | 30 | 22 | 45 | 3 | 55 | 92 | 4 | | 975 | 1,334 |
| Dec. 31, 1920..... | 151 | 34 | 31 | 50 | 2 | 83 | 96 | 8 | | 1,232 | 1,685 |
| Dec. 31, 1921..... | 78 | 27 | 14 | 22 | 2 | 45 | 65 | 13 | | 635 | 901 |
| Dec. 31, 1922..... | 81 | 16 | 23 | 37 | 1 | 43 | 63 | 22 | 410 | 292 | 963 |
| Dec. 31, 1923..... | 103 | 27 | 31 | 24 | 1 | 47 | 101 | 29 | 522 | 403 | 1,288 |
| Dec. 31, 1924..... | 72 | 21 | 20 | 34 | 3 | 36 | 62 | 30 | 388 | 310 | 976 |
| Injuries | | | | | | | | | | | |
| June 30, 1911..... | 2,966 | | | | | 1,510 | 7,530 | 39 | 1,872 | 25,330 | 30,247 |
| June 30, 1912..... | 3,234 | | | | | 1,523 | 8,150 | 1 | 2,033 | 27,081 | 42,022 |
| June 30, 1913..... | 3,360 | | | | | 1,835 | 9,358 | | 2,154 | 33,007 | 46,714 |
| June 30, 1914..... | 2,692 | | | | | 1,490 | 8,468 | | 1,914 | 31,424 | 46,018 |
| June 30, 1915..... | 1,933 | | | | | 1,083 | 6,366 | | 1,315 | 23,032 | 34,689 |
| June 30, 1916..... | 2,194 | | | | | 1,310 | 7,234 | | 1,443 | 25,893 | 39,074 |
| Dec. 31, 1916..... | 2,443 | | | | | 1,538 | 8,403 | | 1,636 | 30,562 | 44,579 |
| Dec. 31, 1917..... | 2,508 | 664 | | | | 1,572 | 8,601 | | 1,876 | 32,801 | 48,022 |
| Dec. 31, 1918..... | 2,332 | 590 | | | | 1,340 | 7,755 | | 1,890 | 28,806 | 42,782 |
| Dec. 31, 1919..... | 1,975 | 426 | 7,379 | 1,971 | 965 | 1,000 | 6,162 | 47 | | 13,371 | 33,525 |
| Dec. 31, 1920..... | 2,450 | 590 | 9,426 | 2,592 | 1,453 | 1,293 | 8,773 | 39 | | 16,919 | 43,535 |
| Dec. 31, 1921..... | 1,540 | 378 | 5,732 | 1,623 | 847 | 775 | 5,510 | 64 | | 10,759 | 27,228 |
| Dec. 31, 1922..... | 1,468 | 393 | 6,187 | 1,987 | 916 | 722 | 6,157 | 58 | | 11,844 | 30,431 |
| Dec. 31, 1923..... | 1,954 | 520 | 8,043 | 2,571 | 1,084 | 859 | 8,090 | 100 | 703 | 13,517 | 37,637 |
| Dec. 31, 1924..... | 1,592 | 430 | 5,877 | 2,042 | 1,050 | 730 | 6,504 | 97 | 707 | 11,066 | 30,097 |

NONTRAIN ACCIDENTS, 1917 TO 1924

Table 42 shows how the hazard of various accident causes has varied in nontrain accidents in the 8-year period covered. It should be noted that this shift is not disclosed by the number of cases

recorded. For example, the total deaths from nontrain accidents in 1917 were 376 while the total in 1923 was 441. Inspection of these figures alone would suggest that 1923 was a decidedly less satisfactory year than 1917, but if attention be given to the frequency rates shown in the table it will appear that 1917 had a rate of 0.097 cases per 1,000,000 hours' exposure while the rate for 1923 is 0.091.

The difference is small enough to suggest that it may represent a chance relationship. The same situation exists, however, in the case of total injuries. In 1918 the total injuries numbered 104,900 while in 1923 there were 112,296. The frequency rates for the two years are 26.46 for 1918 and 23.12 for 1923. It is perfectly clear that the record of number of cases without regard to exposure is not a reliable index of conditions.

TABLE 42.—NONTRAIN ACCIDENTS ON CLASS I RAILROADS IN THE UNITED STATES, 1917 TO 1924, BY CAUSES OF ACCIDENT

| Cause of accident | FATALITIES | | | | | | | |
|----------------------------------|---|---------|--------|--------|--------|--------|---------|--------|
| | 1917 | 1918 | 1919 | 1920 | 1921 | 1922 | 1923 | 1924 |
| | Number | | | | | | | |
| Working machinery, engines, etc. | 15 | 38 | 17 | 22 | 13 | 18 | 29 | 16 |
| Transmission apparatus | 5 | 7 | 6 | 3 | 7 | 4 | 5 | 3 |
| Handling | 38 | 42 | 52 | 39 | 25 | 13 | 29 | 13 |
| Flying particles | 1 | 4 | | 1 | 2 | 3 | 2 | |
| Hot substances | 21 | 21 | 16 | 13 | 13 | 20 | 35 | 17 |
| Electric currents | 24 | 25 | 22 | 9 | 16 | 19 | 27 | 32 |
| Collapse, fall, etc., of objects | 42 | 56 | 42 | 44 | 27 | 40 | 45 | 48 |
| Falls of persons | 98 | 111 | 89 | 76 | 59 | 87 | 74 | 49 |
| Miscellaneous | 132 | 149 | 115 | 154 | 92 | 242 | 195 | 205 |
| Total | 376 | 453 | 359 | 301 | 254 | 451 | 441 | 383 |
| | Frequency rates (per 1,000,000 hours' exposure) | | | | | | | |
| Working machinery, engines, etc. | 0.004 | 0.010 | 0.005 | 0.006 | 0.004 | 0.004 | 0.006 | 0.004 |
| Transmission apparatus | .001 | .002 | .002 | .006 | .002 | .001 | .001 | .001 |
| Handling | .010 | .011 | .015 | .010 | .008 | .004 | .006 | .003 |
| Flying particles | (1) | .001 | | (1) | .001 | .001 | (1) | |
| Hot substances | .006 | .005 | .005 | .003 | .004 | .005 | .007 | .004 |
| Electric currents | .006 | .006 | .006 | .002 | .005 | .004 | .006 | .007 |
| Falling objects | .011 | .014 | .012 | .011 | .009 | .009 | .009 | .011 |
| Falls of persons | .026 | .028 | .025 | .020 | .021 | .020 | .015 | .011 |
| Miscellaneous | .032 | .033 | .028 | .035 | .032 | .058 | .040 | .045 |
| Total | .097 | .111 | .097 | .090 | .090 | .106 | .091 | .086 |
| | INJURIES | | | | | | | |
| | Number | | | | | | | |
| Working machinery, engines, etc. | 4,741 | 4,335 | 3,885 | 4,087 | 2,919 | 2,997 | 4,600 | 3,156 |
| Transmission apparatus | 530 | 585 | 460 | 499 | 343 | 495 | 553 | 302 |
| Handling | 44,555 | 37,196 | 33,340 | 35,489 | 25,858 | 28,862 | 39,193 | 33,077 |
| Flying particles | 7,423 | 6,897 | 5,838 | 5,744 | 4,227 | 4,759 | 6,760 | 5,483 |
| Hot substances | 2,949 | 2,857 | 2,356 | 2,648 | 1,875 | 2,467 | 3,757 | 2,765 |
| Electric currents | 185 | 245 | 223 | 221 | 124 | 273 | 270 | 235 |
| Collapse, fall, etc., of objects | 14,087 | 13,132 | 10,836 | 11,822 | 8,341 | 10,165 | 15,251 | 11,980 |
| Falls of persons | 13,892 | 12,474 | 9,871 | 10,906 | 7,725 | 9,642 | 11,614 | 10,270 |
| Miscellaneous | 28,548 | 26,679 | 24,635 | 26,887 | 20,037 | 24,928 | 30,199 | 25,117 |
| Total | 117,210 | 104,900 | 90,842 | 98,293 | 71,449 | 84,586 | 112,296 | 92,385 |
| | Frequency rates (1,000,000 hours' exposure) | | | | | | | |
| Working machinery, engines, etc. | 1.27 | 1.23 | 1.10 | 1.09 | 1.04 | 0.71 | 0.97 | 0.71 |
| Transmission apparatus | 14 | 15 | 13 | 13 | 12 | 12 | 11 | 10.7 |
| Handling | 12.03 | 9.48 | 9.47 | 9.43 | 9.20 | 6.80 | 8.07 | 7.40 |
| Flying particles | 1.99 | 1.76 | 1.57 | 1.53 | 1.50 | 1.12 | 1.39 | 1.23 |
| Hot substances | .79 | .73 | .67 | .70 | .66 | .58 | .77 | .62 |
| Electric currents | .05 | .06 | .06 | .06 | .04 | .05 | .06 | .05 |
| Falling objects | 3.78 | 3.35 | 2.99 | 3.14 | 2.96 | 2.40 | 3.14 | 2.68 |
| Falls of persons | 3.73 | 3.18 | 2.80 | 2.90 | 2.75 | 2.27 | 2.30 | 2.39 |
| Miscellaneous | 7.40 | 6.53 | 6.78 | 7.09 | 7.13 | 5.89 | 6.22 | 5.60 |
| Total | 31.18 | 26.46 | 25.58 | 26.12 | 25.44 | 19.94 | 23.12 | 20.96 |

Until 1921 it was possible to separate the data for such industrial groups as shopmen, station men, etc., but this can not be done easily with the present arrangement of the items.

Since, however, this grouping presents interesting indications regarding the accident movement from year to year and the relations of the several groups, Tables 43 and 44 are reproduced although they terminate with 1921.

TABLE 43.—NUMBER OF NONTRAIN ACCIDENTS, NUMBER OF HOURS' EXPOSURE, AND ACCIDENT FREQUENCY RATES (PER 1,000,000 HOURS' EXPOSURE) FOR INDUSTRIAL EMPLOYEES ON CLASS I RAILROADS IN THE UNITED STATES, 1917 TO 1921, BY YEARS AND OCCUPATIONS

| Occupation | 1917 | 1918 | 1919 | 1920 | 1921 |
|--|---------------------|-----------|-----------|-----------|-----------|
| | Number of accidents | | | | |
| Shopmen..... | 67,445 | 63,951 | 52,318 | 57,397 | 41,748 |
| Station men..... | 15,035 | 12,150 | 11,206 | 11,664 | 6,944 |
| Trackmen..... | 21,080 | 17,498 | 17,250 | 19,113 | 15,778 |
| Bridge and building men..... | 5,104 | 4,200 | 3,835 | 4,167 | 3,398 |
| Other employees..... | 7,375 | 6,499 | 5,806 | 5,653 | 3,835 |
| Total..... | 116,595 | 104,298 | 90,415 | 97,994 | 71,703 |
| Hours of exposure (thousands) | | | | | |
| Shopmen..... | 1,400,734 | 1,582,114 | 1,456,460 | 1,584,884 | 1,150,383 |
| Station men..... | 689,174 | 690,048 | 620,370 | 644,202 | 511,918 |
| Trackmen..... | 1,019,263 | 1,031,366 | 888,206 | 955,570 | 678,478 |
| Bridge and building men..... | 203,314 | 202,575 | 165,072 | 168,550 | 117,742 |
| Other employees..... | 415,005 | 418,927 | 391,372 | 410,764 | 349,977 |
| Total..... | 3,727,490 | 3,925,030 | 3,521,480 | 3,763,970 | 2,808,468 |
| Accident frequency rates (per 1,000,000 hours' exposure) | | | | | |
| Shopmen..... | 48.15 | 40.42 | 35.92 | 36.22 | 36.29 |
| Station men..... | 22.69 | 17.61 | 18.06 | 18.11 | 13.56 |
| Trackmen..... | 20.64 | 16.97 | 19.42 | 20.00 | 23.25 |
| Bridge and building men..... | 25.10 | 20.73 | 23.23 | 24.72 | 28.87 |
| Other employees..... | 17.77 | 15.51 | 14.83 | 13.76 | 10.96 |
| Total..... | 31.28 | 26.57 | 25.68 | 26.03 | 25.53 |

Table 44 shows the frequency rates per 1,000,000 hours' exposure for nontrain employees for the five-year period, 1917 to 1921.

TABLE 44.—ACCIDENT FREQUENCY RATES (PER 1,000,000 HOURS' EXPOSURE) FOR NONTRAIN EMPLOYEES ON CLASS I RAILROADS IN THE UNITED STATES, 1917 TO 1921

| Occupation | Fatalities | All accidents |
|------------------------------|------------|---------------|
| Shopmen..... | 0.09 | 39.54 |
| Station men..... | .03 | 18.30 |
| Trackmen..... | .10 | 20.00 |
| Bridge and building men..... | .30 | 24.29 |

GRADE CROSSING ACCIDENTS, 1890 TO 1924

With the advent of the automobile, casualties at grade crossings began to increase with startling rapidity. In 1911 there were slightly over 1,000 deaths from this cause while in 1923, 2,268 constituted a climax of the irregularly rising series.

This constant increase in spite of the earnest effort of the railways is not much relieved by the fact that casualties per 1,000 registered automobiles are declining. This is due to better quality in the cars themselves, to added experience on the part of the drivers, and to stricter regulations by the supervisory authorities.

It is to be hoped that the slight drop in fatality from 1923 to 1924 indicates a real improvement.

TABLE 45.—NUMBER OF PERSONS AND NUMBER OF TRESPASSERS KILLED OR INJURED IN RAILWAY ACCIDENTS AT HIGHWAY GRADE CROSSINGS IN THE UNITED STATES, 1890 TO 1924 BY YEARS

| Year ending— | Number of persons— | | Number of trespassers— | |
|--------------------|--------------------|---------|------------------------|---------|
| | Killed | Injured | Killed | Injured |
| June 30, 1890..... | 402 | 675 | 98 | 151 |
| June 30, 1891..... | 504 | 863 | 167 | 162 |
| June 30, 1892..... | 508 | 942 | 137 | 176 |
| June 30, 1893..... | 596 | 1,064 | 163 | 179 |
| June 30, 1894..... | 571 | 817 | 119 | 136 |
| June 30, 1895..... | 508 | 961 | 133 | 174 |
| June 30, 1896..... | 615 | 1,058 | 171 | 248 |
| June 30, 1897..... | 575 | 1,039 | 116 | 197 |
| June 30, 1898..... | 657 | 1,123 | 151 | 202 |
| June 30, 1899..... | 674 | 1,087 | 170 | 168 |
| June 30, 1900..... | 730 | 1,297 | 171 | 204 |
| June 30, 1901..... | 831 | 1,354 | 209 | 242 |
| June 30, 1902..... | 827 | 1,335 | 265 | 272 |
| June 30, 1903..... | 804 | 1,481 | 271 | 247 |
| June 30, 1904..... | 968 | 1,463 | 197 | 224 |
| June 30, 1905..... | 828 | 1,574 | 215 | 256 |
| June 30, 1906..... | 929 | 1,892 | 250 | 229 |
| June 30, 1907..... | 934 | 1,817 | 237 | 274 |
| June 30, 1908..... | 837 | 1,762 | 216 | 323 |
| June 30, 1909..... | 735 | 1,833 | 112 | 211 |
| June 30, 1910..... | 839 | 1,939 | 129 | 153 |
| June 30, 1911..... | 992 | 2,434 | 148 | 124 |
| June 30, 1912..... | 1,032 | 2,506 | 136 | 138 |
| June 30, 1913..... | 1,125 | 3,080 | 145 | 172 |
| June 30, 1914..... | 1,147 | 2,935 | 122 | 119 |
| June 30, 1915..... | 1,086 | 2,981 | 83 | 72 |
| June 30, 1916..... | 1,396 | 3,267 | 86 | 83 |
| Dec. 31, 1916..... | 1,452 | 3,559 | 121 | 101 |
| Dec. 31, 1917..... | 1,969 | 4,764 | 131 | 128 |
| Dec. 31, 1918..... | 1,852 | 4,683 | 137 | 140 |
| Dec. 31, 1919..... | 1,784 | 4,616 | 107 | 216 |
| Dec. 31, 1920..... | 1,791 | 5,077 | 100 | 273 |
| Dec. 31, 1921..... | 1,705 | 4,968 | 106 | 166 |
| Dec. 31, 1922..... | 1,810 | 5,383 | 96 | 163 |
| Dec. 31, 1923..... | 2,268 | 6,314 | 133 | 148 |
| Dec. 31, 1924..... | 2,149 | 6,525 | 107 | 168 |

ELECTRIC RAILWAYS

The comparison in Table 46 of the accident experience of American electric railways for the years 1923 and 1924 is drawn from a recent publication of the American Electric Railway Association. The facts given are for 105 companies located in all parts of the country, which companies reported fully on the items in the table.

It will be noted that in nearly every comparison possible to make, the year 1924 was more satisfactory than 1923. This is particularly true in cases of injury per 1,000,000 passengers carried, the figures being 6.48 for 1923 and 5.53 for 1924.

TABLE 46.—ACCIDENT EXPERIENCES OF 105 AMERICAN ELECTRIC RAILWAYS IN 1923 AND 1924

| Item | 1923 | 1924 | Item | 1923 | 1924 |
|---|------------------|------------------|--|-------------------------------------|-------|
| Car-miles operated . . . | 448, 489, 978 | 445, 200, 730 | Accidents per 1,000,- 000 car-miles—Con. | | |
| Passengers carried . . . | 3, 051, 621, 122 | 3, 239, 039, 582 | | By collision with cars | 9.65 | 8.08 |
| Number of accidents to— | | | To employees | 10.87 | 10.39 |
| Employees | 4, 875 | 4, 627 | To passengers | 44.11 | 40.29 |
| Passengers | 19, 784 | 17, 935 | To other persons | 21.61 | 21.91 |
| Other persons | 9, 691 | 9, 758 | Total | 76.59 | 72.59 |
| Total | 34, 350 | 32, 320 | | | |
| Number of fatalities . . . | 357 | 338 | Accidents to passen- gers per 1,000,000 passengers carried . . . | 6.48 | 5.58 |
| Accidents per 1,000- 000 car-miles: By collision with motor vehicles | 195.87 | 194.35 | | | |

IRON AND STEEL INDUSTRY

The Bureau of Labor Statistics was called upon in 1910 to make a special study of the iron and steel industry, and a section of the investigation then conducted was devoted to the subject of accidents. Since that time such information has been continuously assembled and the results have been published from time to time. For detailed discussion of the various phases of the accident problem as found in the iron and steel industry recourse must be had to the published bulletins,⁴ particularly Bulletin No. 298.

It has been the constant endeavor so to present these statistics as to make them significant and useful in accident prevention. There can be no doubt that these statistical studies have been a very considerable factor in the results which are indicated by the tables which follow.

Tables 47 and 48 present two analyses of accident reduction based on the experience of plants engaged primarily in the production of fabricated products, sheets, wire products, tubes, and miscellaneous steel products. These plants were chosen because they had been engaged for a long time and very actively in accident prevention effort.

Table 47, which presents the accident data separately for the plants manufacturing each specified product and also for the total plants, records a very remarkable success and demonstrates what can be done if an adequate effort is made. Rates were computed for the years ending with each month from December, 1913, to December, 1924, but the omission of the years ending with 9 of the 12 months from December, 1913, to December, 1922, in order to shorten the table, does not disturb the indication of continuous reduction of the rates.

The following reductions in frequency rates appear: Fabricated products from 100.3 to 33.4, or 66.6 per cent; sheets from 61.6 to 10.3, or 83.3 per cent; wire products from 59.3 to 6.2, or 89.5 per cent; tubes from 27.2 to 5.1, or 81.3 per cent; steel products Group A from 70.9 to 11.8, or 83.4 per cent; steel products Group B from 41.3 to 7.9, or 80.9 per cent; total, from 60.3 to 10.2, or 83.1 per cent.

It is doubtful whether any other equally hazardous industrial groups can show a better record.

⁴ Conditions of employment in the iron and steel industry of the United States, Vol. IV, accidents and accident prevention (Doc. No. 110, 62d Cong., 1st sess.); United States Bureau of Labor Statistics Bul. No. 216: Accidents and accident prevention in machine building; Bul. No. 224: The safety movement in the iron and steel industry; Bul. No. 258: Accidents and accident prevention in machine building; Bul. No. 298: Causes and prevention of accidents in the iron and steel industry.

TABLE 47.—ACCIDENT FREQUENCY RATES (PER 1,000,000 HOURS' EXPOSURE) FOR MILLS MAKING SPECIFIED PRODUCTS, BY YEARS ENDING WITH APRIL, AUGUST, AND DECEMBER, FROM DECEMBER, 1913, TO DECEMBER, 1922, AND BY YEARS ENDING EACH MONTH OF 1923 AND 1924

| Year ending with— | Fabri- cated products | Sheets | Wire products | Tubes | Miscellaneous steel products | | Total |
|----------------------|-----------------------------|--------|------------------|-------|---------------------------------|---------|-------|
| | | | | | Group A | Group B | |
| December, 1913..... | 100.3 | 61.6 | 59.3 | 27.2 | 70.9 | 41.3 | 60.3 |
| April, 1914..... | 88.2 | 56.6 | 53.1 | 21.2 | 67.3 | 35.5 | 54.7 |
| August, 1914..... | 66.7 | 49.4 | 48.9 | 16.0 | 57.8 | 31.0 | 47.9 |
| December, 1914..... | 59.0 | 47.2 | 46.2 | 12.5 | 50.7 | 27.6 | 43.5 |
| April, 1915..... | 53.3 | 44.7 | 43.2 | 9.3 | 42.3 | 26.4 | 39.1 |
| August, 1915..... | 50.9 | 39.0 | 46.2 | 9.6 | 45.0 | 20.1 | 38.1 |
| December, 1915..... | 53.5 | 37.3 | 52.4 | 10.8 | 51.9 | 23.0 | 41.5 |
| April, 1916..... | 52.7 | 37.1 | 52.9 | 12.1 | 61.2 | 25.4 | 44.2 |
| August, 1916..... | 54.7 | 36.1 | 51.1 | 12.3 | 66.0 | 28.5 | 45.4 |
| December, 1916..... | 52.1 | 34.0 | 48.2 | 12.4 | 67.6 | 28.2 | 44.4 |
| April, 1917..... | 54.3 | 32.3 | 45.0 | 11.6 | 64.6 | 25.8 | 42.2 |
| August, 1917..... | 52.7 | 34.9 | 39.5 | 10.7 | 57.9 | 22.5 | 38.3 |
| December, 1917..... | 51.3 | 33.9 | 32.5 | 10.2 | 51.3 | 20.5 | 34.5 |
| April, 1918..... | 46.9 | 32.7 | 27.6 | 10.0 | 40.7 | 21.6 | 31.9 |
| August, 1918..... | 42.6 | 27.5 | 22.1 | 9.9 | 44.0 | 28.3 | 30.2 |
| December, 1918..... | 38.2 | 25.9 | 18.8 | 9.1 | 42.0 | 31.4 | 28.8 |
| April, 1919..... | 35.8 | 25.6 | 16.2 | 9.1 | 41.5 | 30.7 | 28.1 |
| August, 1919..... | 32.3 | 24.7 | 14.2 | 8.5 | 39.2 | 25.5 | 26.2 |
| December, 1919..... | 32.8 | 25.8 | 12.5 | 9.1 | 39.7 | 23.0 | 26.1 |
| April, 1920..... | 35.7 | 24.9 | 12.5 | 9.0 | 38.7 | 21.1 | 25.3 |
| August, 1920..... | 35.6 | 24.1 | 12.4 | 9.2 | 37.0 | 20.3 | 24.4 |
| December, 1920..... | 35.3 | 22.7 | 12.0 | 8.9 | 35.3 | 18.6 | 22.9 |
| April, 1921..... | 34.5 | 21.5 | 9.9 | 7.6 | 30.4 | 16.8 | 20.2 |
| August, 1921..... | 32.0 | 20.3 | 8.4 | 7.0 | 24.2 | 14.2 | 17.2 |
| December, 1921..... | 28.4 | 17.5 | 7.5 | 6.1 | 15.8 | 12.1 | 13.2 |
| April, 1922..... | 25.6 | 16.1 | 7.8 | 6.5 | 12.0 | 10.5 | 11.6 |
| August, 1922..... | 31.5 | 16.8 | 8.2 | 6.6 | 14.1 | 10.8 | 12.7 |
| December, 1922..... | 35.8 | 16.9 | 7.9 | 7.1 | 14.5 | 10.8 | 13.0 |
| January, 1923..... | 35.9 | 17.4 | 8.0 | 7.4 | 14.4 | 10.5 | 13.0 |
| February, 1923..... | 34.0 | 17.9 | 7.8 | 7.3 | 14.6 | 10.7 | 13.2 |
| March, 1923..... | 34.2 | 17.6 | 7.8 | 7.5 | 14.9 | 10.7 | 13.3 |
| April, 1923..... | 34.5 | 18.2 | 8.0 | 7.6 | 14.6 | 10.8 | 13.4 |
| May, 1923..... | 34.2 | 18.7 | 8.0 | 7.6 | 14.5 | 10.8 | 13.4 |
| June, 1923..... | 33.2 | 19.0 | 7.9 | 7.7 | 14.3 | 10.3 | 13.3 |
| July, 1923..... | 33.8 | 19.0 | 7.7 | 7.6 | 13.4 | 10.2 | 13.2 |
| August, 1923..... | 33.2 | 18.8 | 7.7 | 7.7 | 14.0 | 10.3 | 13.2 |
| September, 1923..... | 32.4 | 18.5 | 7.7 | 7.7 | 14.0 | 10.0 | 12.8 |
| October, 1923..... | 32.5 | 18.0 | 8.0 | 7.5 | 14.1 | 10.1 | 13.0 |
| November, 1923..... | 32.7 | 17.6 | 7.8 | 7.3 | 14.1 | 10.0 | 12.9 |
| December, 1923..... | 32.6 | 17.2 | 7.9 | 7.0 | 13.9 | 9.8 | 12.7 |
| January, 1924..... | 33.6 | 18.5 | 8.1 | 6.7 | 14.1 | 9.9 | 12.7 |
| February, 1924..... | 34.3 | 18.8 | 8.0 | 6.7 | 14.3 | 9.9 | 12.6 |
| March, 1924..... | 34.9 | 18.4 | 8.0 | 6.4 | 14.1 | 9.9 | 12.5 |
| April, 1924..... | 35.7 | 14.6 | 7.9 | 6.2 | 14.1 | 9.8 | 12.4 |
| May, 1924..... | 35.0 | 13.9 | 7.7 | 7.1 | 13.8 | 9.6 | 12.0 |
| June, 1924..... | 34.7 | 12.9 | 7.4 | 6.0 | 13.5 | 9.1 | 11.6 |
| July, 1924..... | 34.1 | 11.7 | 7.2 | 5.9 | 13.3 | 8.7 | 11.3 |
| August, 1924..... | 34.1 | 11.0 | 7.1 | 6.6 | 13.1 | 8.3 | 11.0 |
| September, 1924..... | 34.2 | 10.8 | 6.9 | 6.3 | 12.9 | 8.2 | 10.9 |
| October, 1924..... | 34.1 | 10.6 | 6.8 | 5.5 | 13.3 | 8.1 | 10.6 |
| November, 1924..... | 33.8 | 9.2 | 6.5 | 5.3 | 12.0 | 7.8 | 10.4 |
| December, 1924..... | 33.4 | 10.3 | 6.2 | 5.1 | 11.8 | 7.9 | 10.2 |

Table 48 presents the same experience as Table 47 but analyzed with reference to accident causes.

Accidents due to handling were most numerous and declined during the period from 26.7 to 3.85, or 85.6 per cent. Nearly one-half of these handling accidents resulted from dropping when handling, and the decline in this group was from 11.2 to 1.93. These declines in a class of injury due almost wholly to lack of skill on the part of the worker are convincing evidence that with proper selection and training of the working force very satisfactory results can be secured.

If it were possible to present severity rates, they would show that while accidents due to machinery are less numerous than those due to handling they are much more serious. The decline in frequency of machine accidents was from 7.3 to 2.03.

TABLE 48.—ACCIDENT FREQUENCY RATES (PER 1,000,000 HOURS' EXPOSURE) IN A PORTION OF THE IRON AND STEEL INDUSTRY, 1913 TO 1924, BY YEARS AND ACCIDENT CAUSES

| Accident cause | 1913 | 1914 | 1915 | 1916 | 1917 | 1918 | 1919 | 1920 | 1921 | 1922 | 1923 | 1924 | 1913 to 1924 |
|---|------|------|------|------|------|------|------|-------|------|------------------|------------------|-------|--------------|
| Machinery..... | 7.3 | 5.0 | 4.9 | 5.4 | 4.5 | 4.0 | 3.3 | 3.4 | 1.8 | 2.2 | 2.3 | 2.03 | 3.85 |
| Working machines..... | 3.8 | 2.7 | 2.6 | 2.6 | 2.0 | 1.8 | 1.4 | 1.5 | .8 | 1.1 | 1.0 | .83 | 1.84 |
| Caught in..... | 2.5 | 1.8 | 1.7 | 1.7 | 1.2 | 1.1 | .9 | 1.0 | .6 | .8 | .7 | .68 | 1.22 |
| Breakage..... | .1 | .1 | .1 | .1 | .1 | .1 | .1 | .1 | .06 | .1 | (¹) | .04 | .08 |
| Moving material in..... | 1.2 | .8 | .8 | .8 | .7 | .6 | .4 | .4 | 1 | .3 | .2 | .21 | .54 |
| Cranes, etc..... | 3.5 | 2.3 | 2.3 | 2.8 | 2.5 | 2.2 | 1.9 | 1.9 | 1.0 | 1.2 | 1.3 | 1.18 | 2.01 |
| Overhead..... | 2.8 | 1.9 | 2.0 | 2.5 | 2.2 | 1.9 | 1.6 | 1.5 | .8 | 1.0 | 1.1 | .94 | 1.69 |
| Locomotive..... | .3 | .2 | .2 | .2 | .2 | .2 | .2 | .2 | .2 | .1 | .1 | .13 | .17 |
| Other hoisting apparatus..... | .4 | .2 | .1 | .1 | .1 | .1 | .1 | .2 | .1 | .1 | .1 | .10 | .15 |
| Vehicles..... | 2.3 | 1.9 | 1.6 | 1.7 | 1.7 | 1.3 | 1.2 | .1 | .5 | .4 | .6 | .48 | 1.23 |
| Hot substances..... | 5.4 | 3.6 | 3.7 | 4.5 | 3.6 | 3.0 | 2.8 | 2.5 | 1.2 | 1.1 | 1.2 | .87 | 2.79 |
| Electricity..... | .5 | .4 | .2 | .4 | .3 | .3 | .2 | .3 | .1 | .1 | (¹) | .07 | .24 |
| Hot metal..... | 3.6 | 2.1 | 2.3 | 3.0 | 2.5 | 2.1 | 2.0 | 1.8 | .8 | .7 | .9 | .61 | 1.89 |
| Hot water, etc..... | 1.3 | 1.1 | 1.2 | 1.1 | .8 | .6 | .6 | .4 | .2 | .3 | .2 | .19 | .66 |
| Falls of persons..... | 4.6 | 4.1 | 3.5 | 3.7 | 3.2 | 2.8 | 2.8 | 2.5 | 1.7 | 1.5 | 1.4 | 1.35 | 2.74 |
| From ladders..... | .3 | .1 | .1 | .1 | .1 | .2 | .1 | .1 | .09 | .1 | .1 | .07 | .13 |
| From scaffolds..... | .2 | .2 | .2 | .2 | .3 | .2 | .2 | .2 | .1 | .1 | .1 | .13 | .19 |
| Into openings..... | .2 | .1 | .1 | .3 | .2 | .1 | .1 | .1 | .07 | (¹) | .1 | .03 | .12 |
| Due to insecure footing..... | 3.8 | 3.7 | 3.1 | 3.1 | 2.6 | 2.3 | 2.3 | 2.1 | 1.4 | 1.3 | 1.1 | 1.12 | 2.30 |
| Falling material not otherwise specified..... | 1.2 | .7 | .7 | .6 | .4 | .3 | .4 | ----- | .1 | .1 | .1 | .09 | .41 |
| Handling objects and tools..... | 26.7 | 19.4 | 20.6 | 21.5 | 15.7 | 12.8 | 11.7 | 10.4 | 6.5 | 5.8 | 5.5 | 3.85 | 13.33 |
| Objects dropped in handling..... | 11.2 | 7.3 | 7.6 | 8.4 | 6.1 | 5.5 | 5.0 | 4.4 | 2.6 | 2.6 | 2.3 | 1.93 | 5.42 |
| Caught between object handled and other object..... | 3.4 | 2.6 | 2.6 | 3.1 | 2.1 | 1.7 | 1.7 | 1.3 | .7 | .7 | .7 | .50 | 1.76 |
| Trucks..... | 1.9 | 1.0 | 1.4 | 1.4 | 1.2 | .9 | .7 | .6 | .5 | .4 | .4 | .21 | .89 |
| Lifting..... | 2.5 | 2.3 | 2.5 | 2.5 | 2.0 | 1.4 | 1.4 | 1.1 | .8 | .8 | .5 | .27 | 1.51 |
| Objects flying from tools..... | .2 | .2 | .1 | .1 | .1 | .1 | .1 | .1 | .07 | .1 | .1 | .04 | .10 |
| Sharp points and edges..... | 3.8 | 3.4 | 3.8 | 3.1 | 2.2 | 1.5 | 1.3 | 1.5 | 1.1 | .6 | .6 | .33 | 1.91 |
| Tools..... | 3.7 | 2.6 | 2.6 | 2.9 | 2.0 | 1.7 | 1.4 | 1.4 | .8 | .7 | .8 | .59 | 1.75 |
| Miscellaneous..... | 12.9 | 8.8 | 6.5 | 7.0 | 5.4 | 4.6 | 4.1 | 3.1 | 1.3 | 1.9 | 1.8 | 1.60 | 4.60 |
| Asphyxiating gas..... | .3 | .2 | .1 | .1 | .1 | .1 | .2 | .1 | .5 | (¹) | .1 | .03 | .12 |
| Flying object not striking eye..... | .8 | .6 | .6 | .5 | .4 | .5 | .3 | .3 | .2 | .1 | .3 | .17 | .39 |
| Flying object striking eye..... | 2.9 | 2.1 | 1.7 | 1.9 | 1.6 | 1.6 | 1.3 | 1.1 | .5 | .4 | .2 | .33 | 1.31 |
| Heat..... | .9 | .8 | .4 | .4 | .1 | .2 | .1 | .1 | .06 | .1 | (¹) | .05 | .25 |
| Other causes..... | 8.0 | 5.1 | 3.7 | 4.1 | 3.2 | 2.2 | 2.2 | 1.5 | .6 | 1.3 | 1.1 | 1.01 | 2.53 |
| Total..... | 60.3 | 43.5 | 41.5 | 44.4 | 34.5 | 28.8 | 26.3 | 22.0 | 13.3 | 13.0 | 12.8 | 10.22 | 28.96 |

¹ Less than one-tenth of 1.

The concerns for which data are presented in Tables 47 and 48 are among the best in the industry. It will be enlightening to consider what has occurred in the industry at large.

Table 49 has been prepared to show the relation between the industry and certain of the important departments. Instead of annual periods, 5-year periods are used in order to secure a large enough volume to overcome the influence of local and temporary conditions. With the exception of foundries a steady and quite considerable decline appears in both frequency and severity rates.

TABLE 49.—TREND OF ACCIDENT RATES FOR 5-YEAR PERIODS IN THE IRON AND STEEL INDUSTRY

| Five-year periods ending— | The industry | Blast furnaces | Bessemer | Open hearth | Foundries | Heavy rolling mills | Plate mills | Sheet mills |
|---|--------------|----------------|----------|-------------|-----------|---------------------|-------------|-------------|
| Accident frequency rates (per 1,000,000 hours' exposure) | | | | | | | | |
| 1911..... | 69.2 | 76.1 | 101.5 | 84.2 | 80.1 | 61.0 | 69.4 | 44.1 |
| 1912..... | 65.1 | 67.7 | 79.5 | 79.5 | 61.5 | 37.0 | 60.8 | 47.9 |
| 1913..... | 62.1 | 62.4 | 92.3 | 78.6 | 65.1 | 51.7 | 55.9 | 49.1 |
| 1914..... | 59.2 | 62.3 | 89.8 | 75.0 | 63.6 | 46.1 | 49.9 | 51.1 |
| 1915..... | 53.3 | 50.3 | 65.0 | 67.6 | 59.3 | 39.4 | 44.7 | 48.1 |
| 1916..... | 51.3 | 47.8 | 78.1 | 64.8 | 57.8 | 37.3 | 41.5 | 47.4 |
| 1917..... | 48.2 | 44.1 | 68.3 | 58.4 | 60.4 | 32.1 | 36.6 | 41.3 |
| 1918..... | 43.6 | 40.5 | 60.7 | 53.5 | 57.0 | 31.1 | 39.8 | 35.8 |
| 1919..... | 41.6 | 39.0 | 57.7 | 50.5 | 61.0 | 32.4 | 39.2 | 32.7 |
| 1920..... | 41.1 | 38.0 | 53.1 | 50.2 | 61.0 | 31.4 | 38.4 | 33.7 |
| 1921..... | 39.5 | 39.3 | 47.0 | 44.8 | 63.1 | 29.9 | 37.6 | 33.4 |
| 1922..... | 36.5 | 34.0 | 39.9 | 41.3 | 60.4 | 27.6 | 36.7 | 35.2 |
| 1923..... | 34.9 | 32.9 | 30.5 | 33.0 | 61.7 | 23.8 | 31.4 | 37.2 |
| 1924..... | 33.6 | 30.7 | 24.9 | 32.9 | 62.7 | 21.2 | 29.4 | 35.1 |
| Accident severity rates (days lost per 1,000 hours' exposure) | | | | | | | | |
| 1911..... | 5.9 | 10.6 | 7.6 | 7.5 | 2.7 | 4.4 | 5.1 | 3.1 |
| 1912..... | 4.3 | 8.8 | 7.4 | 6.6 | 3.1 | 4.2 | 4.1 | 2.8 |
| 1913..... | 4.4 | 8.3 | 6.7 | 6.8 | 3.5 | 4.0 | 3.8 | 3.0 |
| 1914..... | 4.1 | 7.0 | 6.4 | 6.6 | 3.6 | 3.6 | 3.9 | 2.6 |
| 1915..... | 3.6 | 6.2 | 5.3 | 5.8 | 3.3 | 3.4 | 3.1 | 2.2 |
| 1916..... | 3.7 | 5.8 | 6.1 | 5.5 | 3.1 | 3.5 | 2.8 | 2.3 |
| 1917..... | 3.7 | 5.6 | 7.1 | 5.1 | 3.3 | 3.6 | 2.6 | 2.1 |
| 1918..... | 3.5 | 5.4 | 7.3 | 5.8 | 3.2 | 3.4 | 2.6 | 1.8 |
| 1919..... | 3.6 | 5.8 | 6.9 | 6.5 | 3.4 | 3.9 | 2.5 | 1.8 |
| 1920..... | 3.5 | 5.7 | 6.3 | 6.3 | 3.2 | 3.5 | 2.6 | 1.8 |
| 1921..... | 3.4 | 5.7 | 5.4 | 5.8 | 3.2 | 3.3 | 2.5 | 1.7 |
| 1922..... | 3.1 | 5.5 | 4.3 | 5.3 | 2.7 | 2.9 | 2.5 | 1.8 |
| 1923..... | 3.0 | 5.0 | 3.2 | 4.2 | 2.7 | 2.4 | 2.4 | 1.9 |
| 1924..... | 2.8 | 4.5 | 2.6 | 4.2 | 2.8 | 2.3 | 2.4 | 2.1 |

To understand the course of events it will be necessary to refer to another table—No. 50. In Table 47 it is seen that for the selected concerns the frequency rate in 1913 was 60.3, and from Table 50 it appears that for the industry at large the frequency rate was 59.6. The difference between the two rates is too small to be significant. In 1924 the rate for the selected plants was 10.2 and for the industry 30.8. Since the selected plants are included in the industry total they manifestly have their influence in determining what the rate will be, and since they constitute about 50 per cent of the industry and have a rate of 10.2, it is evident that the rate for the other 50 per cent must be close to 50.

While the selected plants have been reducing their rate from 60.3 to 10.2, the remainder of the industry has gone from 59.6 to about 50. If the matter could be presented from the severity standpoint the discrepancy would not be so great, but it would still be sufficient to challenge attention. It means that in the iron and steel industry, where remarkable results in accident reduction have been attained, there is still room for improvement.

ACCIDENT EXPERIENCE OF THE DEPARTMENTS OF THE INDUSTRY

Tables 50 to 72 present in detail the accident experience of the several departments of the iron and steel industry. While there is a considerable group of concerns which were not able for one reason

or another to furnish the data desired, the reports received cover so large a portion of the workers that the rates derived may be regarded as typical.

It has been the custom to undertake some special studies at the close of 5-year periods. As the year 1924 completes a third such period, there is accordingly in each table herewith presented a showing for these three 5-year periods. It is interesting to observe that with very few exceptions these figures, based on a greater volume of material, show a steady drop from period to period both in frequency and in severity.

The varying size of the working group from year to year is due, with three exceptions, to changing industrial conditions. The regular accumulation of accident data was not begun until 1910, and very few concerns had at that time records of earlier years. As a result the group for 1907 was relatively small. It is included because, in spite of its small size, it clearly indicates a condition still less satisfactory than that of 1910. There can be no doubt that if it were possible to determine rates for earlier years a still worse condition would be disclosed. In 1915 and 1916 it was not possible to secure complete data.

From 1910 to 1925 the decline in frequency was 62.1 per cent and in severity 51.9 per cent.

TABLE 50.—ACCIDENTS AND ACCIDENT RATES IN THE IRON AND STEEL INDUSTRY, 1907 TO 1925, BY YEARS AND 5-YEAR PERIODS.

| Year or period | Full-year workers | Number of cases | | | | Accident frequency rates (per 1,000,000 hours' exposure) | | | | Accident severity rates (per 1,000 hours' exposure) | | | |
|----------------|-------------------|-----------------|------------------------|------------------------|---------|--|------------------------|------------------------|-------|---|------------------------|------------------------|-------|
| | | Death | Perma-nent disa-bility | Tem-porary disa-bility | Total | Death | Perma-nent disa-bility | Tem-porary disa-bility | Total | Death | Perma-nent disa-bility | Tem-porary disa-bility | Total |
| 1907..... | 27,632 | 61 | 106 | 6,530 | 6,697 | 0.7 | 1.3 | 78.8 | 80.8 | 4.4 | 1.7 | 1.1 | 7.2 |
| 1910..... | 202,157 | 327 | 845 | 44,108 | 45,283 | .5 | 1.4 | 72.7 | 74.7 | 3.2 | 1.2 | .8 | 5.2 |
| 1911..... | 231,544 | 204 | 961 | 34,676 | 35,611 | .3 | 1.3 | 49.9 | 51.5 | 1.8 | 1.1 | .6 | 3.5 |
| 1912..... | 300,922 | 348 | 1,241 | 54,675 | 56,164 | .4 | 1.4 | 60.4 | 62.2 | 2.3 | 1.1 | .8 | 4.2 |
| 1913..... | 318,919 | 426 | 1,200 | 55,556 | 57,182 | .4 | 1.3 | 57.9 | 59.6 | 2.7 | .9 | .7 | 4.3 |
| 1914..... | 256,299 | 219 | 800 | 37,390 | 38,409 | .3 | 1.1 | 48.6 | 50.0 | 1.7 | .9 | .6 | 3.2 |
| 1915..... | 116,224 | 87 | 372 | 18,481 | 19,340 | .2 | 1.1 | 38.7 | 40.0 | 1.5 | .7 | .5 | 2.7 |
| 1916..... | 166,646 | 160 | 728 | 23,855 | 24,542 | .3 | 1.4 | 41.8 | 43.0 | 1.9 | 1.0 | .6 | 3.5 |
| 1917..... | 410,852 | 523 | 1,268 | 57,094 | 58,585 | .4 | 1.0 | 46.3 | 47.7 | 2.5 | .9 | .6 | 4.0 |
| 1918..... | 474,435 | 543 | 1,268 | 54,293 | 56,089 | .4 | .9 | 38.1 | 39.4 | 2.3 | .8 | .5 | 3.6 |
| 1919..... | 377,549 | 410 | 848 | 41,009 | 42,276 | .4 | 1.0 | 40.2 | 41.6 | 2.2 | .8 | .6 | 3.6 |
| 1920..... | 442,685 | 327 | 1,084 | 49,482 | 50,898 | .2 | .8 | 37.3 | 38.3 | 1.5 | .8 | .4 | 2.7 |
| 1921..... | 237,064 | 156 | 527 | 21,279 | 21,962 | .2 | .7 | 29.9 | 30.8 | 1.3 | .7 | .5 | 2.5 |
| 1922..... | 335,909 | 236 | 876 | 32,120 | 33,224 | .2 | .9 | 31.9 | 33.0 | 1.4 | .8 | .5 | 2.7 |
| 1923..... | 434,693 | 314 | 1,188 | 41,766 | 43,268 | .2 | .9 | 32.1 | 33.2 | 1.4 | .8 | .5 | 2.7 |
| 1924..... | 389,438 | 312 | 1,133 | 34,481 | 35,920 | .3 | 1.0 | 29.5 | 30.8 | 1.6 | .9 | .5 | 3.0 |
| 1910-1914..... | 1,310,911 | 1,524 | 5,080 | 228,205 | 232,954 | .4 | 1.3 | 57.5 | 59.2 | 2.3 | 1.1 | .7 | 4.1 |
| 1915-1919..... | 1,548,707 | 1,731 | 4,469 | 186,532 | 192,732 | .4 | 1.0 | 40.2 | 41.6 | 2.2 | .8 | .6 | 3.6 |
| 1920-1924..... | 1,839,918 | 1,345 | 4,810 | 179,128 | 185,277 | .2 | .9 | 32.6 | 33.6 | 1.5 | .8 | .5 | 2.8 |
| 1925..... | 445,223 | 207 | 1,091 | 36,404 | 37,772 | .2 | .8 | 27.3 | 28.3 | 1.2 | .8 | .4 | 2.5 |

BLAST FURNACES

The blast furnace must be regarded as one of the most hazardous departments in the industry. It is subject more than any other department to accidents causing injury to several men at the same time.

From 1910 to 1925 accident frequency declined 72.4 per cent and accident severity 54.2 per cent.

INDUSTRIAL ACCIDENTS IN UNITED STATES

TABLE 51.—ACCIDENTS AND ACCIDENT RATES IN BLAST FURNACES, 1907 TO 1925, BY YEARS AND 5-YEAR PERIODS

| Year or period | Full-year workers | Number of cases | | | | Accident frequency rates (per 1,000,000 hours' exposure) | | | | Accident severity rates (per 1,000 hours' exposure) | | | |
|----------------|-------------------|-----------------|------------------------|------------------------|--------|--|------------------------|------------------------|-------|---|------------------------|------------------------|-------|
| | | Death | Perma-nent disa-bility | Tempo-rary disa-bility | Total | Death | Perma-nent disa-bility | Tempo-rary disa-bility | Total | Death | Perma-nent disa-bility | Tempo-rary disa-bility | Total |
| | | | | | | | | | | | | | |
| 1907 | 1,566 | 9 | 11 | 456 | 476 | 1.9 | 2.3 | 97.1 | 101.3 | 11.5 | 2.7 | 1.8 | 16.0 |
| 1910 | 19,389 | 68 | 68 | 4,971 | 5,107 | 1.2 | 1.2 | 85.5 | 87.9 | 6.9 | 1.7 | 1.0 | 9.6 |
| 1911 | 21,479 | 52 | 54 | 3,203 | 3,409 | .8 | .8 | 51.3 | 52.9 | 4.8 | .9 | .8 | 6.5 |
| 1912 | 27,154 | 73 | 87 | 4,790 | 4,950 | .9 | 1.1 | 58.8 | 60.8 | 5.4 | 1.0 | .8 | 7.2 |
| 1913 | 31,988 | 86 | 80 | 4,749 | 4,945 | .9 | .8 | 58.1 | 59.8 | 5.3 | 1.0 | .9 | 7.2 |
| 1914 | 26,372 | 45 | 77 | 3,935 | 4,057 | .6 | 1.0 | 49.4 | 51.0 | 3.5 | 1.0 | .7 | 5.2 |
| 1915 | 10,721 | 19 | 24 | 1,981 | 1,923 | .6 | .7 | 30.5 | 31.8 | 3.5 | .6 | .4 | 4.5 |
| 1916 | 14,905 | 23 | 57 | 1,763 | 1,843 | .5 | 1.3 | 39.4 | 41.2 | 3.1 | .9 | .6 | 4.6 |
| 1917 | 36,202 | 79 | 93 | 4,440 | 4,612 | .7 | .9 | 40.9 | 42.5 | 4.4 | .9 | .5 | 5.8 |
| 1918 | 41,449 | 102 | 72 | 4,358 | 4,532 | .8 | .6 | 35.0 | 36.4 | 4.9 | .8 | .5 | 6.2 |
| 1919 | 32,889 | 94 | 67 | 3,745 | 3,906 | 1.0 | .7 | 38.0 | 39.7 | 5.7 | 1.0 | .5 | 7.2 |
| 1920 | 35,470 | 47 | 58 | 3,214 | 3,319 | .4 | .5 | 30.2 | 31.1 | 2.7 | .9 | .4 | 4.0 |
| 1921 | 15,486 | 23 | 24 | 1,160 | 1,207 | .5 | .5 | 25.0 | 26.0 | 3.0 | .5 | .4 | 3.9 |
| 1922 | 17,933 | 38 | 35 | 1,686 | 1,659 | .7 | .7 | 29.7 | 30.8 | 4.2 | .4 | .5 | 5.1 |
| 1923 | 29,698 | 53 | 68 | 2,702 | 2,823 | .6 | .8 | 30.3 | 31.7 | 3.6 | .1 | .5 | 4.2 |
| 1924 | 25,268 | 50 | 60 | 2,248 | 2,304 | .7 | .9 | 29.7 | 31.3 | 4.0 | 1.1 | .6 | 5.6 |
| 1910-1914 | 126,582 | 324 | 366 | 22,678 | 23,268 | .9 | 1.0 | 60.4 | 62.3 | 5.2 | 1.0 | .9 | 7.0 |
| 1915-1919 | 136,166 | 317 | 312 | 15,287 | 15,916 | .8 | .8 | 37.4 | 39.0 | 4.7 | .9 | .6 | 6.1 |
| 1920-1924 | 123,854 | 211 | 251 | 10,910 | 11,372 | .6 | .7 | 29.4 | 30.7 | 3.4 | .7 | .5 | 4.5 |
| 1925 | 25,819 | 40 | 51 | 1,789 | 1,880 | .5 | .7 | 23.1 | 24.3 | 3.1 | .9 | .4 | 4.4 |

BESSEMER CONVERTERS

The accident experience of the Bessemer department is very erratic. The rates change from year to year in a fashion difficult to explain. However, here, as elsewhere, the general tendency is to decline.

From 1910 to 1925 frequency declined 92.9 per cent and severity 55.8 per cent.

TABLE 52.—ACCIDENTS AND ACCIDENT RATES IN BESSEMER CONVERTERS, 1907 TO 1925, BY YEARS AND 5-YEAR PERIODS

| Year or period | Full-year workers | Number of cases | | | | Accident frequency rates (per 1,000,000 hours' exposure) | | | | Accident severity rates (per 1,000 hours' exposure) | | | |
|----------------|-------------------|-----------------|------------------------|------------------------|-------|--|------------------------|------------------------|-------|---|------------------------|------------------------|-------|
| | | Death | Perma-nent disa-bility | Tempo-rary disa-bility | Total | Death | Perma-nent disa-bility | Tempo-rary disa-bility | Total | Death | Perma-nent disa-bility | Tempo-rary disa-bility | Total |
| | | | | | | | | | | | | | |
| 1907 | 967 | 1 | 5 | 383 | 389 | 0.3 | 1.7 | 132.0 | 134.0 | 2.1 | 0.9 | 2.4 | 5.4 |
| 1910 | 5,070 | 20 | 18 | 1,943 | 1,981 | 1.3 | 1.2 | 127.7 | 130.2 | 7.9 | .9 | 1.6 | 10.4 |
| 1911 | 5,155 | 6 | 24 | 1,237 | 1,267 | .4 | 1.6 | 79.9 | 81.9 | 2.3 | 1.1 | 1.1 | 4.5 |
| 1912 | 6,521 | 9 | 37 | 1,892 | 1,938 | .5 | 1.9 | 96.7 | 99.1 | 2.8 | 1.0 | 1.5 | 5.3 |
| 1913 | 6,885 | 16 | 42 | 1,610 | 1,668 | .8 | 2.0 | 77.9 | 80.7 | 4.6 | 1.2 | 1.2 | 7.0 |
| 1914 | 4,470 | 6 | 25 | 685 | 716 | .4 | 1.8 | 51.1 | 53.3 | 2.2 | 1.2 | .9 | 4.3 |
| 1915 | 3,160 | 2 | 21 | 494 | 517 | .2 | 2.2 | 52.1 | 54.5 | 1.3 | 1.4 | .8 | 3.5 |
| 1916 | 4,070 | 13 | 34 | 848 | 894 | 1.1 | 2.8 | 69.5 | 73.4 | 6.4 | 2.1 | 1.2 | 9.7 |
| 1917 | 5,979 | 20 | 21 | 1,194 | 1,235 | 1.1 | 1.2 | 66.6 | 68.9 | 6.7 | 1.3 | 1.2 | 9.2 |
| 1918 | 5,881 | 13 | 18 | 877 | 908 | .7 | 1.0 | 49.7 | 51.4 | 4.4 | 1.0 | .8 | 6.2 |
| 1919 | 6,555 | 14 | 18 | 849 | 881 | .7 | .9 | 43.2 | 44.8 | 4.3 | .5 | .9 | 5.7 |
| 1920 | 6,907 | 5 | 9 | 750 | 764 | .2 | .4 | 36.2 | 36.8 | 1.4 | .3 | .6 | 2.3 |
| 1921 | 3,440 | 4 | 6 | 252 | 262 | .4 | .6 | 24.4 | 25.4 | 2.3 | .4 | .4 | 3.1 |
| 1922 | 4,778 | 2 | 8 | 233 | 243 | .1 | .6 | 16.3 | 17.0 | .8 | .5 | .3 | 1.6 |
| 1923 | 6,080 | 6 | 20 | 367 | 393 | .3 | 1.1 | 20.1 | 21.5 | 2.0 | .5 | .5 | 3.0 |
| 1924 | 4,943 | 7 | 10 | 274 | 291 | .5 | .7 | 18.5 | 19.7 | 2.8 | .6 | .3 | 3.7 |
| 1910-1914 | 28,101 | 57 | 146 | 7,367 | 7,570 | .7 | 1.7 | 87.4 | 89.8 | 4.0 | 1.1 | 1.3 | 6.4 |
| 1915-1919 | 25,645 | 62 | 112 | 4,262 | 4,436 | .8 | 1.5 | 55.4 | 57.7 | 4.8 | 1.1 | 1.0 | 6.9 |
| 1920-1924 | 26,147 | 24 | 53 | 1,876 | 1,953 | .3 | .7 | 23.9 | 24.9 | 1.8 | .4 | .4 | 2.6 |
| 1925 | 4,834 | 9 | 10 | 115 | 134 | .6 | .7 | 7.9 | 9.2 | .7 | 3.7 | .2 | 4.6 |

OPEN HEARTHS

In open hearths from 1910 to 1925 accident frequency declined 74.3 per cent and severity 62.2 per cent. From year to year the changes are somewhat irregular, but the 5-year periods show an extremely uniform downward movement.

TABLE 53.—ACCIDENTS AND ACCIDENT RATES IN OPEN HEARTHS, 1907 TO 1925, BY YEARS AND 5-YEAR PERIODS

| Year or period | Full-year workers | Number of cases | | | | Accident frequency rates (per 1,000,000 hours' exposure) | | | | Accident severity rates (per 1,000 hours' exposure) | | | |
|----------------|-------------------|-----------------|------------------------|------------------------|--------|--|------------------------|------------------------|-------|---|------------------------|------------------------|-------|
| | | Death | Perma-nent disa-bility | Tempo-rary disa-bility | Total | Death | Perma-nent disa-bility | Tempo-rary disa-bility | Total | Death | Perma-nent disa-bility | Tempo-rary disa-bility | Total |
| 1907..... | 2,987 | 14 | 14 | 908 | 936 | 1.6 | 1.6 | 101.3 | 104.5 | 9.3 | 4.0 | 1.1 | 14.4 |
| 1910..... | 9,739 | 29 | 53 | 3,028 | 3,110 | 1.0 | 1.8 | 103.6 | 106.4 | 6.0 | 2.4 | 1.4 | 9.8 |
| 1911..... | 10,718 | 18 | 45 | 1,890 | 1,953 | .6 | 1.4 | 58.8 | 60.8 | 3.4 | 1.1 | .9 | 5.4 |
| 1912..... | 17,355 | 47 | 99 | 4,039 | 4,185 | .9 | 1.9 | 77.6 | 80.4 | 5.3 | 1.9 | 1.0 | 8.2 |
| 1913..... | 20,604 | 35 | 95 | 4,368 | 4,498 | .6 | 1.5 | 70.7 | 72.8 | 3.4 | 1.4 | 1.0 | 5.8 |
| 1914..... | 12,877 | 14 | 41 | 2,484 | 2,539 | .4 | 1.1 | 64.3 | 65.8 | 2.2 | 1.5 | .8 | 4.5 |
| 1915..... | 5,969 | 8 | 20 | 832 | 860 | .4 | 1.1 | 46.5 | 48.0 | 2.7 | .9 | .6 | 4.2 |
| 1916..... | 9,634 | 12 | 37 | 1,438 | 1,507 | .4 | 1.3 | 50.3 | 52.0 | 2.5 | .8 | .9 | 4.2 |
| 1917..... | 21,457 | 47 | 86 | 3,187 | 3,320 | .7 | 1.3 | 49.5 | 51.5 | 4.4 | 1.2 | .8 | 6.4 |
| 1918..... | 26,410 | 71 | 103 | 3,983 | 4,157 | .9 | 1.3 | 50.3 | 52.5 | 5.4 | 1.4 | 1.1 | 7.9 |
| 1919..... | 22,685 | 53 | 71 | 3,103 | 3,227 | .8 | 1.0 | 45.6 | 47.4 | 4.7 | 1.3 | .8 | 6.8 |
| 1920..... | 28,823 | 43 | 70 | 3,164 | 3,277 | .5 | .8 | 37.0 | 38.3 | 3.0 | .8 | .5 | 4.3 |
| 1921..... | 12,783 | 9 | 21 | 1,082 | 1,112 | .2 | .6 | 28.2 | 29.0 | 1.4 | .4 | .5 | 2.3 |
| 1922..... | 10,805 | 22 | 46 | 1,936 | 2,004 | .4 | .8 | 32.6 | 33.8 | 2.2 | .9 | .5 | 3.6 |
| 1923..... | 24,917 | 42 | 74 | 2,145 | 2,261 | .6 | 1.0 | 28.6 | 30.2 | 3.4 | 1.1 | .7 | 5.2 |
| 1924..... | 21,493 | 32 | 67 | 1,864 | 1,963 | .5 | 1.0 | 28.9 | 30.4 | 3.0 | .9 | .5 | 4.4 |
| 1910-1914..... | 71,293 | 143 | 333 | 15,809 | 16,285 | .7 | 1.5 | 72.8 | 75.0 | 4.0 | 1.6 | 1.0 | 6.6 |
| 1915-1919..... | 86,175 | 191 | 317 | 12,563 | 13,071 | .7 | 1.2 | 48.6 | 50.5 | 4.4 | 1.2 | .9 | 6.5 |
| 1920-1924..... | 107,820 | 148 | 278 | 10,191 | 10,617 | .5 | .9 | 31.6 | 32.9 | 2.7 | .9 | .6 | 4.2 |
| 1925..... | 22,837 | 25 | 73 | 1,769 | 1,867 | .4 | 1.1 | 25.8 | 27.3 | 2.2 | 1.0 | .5 | 3.7 |

FOUNDRIES

When compared with the basic metallurgical departments foundries have a distinctly lower accident severity and a higher accident frequency. The changes from year to year are disappointing in view of the fact that some of the better plants have clearly demonstrated that the figures are higher than they need to be and that reasonable reduction is possible.

When the 5-year periods are considered the situation looks somewhat better. From the first 5-year period to the third there has been a decline of 1.4 per cent in frequency and 22.2 per cent in severity.

TABLE 54.—ACCIDENTS AND ACCIDENT RATES IN FOUNDRIES, 1907 TO 1925, BY YEARS AND 5-YEAR PERIODS

| Year or period | Full-year workers | Number of cases | | | | Accident frequency rates (per 1,000,000 hours' exposure) | | | | Accident severity rates (per 1,000 hours' exposure) | | | |
|----------------|-------------------|-----------------|--------------------------|--------------------------|--------|--|--------------------------|--------------------------|-------|---|--------------------------|--------------------------|-------|
| | | Death | Perma- nent disa- bility | Tempo- rary disa- bility | Total | Death | Perma- nent disa- bility | Tempo- rary disa- bility | Total | Death | Perma- nent disa- bility | Tempo- rary disa- bility | Total |
| 1907 | 939 | 1 | 3 | 179 | 183 | 0.4 | 1.1 | 63.5 | 65.0 | 2.1 | 0.3 | 1.0 | 3.4 |
| 1910 | 16,885 | 7 | 78 | 2,615 | 2,700 | .1 | 1.5 | 51.6 | 33.2 | .8 | 1.0 | .6 | 2.4 |
| 1911 | 13,490 | 18 | 57 | 1,970 | 2,045 | .4 | 1.4 | 48.6 | 30.4 | 2.7 | 1.0 | .6 | 4.3 |
| 1912 | 23,294 | 23 | 135 | 4,512 | 4,670 | .3 | 1.9 | 64.6 | 66.8 | 2.1 | 1.5 | .8 | 4.4 |
| 1913 | 24,605 | 22 | 118 | 5,236 | 5,376 | .3 | 1.6 | 70.9 | 72.8 | 1.7 | 1.2 | .8 | 3.7 |
| 1914 | 17,634 | 14 | 61 | 3,432 | 3,507 | .3 | 1.2 | 64.9 | 66.4 | 1.6 | 1.0 | .7 | 3.3 |
| 1915 | 1,309 | 1 | 2 | 118 | 120 | .2 | .5 | 30.0 | 30.5 | .2 | .2 | .4 | .6 |
| 1916 | 1,231 | 1 | 6 | 145 | 152 | .3 | 1.6 | 39.3 | 41.2 | 1.6 | .6 | .7 | 2.9 |
| 1917 | 31,905 | 45 | 101 | 6,810 | 6,956 | .5 | 1.1 | 71.4 | 73.0 | 2.8 | 1.0 | .9 | 4.7 |
| 1918 | 32,181 | 23 | 106 | 5,482 | 5,611 | .2 | 1.1 | 56.8 | 58.1 | 1.5 | 1.0 | .7 | 3.2 |
| 1919 | 24,220 | 15 | 62 | 4,048 | 4,125 | .2 | .9 | 55.7 | 56.8 | 1.2 | .8 | .7 | 2.7 |
| 1920 | 35,300 | 13 | 97 | 6,688 | 6,798 | .1 | .9 | 63.2 | 64.2 | .7 | .8 | .8 | 2.3 |
| 1921 | 15,388 | 9 | 34 | 2,766 | 2,799 | .2 | .7 | 59.7 | 60.6 | 1.2 | .7 | .8 | 2.7 |
| 1922 | 22,770 | 12 | 59 | 4,134 | 4,205 | .2 | .9 | 60.5 | 61.6 | 1.1 | .9 | .7 | 2.7 |
| 1923 | 38,660 | 26 | 126 | 7,171 | 7,323 | .2 | 1.2 | 61.8 | 63.2 | 1.4 | .8 | .8 | 3.0 |
| 1924 | 37,325 | 21 | 143 | 6,820 | 6,984 | .2 | 1.3 | 60.9 | 62.4 | 1.1 | 1.1 | .8 | 3.0 |
| 1910-1914 | 95,917 | 84 | 449 | 17,785 | 18,298 | .3 | 1.6 | 61.7 | 63.6 | 1.8 | 1.1 | .7 | 3.6 |
| 1915-1919 | 92,746 | 84 | 277 | 16,604 | 16,965 | .3 | 1.0 | 59.7 | 61.0 | 1.8 | .9 | .7 | 3.4 |
| 1920-1924 | 149,441 | 81 | 459 | 27,569 | 28,109 | .2 | 1.0 | 61.5 | 62.7 | 1.1 | .9 | .8 | 2.8 |
| 1925 | 35,570 | 27 | 128 | 6,877 | 7,032 | .3 | 1.2 | 64.5 | 65.9 | 1.5 | 1.3 | .9 | 3.7 |

BAR MILLS

There are no available accident data prior to 1915 regarding bar mills. From that year to 1925 accident frequency declined 58.0 per cent and accident severity increased 15.8 per cent. The experience for the second 5-year period is below that for the first—45.8 per cent in frequency and 29 per cent in severity.

TABLE 55.—ACCIDENTS AND ACCIDENT RATES IN BAR MILLS, 1915 TO 1925, BY YEARS AND 5-YEAR PERIODS

| Year or period | Full-year workers | Number of cases | | | | Accident frequency rates (per 1,000,000 hours' exposure) | | | | Accident severity rates (per 1,000 hours' exposure) | | | |
|----------------|-------------------|-----------------|--------------------------|--------------------------|-------|--|--------------------------|--------------------------|-------|---|--------------------------|--------------------------|-------|
| | | Death | Perma- nent disa- bility | Tempo- rary disa- bility | Total | Death | Perma- nent disa- bility | Tempo- rary disa- bility | Total | Death | Perma- nent disa- bility | Tempo- rary disa- bility | Total |
| 1915 | 3,232 | 1 | 7 | 577 | 585 | 0.1 | 0.7 | 59.5 | 60.3 | 0.6 | 0.6 | 0.7 | 1.9 |
| 1916 | 3,042 | 4 | 11 | 783 | 798 | .4 | 1.2 | 85.8 | 87.4 | 2.6 | .5 | 1.1 | 4.2 |
| 1917 | 7,472 | 8 | 34 | 1,940 | 1,982 | .4 | 1.5 | 86.5 | 88.4 | 2.1 | 1.0 | 1.0 | 4.0 |
| 1918 | 5,784 | 6 | 18 | 756 | 780 | .3 | 1.0 | 43.9 | 45.2 | 2.1 | .7 | .7 | 3.5 |
| 1919 | 4,801 | 1 | 7 | 689 | 697 | .1 | .5 | 49.9 | 50.5 | .4 | .5 | .7 | 1.6 |
| 1920 | 3,880 | 1 | 5 | 325 | 331 | .1 | .4 | 44.8 | 45.3 | .5 | .2 | .5 | 1.2 |
| 1921 | 1,912 | 5 | 5 | 228 | 233 | .9 | .9 | 39.8 | 40.7 | 1.0 | .6 | .6 | 1.6 |
| 1922 | 3,789 | 7 | 10 | 392 | 409 | .6 | .9 | 34.6 | 36.1 | 3.7 | .8 | .5 | 5.0 |
| 1923 | 4,003 | 17 | 44 | 443 | 460 | .8 | 1.4 | 36.4 | 37.8 | .7 | .7 | .6 | 1.3 |
| 1924 | 4,093 | 2 | 7 | 285 | 294 | .2 | .6 | 23.2 | 24.0 | 1.0 | .2 | .5 | 1.7 |
| 1915-1919 | 24,081 | 20 | 77 | 4,745 | 4,842 | .3 | 1.1 | 65.6 | 67.0 | 1.7 | .7 | .7 | 3.1 |
| 1920-1924 | 17,666 | 10 | 44 | 1,969 | 1,923 | .2 | .8 | 35.3 | 36.3 | 1.1 | .6 | .5 | 2.2 |
| 1925 | 4,471 | 2 | 13 | 324 | 339 | .2 | 1.0 | 24.2 | 25.3 | .9 | .9 | .4 | 2.2 |

HEAVY ROLLING MILLS

Heavy rolling mills show a steady change for the better in accident experience. From 1910 to 1925 accident frequency dropped 79.4 per cent and accident severity 53.8 per cent. Accident frequency in the

third 5-year period is lower than that of the first period by 54 per cent and accident severity by 36.1 per cent.

TABLE 56.—ACCIDENTS AND ACCIDENT RATES IN HEAVY ROLLING MILLS, 1907 TO 1925, BY YEARS AND 5-YEAR PERIODS

| Year or period | Full-year workers | Number of cases | | | | Accident frequency rates (per 1,000,000 hours' exposure) | | | | Accident severity rates (per 1,000 hours' exposure) | | | |
|----------------|-------------------|-----------------|------------------------|------------------------|-------|--|------------------------|------------------------|-------|---|------------------------|------------------------|-------|
| | | Death | Perma-nent disa-bility | Tempo-rary disa-bility | Total | Death | Perma-nent disa-bility | Tempo-rary disa-bility | Total | Death | Perma-nent disa-bility | Tempo-rary disa-bility | Total |
| 1907 | 4,556 | 8 | 10 | 874 | 892 | 0.6 | 0.7 | 64.0 | 65.3 | 3.5 | 0.3 | 1.0 | 4.8 |
| 1910 | 9,442 | 19 | 57 | 2,167 | 2,243 | .7 | 2.0 | 76.5 | 79.2 | 4.0 | 1.5 | 1.0 | 6.5 |
| 1911 | 12,409 | 9 | 48 | 1,636 | 1,683 | .2 | 1.3 | 43.9 | 45.4 | 1.4 | .9 | .7 | 3.0 |
| 1912 | 16,258 | 20 | 41 | 2,395 | 2,456 | .4 | .8 | 49.1 | 50.3 | 2.3 | .9 | .7 | 3.9 |
| 1913 | 17,669 | 16 | 60 | 1,910 | 1,986 | .3 | 1.1 | 36.2 | 37.6 | 1.7 | .6 | .6 | 2.9 |
| 1914 | 11,965 | 10 | 55 | 899 | 964 | .3 | 1.5 | 25.0 | 26.8 | 1.5 | 1.0 | .4 | 2.9 |
| 1915 | 7,148 | 10 | 24 | 596 | 630 | .5 | 1.1 | 27.8 | 29.4 | 2.8 | 1.0 | .3 | 4.1 |
| 1916 | 10,076 | 7 | 44 | 959 | 1,010 | .2 | 1.5 | 31.7 | 33.4 | 1.4 | 1.3 | .5 | 3.2 |
| 1917 | 20,530 | 30 | 87 | 1,784 | 1,901 | .5 | 1.4 | 29.0 | 30.9 | 2.9 | 1.0 | .5 | 4.4 |
| 1918 | 19,897 | 24 | 67 | 1,900 | 1,991 | .4 | 1.1 | 32.0 | 33.5 | 2.4 | .9 | .5 | 3.8 |
| 1919 | 17,665 | 20 | 53 | 1,711 | 1,784 | .4 | 1.0 | 32.4 | 33.8 | 2.3 | 1.1 | .5 | 3.9 |
| 1920 | 20,787 | 12 | 34 | 1,038 | 1,084 | .2 | .5 | 26.3 | 27.0 | 1.2 | .4 | .4 | 2.0 |
| 1921 | 9,000 | 3 | 15 | 485 | 503 | .1 | .5 | 16.5 | 17.1 | .6 | .3 | .3 | 1.2 |
| 1922 | 14,574 | 9 | 56 | 752 | 817 | .2 | 1.8 | 17.2 | 18.7 | 1.2 | .9 | .4 | 2.5 |
| 1923 | 16,602 | 8 | 36 | 882 | 926 | .2 | .7 | 17.7 | 18.6 | 1.0 | .8 | .3 | 2.1 |
| 1924 | 13,162 | 18 | 30 | 789 | 846 | .5 | 1.0 | 20.0 | 21.5 | 2.7 | .8 | .4 | 3.9 |
| 1910-1914 | 67,663 | 74 | 261 | 9,007 | 9,342 | .4 | 1.3 | 44.4 | 46.1 | 2.1 | .9 | .0 | 3.6 |
| 1915-1919 | 75,166 | 91 | 275 | 6,950 | 7,316 | .4 | 1.2 | 30.8 | 32.4 | 2.4 | 1.0 | .5 | 3.9 |
| 1920-1924 | 74,944 | 50 | 180 | 4,546 | 4,776 | .2 | .8 | 20.2 | 21.2 | 1.3 | .6 | .4 | 2.3 |
| 1925 | 16,553 | 13 | 50 | 747 | 810 | .3 | 1.0 | 15.0 | 16.3 | 1.6 | 1.1 | .3 | 3.0 |

PLATE MILLS

The downward movement of the accident rates in plate mills is unusually regular. From 1910 to 1925 frequency declined 64.2 per cent, and in the same interval severity declined 43.9 per cent. The accident experience of the third 5-year period is below that of the first 41.1 per cent in frequency and 38.5 per cent in severity.

TABLE 57.—ACCIDENTS AND ACCIDENT RATES IN PLATE MILLS, 1907 TO 1925, BY YEARS AND 5-YEAR PERIODS

| Year or period | Full-year workers | Number of cases | | | | Accident frequency rates (per 1,000,000 hours' exposure) | | | | Accident severity rates (per 1,000 hours' exposure) | | | |
|----------------|-------------------|-----------------|------------------------|------------------------|-------|--|------------------------|------------------------|-------|---|------------------------|------------------------|-------|
| | | Death | Perma-nent disa-bility | Tempo-rary disa-bility | Total | Death | Perma-nent disa-bility | Tempo-rary disa-bility | Total | Death | Perma-nent disa-bility | Tempo-rary disa-bility | Total |
| 1907 | 1,915 | 4 | 12 | 637 | 653 | 0.7 | 2.1 | 110.9 | 113.7 | 4.2 | 3.7 | 1.2 | 9.1 |
| 1910 | 3,287 | 7 | 27 | 602 | 636 | .7 | 2.7 | 61.1 | 64.5 | 4.8 | 1.6 | .7 | 6.6 |
| 1911 | 4,380 | 5 | 15 | 560 | 610 | .4 | 1.1 | 44.8 | 40.3 | 2.3 | 1.0 | .6 | 3.9 |
| 1912 | 5,128 | 2 | 25 | 583 | 620 | .1 | 1.6 | 58.0 | 59.7 | .8 | 2.0 | .8 | 3.0 |
| 1913 | 5,430 | 3 | 25 | 725 | 753 | .2 | 1.5 | 44.5 | 46.2 | 1.1 | 1.2 | .6 | 2.9 |
| 1914 | 3,476 | 2 | 13 | 319 | 334 | .2 | 1.2 | 30.6 | 32.0 | 1.1 | 1.0 | .5 | 2.6 |
| 1915 | 2,086 | 1 | 9 | 121 | 131 | .2 | 1.4 | 19.3 | 20.9 | 1.0 | .6 | .3 | 1.9 |
| 1916 | 4,681 | 3 | 15 | 436 | 454 | .2 | 1.1 | 31.0 | 32.3 | 1.3 | .7 | .5 | 2.5 |
| 1917 | 6,764 | 4 | 22 | 766 | 792 | .2 | 1.1 | 37.7 | 39.0 | 1.2 | .9 | .5 | 2.6 |
| 1918 | 9,650 | 8 | 19 | 1,446 | 1,473 | .3 | .7 | 49.9 | 50.9 | 1.7 | .6 | .7 | 3.0 |
| 1919 | 11,892 | 9 | 24 | 1,247 | 1,280 | .3 | .7 | 35.0 | 36.0 | 1.5 | .5 | .5 | 2.5 |
| 1920 | 11,928 | 9 | 23 | 1,147 | 1,179 | .3 | .6 | 32.1 | 33.0 | 1.5 | .6 | .4 | 2.5 |
| 1921 | 4,860 | 3 | 7 | 313 | 328 | .2 | .5 | 23.1 | 23.8 | 1.3 | .3 | .4 | 2.0 |
| 1922 | 6,198 | 2 | 26 | 581 | 609 | .1 | 1.4 | 31.2 | 32.7 | .6 | .9 | .5 | 2.0 |
| 1923 | 8,731 | 5 | 24 | 662 | 691 | .2 | .9 | 25.3 | 26.4 | 1.1 | 1.2 | .4 | 2.7 |
| 1924 | 6,434 | 3 | 18 | 506 | 527 | .2 | .9 | 26.1 | 27.2 | .9 | .6 | .5 | 2.0 |
| 1910-1914 | 37,711 | 19 | 105 | 3,129 | 3,253 | .8 | 1.6 | 48.0 | 49.9 | 1.8 | 1.4 | .7 | 3.9 |
| 1915-1919 | 35,073 | 25 | 89 | 4,016 | 4,130 | .2 | .8 | 38.2 | 39.2 | 1.4 | .6 | .5 | 2.5 |
| 1920-1924 | 37,891 | 22 | 98 | 3,214 | 3,334 | .2 | .9 | 28.3 | 29.4 | 1.2 | .8 | .4 | 2.4 |
| 1925 | 5,734 | 6 | 15 | 370 | 391 | .4 | .9 | 21.5 | 22.7 | 2.1 | 1.2 | .4 | 3.7 |

PUDDLING MILLS

Accident data for puddling mills are available only for 1917 and succeeding years. Such data are shown in Table 58.

TABLE 58.—ACCIDENTS AND ACCIDENT RATES IN PUDDLING MILLS, 1917 TO 1925, BY YEARS AND 5-YEAR PERIODS

| Year or period | Full-year workers | Number of cases | | | | Accident frequency rates (per 1,000,000 hours' exposure) | | | | Accident severity rates (per 1,000 hours' exposure) | | | |
|----------------|-------------------|-----------------|--------------------------|--------------------------|--------|--|--------------------------|--------------------------|-------|---|--------------------------|--------------------------|-------|
| | | Death | Perma- nent disa- bility | Tempo- rary disa- bility | Total | Death | Perma- nent disa- bility | Tempo- rary disa- bility | Total | Death | Perma- nent disa- bility | Tempo- rary disa- bility | Total |
| 1917..... | 4, 129 | 1 | 10 | 572 | 583 | 0.1 | 0.8 | 46.2 | 47.1 | 0.5 | 0.6 | 0.6 | 1.7 |
| 1918..... | 2, 712 | 3 | 4 | 370 | 377 | .4 | .5 | 45.5 | 46.4 | 2.2 | .4 | .6 | 3.2 |
| 1919..... | 1, 619 | ..... | 1 | 140 | 141 | ..... | 2 | 28.8 | 29.0 | ..... | .1 | .4 | .5 |
| 1920..... | 2, 007 | 1 | 10 | 243 | 254 | .2 | 1.7 | 40.3 | 42.2 | 1.0 | .8 | .6 | 2.4 |
| 1923..... | 1, 620 | ..... | 3 | 280 | 283 | ..... | 6 | 57.6 | 58.2 | ..... | 1.1 | 1.0 | 2.1 |
| 1924..... | 814 | ..... | 4 | 156 | 160 | ..... | 1.6 | 68.9 | 68.5 | ..... | 1.2 | 1.2 | 2.4 |
| 1917-1919..... | 8, 460 | 4 | 15 | 1, 082 | 1, 101 | .2 | .6 | 42.6 | 43.4 | .9 | .4 | .6 | 1.9 |
| 1920-1924..... | 4, 406 | ..... | 9 | 787 | 806 | ..... | .7 | 60.3 | 61.0 | ..... | .8 | 1.1 | 1.9 |
| 1925..... | 1, 108 | ..... | 6 | 166 | 172 | ..... | 1.8 | 49.9 | 51.7 | ..... | 2.8 | .9 | 3.7 |

SHEET MILLS

At the outset of the period covered the sheet mills have rather low accident rates. From that point there is an irregular but continuous decline. From 1910 to 1925 frequency declines 46.1 per cent and severity 60.5 per cent. The accident experience of the third 5-year period is below that of the first 31.4 per cent in frequency and 19.2 per cent in severity.

TABLE 59.—ACCIDENTS AND ACCIDENT RATES IN SHEET MILLS, 1907 TO 1925, BY YEARS AND 5-YEAR PERIODS

| Year or period | Full-year workers | Number of cases | | | | Accident frequency rates (per 1,000,000 hours' exposure) | | | | Accident severity rates (per 1,000 hours' exposure) | | | |
|----------------|-------------------|-----------------|--------------------------|--------------------------|---------|--|--------------------------|--------------------------|-------|---|--------------------------|--------------------------|-------|
| | | Death | Perma- nent disa- bility | Tempo- rary disa- bility | Total | Death | Perma- nent disa- bility | Tempo- rary disa- bility | Total | Death | Perma- nent disa- bility | Tempo- rary disa- bility | Total |
| 1907..... | 2, 211 | 2 | 8 | 274 | 284 | 0.3 | 1.2 | 43.3 | 44.8 | 1.8 | 1.9 | 0.4 | 4.1 |
| 1910..... | 18, 501 | 28 | 52 | 3, 310 | 3, 390 | .5 | .9 | 59.6 | 61.0 | 2.9 | .8 | .6 | 4.3 |
| 1911..... | 29, 710 | 9 | 71 | 3, 625 | 3, 705 | .1 | .8 | 40.7 | 41.6 | .7 | .7 | .4 | 1.8 |
| 1912..... | 32, 087 | 19 | 67 | 5, 497 | 5, 583 | .2 | .7 | 57.1 | 58.0 | 1.2 | .7 | .7 | 2.6 |
| 1913..... | 25, 988 | 21 | 67 | 3, 717 | 3, 805 | .3 | .9 | 47.8 | 49.0 | 1.6 | .5 | .6 | 2.7 |
| 1914..... | 22, 187 | 11 | 51 | 3, 113 | 3, 175 | .2 | .8 | 46.8 | 47.8 | .9 | .5 | .6 | 2.0 |
| 1915..... | 16, 266 | 7 | 23 | 1, 901 | 1, 931 | .1 | .5 | 39.0 | 39.6 | .9 | .3 | .5 | 1.7 |
| 1916..... | 24, 722 | 13 | 62 | 2, 655 | 2, 730 | .2 | .8 | 35.8 | 36.8 | .6 | .5 | .5 | 1.6 |
| 1917..... | 26, 855 | 11 | 38 | 2, 687 | 2, 736 | .1 | .5 | 33.4 | 34.0 | .8 | .6 | .5 | 1.9 |
| 1918..... | 17, 278 | 3 | 17 | 937 | 957 | .1 | .3 | 18.1 | 18.5 | .3 | .5 | .2 | 1.0 |
| 1919..... | 19, 214 | 3 | 32 | 1, 854 | 1, 889 | .1 | .6 | 32.0 | 32.7 | .3 | .4 | .4 | 1.1 |
| 1920..... | 24, 279 | 14 | 59 | 2, 979 | 3, 052 | .2 | .8 | 40.1 | 41.0 | 1.2 | .7 | .8 | 2.3 |
| 1921..... | 15, 845 | 5 | 38 | 1, 702 | 1, 745 | .1 | .8 | 35.8 | 36.7 | .6 | .5 | .5 | 1.6 |
| 1922..... | 24, 391 | 10 | 66 | 2, 951 | 3, 027 | .1 | .9 | 40.3 | 41.3 | .8 | .8 | .9 | 2.5 |
| 1923..... | 29, 814 | 14 | 61 | 2, 390 | 2, 465 | .2 | .7 | 27.6 | 28.5 | 1.0 | .7 | .5 | 2.2 |
| 1924..... | 28, 247 | 7 | 54 | 2, 457 | 2, 518 | .1 | .6 | 29.0 | 29.7 | .5 | .7 | .5 | 1.7 |
| 1910-1914..... | 128, 423 | 88 | 308 | 19, 262 | 19, 658 | .2 | .9 | 50.0 | 51.1 | 1.4 | .6 | .6 | 2.6 |
| 1915-1919..... | 104, 335 | 37 | 172 | 10, 034 | 10, 243 | .1 | .5 | 32.1 | 32.7 | .7 | .4 | .4 | 1.5 |
| 1920-1924..... | 121, 552 | 50 | 278 | 12, 479 | 12, 807 | .1 | .8 | 34.2 | 35.1 | .8 | .7 | .6 | 2.1 |
| 1925..... | 32, 043 | 10 | 56 | 3, 096 | 3, 162 | .1 | .6 | 32.2 | 32.9 | .6 | .4 | .6 | 1.7 |

ROD MILLS

The annual groups of workers in rod mills are not large enough to give an entirely satisfactory basis for accident rates. However, comparing the two 5-year periods shows declines from the first to the second of 40 per cent in frequency and 52.8 per cent in severity.

TABLE 60.—ACCIDENTS AND ACCIDENT RATES IN ROD MILLS, 1915 TO 1925, BY YEARS AND 5-YEAR PERIODS

| Year or period | Full-year workers | Number of cases | | | | Accident frequency rates (per 1,000,000 hours' exposure) | | | | Accident severity rates (per 1,000 hours' exposure) | | | |
|----------------|-------------------|-----------------|------------------------|------------------------|--------|--|------------------------|------------------------|--------|---|------------------------|------------------------|--------|
| | | Death | Perma-nent disa-bility | Tempo-rary disa-bility | To-tal | Death | Perma-nent disa-bility | Tempo-rary disa-bility | To-tal | Death | Perma-nent disa-bility | Tempo-rary disa-bility | To-tal |
| 1915..... | 2,062 | 10 | 229 | 239 | 1.6 | 37.0 | 38.6 | 0.7 | 0.5 | 1.2 | | | |
| 1916..... | 2,493 | 16 | 259 | 275 | 2.1 | 34.6 | 36.7 | 1.9 | .5 | 2.4 | | | |
| 1917..... | 4,951 | 7 | 23 | 609 | 729 | 0.5 | 1.5 | 47.1 | 49.1 | 2.8 | 1.4 | .5 | 4.7 |
| 1918..... | 3,249 | 5 | 11 | 350 | 366 | .5 | 1.1 | 35.9 | 37.5 | 3.1 | 1.0 | .6 | 4.7 |
| 1919..... | 2,463 | 2 | 10 | 184 | 196 | .3 | 1.4 | 24.9 | 26.6 | 1.6 | 1.4 | .5 | 3.5 |
| 1920..... | 3,729 | 1 | 9 | 344 | 354 | .1 | .8 | 30.7 | 31.6 | .5 | .5 | .4 | 1.4 |
| 1921..... | 2,099 | 6 | 126 | 132 | 1.0 | 20.0 | 21.0 | .7 | .3 | 1.0 | | | |
| 1922..... | 2,645 | 1 | 5 | 196 | 202 | .1 | .6 | 24.7 | 25.4 | .8 | .5 | .5 | 1.8 |
| 1923..... | 3,224 | 1 | 10 | 189 | 200 | .1 | 1.1 | 20.2 | 21.4 | .6 | 1.3 | .3 | 2.2 |
| 1924..... | 2,828 | 1 | 7 | 127 | 135 | .1 | .8 | 15.0 | 15.9 | .7 | .7 | .4 | 1.8 |
| 1915-1919..... | 15,218 | 14 | 70 | 1,721 | 1,805 | .3 | 1.5 | 37.7 | 39.5 | 1.8 | 1.3 | .5 | 3.6 |
| 1920-1924..... | 14,425 | 4 | 37 | 982 | 1,023 | .1 | .9 | 22.7 | 23.7 | .6 | .8 | .4 | 1.7 |
| 1925..... | 2,907 | 2 | 7 | 146 | 155 | .2 | .8 | 16.7 | 17.8 | 1.4 | 1.0 | .3 | 2.6 |

TUBE MILLS

Tube mills show a very marked decline in accident frequency. This is undoubtedly due in considerable measure to the effective use of a foreman's bonus ¹ for accident reduction in some of the concerns covered by this table.

From 1910 to 1925 accident frequency declined 71.6 per cent, but accident severity did not change. When the 5-year periods are considered, however, it becomes apparent, that both frequency and severity have declined over the period as a whole.

¹ See United States Bureau of Labor Statistics Bul. No. 298, p. 158.

TABLE 61.—ACCIDENTS AND ACCIDENT RATES IN TUBE MILLS, 1907 TO 1925, BY YEARS AND 5-YEAR PERIODS

| Year or period | Full-year workers | Number of cases | | | | Accident frequency rates (per 1,000,000 hours' exposure) | | | | Accident severity rates (per 1,000 hours' exposure) | | | |
|----------------|-------------------|-----------------|------------------------|------------------------|-------|--|------------------------|------------------------|-------|---|------------------------|------------------------|-------|
| | | Death | Perma-nent disa-bility | Tempo-rary disa-bility | Total | Death | Perma-nent disa-bility | Tempo-rary disa-bility | Total | Death | Perma-nent disa-bility | Tempo-rary disa-bility | Total |
| 1907 | 2,007 | 1 | 4 | 575 | 590 | 0.2 | 0.7 | 95.5 | 96.4 | 1.0 | 0.6 | 1.5 | 3.1 |
| 1910 | 3,767 | 3 | 25 | 1,608 | 1,636 | .1 | .9 | 54.9 | 56.9 | .6 | .4 | .7 | 1.7 |
| 1911 | 13,676 | 1 | 53 | 2,080 | 2,134 | .03 | 1.3 | 50.7 | 52.0 | .2 | .8 | .5 | 1.5 |
| 1912 | 17,080 | 10 | 60 | 2,154 | 2,224 | .5 | 1.2 | 42.0 | 43.7 | 1.3 | .8 | .5 | 2.6 |
| 1913 | 18,909 | 15 | 72 | 1,586 | 1,673 | .3 | 1.3 | 28.0 | 29.6 | 1.6 | .7 | .4 | 2.7 |
| 1914 | 13,906 | 7 | 39 | 1,195 | 1,241 | .2 | .9 | 28.6 | 29.7 | 1.0 | .6 | .4 | 2.0 |
| 1915 | 7,109 | 2 | 21 | 182 | 205 | .1 | 1.0 | 8.5 | 9.6 | .6 | .6 | .2 | 1.4 |
| 1916 | 11,355 | 2 | 26 | 425 | 453 | .1 | .8 | 12.5 | 13.4 | .4 | .3 | .3 | 1.0 |
| 1917 | 19,819 | 17 | 51 | 1,967 | 2,035 | .3 | .9 | 33.1 | 34.3 | 1.7 | .5 | .4 | 2.6 |
| 1918 | 18,499 | 8 | 41 | 1,127 | 1,176 | .1 | .7 | 20.3 | 21.1 | .9 | .4 | .3 | 1.6 |
| 1919 | 18,326 | 9 | 39 | 1,127 | 1,172 | .2 | .7 | 20.4 | 21.3 | 1.0 | .6 | .3 | 1.9 |
| 1920 | 22,666 | 13 | 71 | 2,166 | 2,250 | .2 | 1.0 | 31.9 | 33.1 | 1.1 | .5 | .5 | 2.1 |
| 1921 | 14,622 | 4 | 35 | 840 | 879 | .1 | .8 | 19.1 | 20.0 | .5 | .5 | .4 | 1.4 |
| 1922 | 19,635 | 6 | 40 | 1,332 | 1,378 | .1 | .7 | 22.7 | 23.5 | .6 | .6 | .4 | 1.6 |
| 1923 | 24,766 | 8 | 54 | 1,292 | 1,364 | .1 | .7 | 17.4 | 18.2 | .6 | .6 | .3 | 1.5 |
| 1924 | 22,655 | 14 | 68 | 1,185 | 1,267 | .2 | 1.0 | 17.2 | 18.4 | 1.2 | .6 | .3 | 2.1 |
| 1910-1914 | 73,338 | 36 | 249 | 8,623 | 8,908 | .2 | 1.1 | 39.2 | 40.5 | 1.0 | .7 | .5 | 2.2 |
| 1915-1919 | 75,108 | 38 | 178 | 4,825 | 5,041 | .3 | .8 | 21.4 | 22.4 | 1.0 | .5 | .3 | 1.8 |
| 1920-1924 | 104,577 | 45 | 268 | 6,815 | 7,128 | .1 | .9 | 21.7 | 22.7 | .9 | .6 | .4 | 1.9 |
| 1925 | 25,511 | 10 | 64 | 1,142 | 1,216 | .1 | .8 | 14.9 | 15.9 | .8 | .6 | .3 | 1.7 |

UNCLASSIFIED ROLLING MILLS

The group of unclassified rolling mills is of such miscellaneous make-up that it has no great significance except as confirmatory of the general downward trend almost universal in the industry.

From 1910 to 1925 accident frequency declined 78.8 per cent and accident severity 68 per cent. The experience of the third 5-year period is below that of the first, 46 per cent in frequency and 27 per cent in severity.

TABLE 62.—ACCIDENTS AND ACCIDENT RATES IN ROLLING MILLS, 1910 TO 1925, BY YEARS AND 5-YEAR PERIODS

| Year or period | Full-year workers | Number of cases | | | | Accident frequency rates (per 1,000,000 hours' exposure) | | | | Accident severity rates (per 1,000 hours' exposure) | | | |
|----------------|-------------------|-----------------|------------------------|------------------------|--------|--|------------------------|------------------------|-------|---|------------------------|------------------------|-------|
| | | Death | Perma-nent disa-bility | Tempo-rary disa-bility | Total | Death | Perma-nent disa-bility | Tempo-rary disa-bility | Total | Death | Perma-nent disa-bility | Tempo-rary disa-bility | Total |
| 1910 | 14,434 | 15 | 49 | 4,861 | 4,925 | 0.3 | 1.1 | 112.3 | 113.7 | 2.1 | 1.6 | 1.3 | 5.0 |
| 1911 | 21,231 | 16 | 76 | 3,398 | 3,480 | .3 | 1.2 | 53.2 | 54.7 | 1.5 | 1.1 | .7 | 3.3 |
| 1912 | 22,909 | 16 | 76 | 4,690 | 4,752 | .2 | 1.1 | 67.8 | 69.1 | 1.5 | 1.0 | .9 | 3.4 |
| 1913 | 23,382 | 24 | 84 | 5,051 | 5,159 | .3 | 1.2 | 72.0 | 73.5 | 2.0 | 1.1 | 1.0 | 4.1 |
| 1914 | 22,873 | 11 | 75 | 3,541 | 3,627 | .2 | 1.1 | 51.6 | 52.9 | 1.0 | .8 | .7 | 2.5 |
| 1915 | 3,367 | 2 | 14 | 475 | 491 | .2 | 1.1 | 36.2 | 37.5 | .9 | .5 | .4 | 1.8 |
| 1916 | 3,082 | 5 | 25 | 922 | 952 | .2 | 1.0 | 38.0 | 39.2 | 1.2 | .6 | .7 | 2.5 |
| 1917 | 27,978 | 10 | 60 | 4,255 | 4,335 | .1 | .7 | 50.8 | 51.6 | .7 | .7 | .7 | 2.1 |
| 1918 | 37,163 | 22 | 74 | 4,015 | 4,111 | .2 | .7 | 30.8 | 36.9 | 1.2 | .5 | .5 | 2.2 |
| 1919 | 25,106 | 14 | 45 | 2,987 | 3,026 | .2 | .6 | 39.4 | 40.2 | 1.1 | .4 | .6 | 2.1 |
| 1920 | 21,055 | 16 | 68 | 2,783 | 2,969 | .3 | 1.1 | 44.1 | 45.4 | 1.5 | .9 | .5 | 2.9 |
| 1921 | 12,008 | 4 | 36 | 1,479 | 1,519 | .1 | 1.0 | 40.9 | 42.0 | .7 | .9 | .7 | 2.3 |
| 1922 | 19,382 | 10 | 59 | 2,416 | 2,485 | .2 | 1.0 | 41.5 | 42.7 | 1.0 | .9 | .7 | 2.6 |
| 1923 | 26,357 | 11 | 92 | 2,830 | 2,933 | .1 | 1.2 | 35.8 | 37.1 | .8 | 1.3 | .6 | 2.7 |
| 1924 | 21,664 | 11 | 77 | 2,193 | 2,377 | .2 | 1.2 | 33.5 | 34.9 | 1.0 | 1.3 | .6 | 2.9 |
| 1910-1914 | 104,829 | 82 | 360 | 21,501 | 21,943 | .3 | 1.2 | 71.8 | 73.3 | 1.7 | 1.1 | .9 | 3.7 |
| 1915-1919 | 102,096 | 53 | 218 | 12,644 | 12,915 | .2 | .7 | 41.0 | 41.9 | 1.0 | .5 | .6 | 2.1 |
| 1920-1924 | 109,555 | 55 | 345 | 12,631 | 13,027 | .2 | 1.0 | 38.4 | 39.6 | 1.0 | 1.1 | .6 | 2.7 |
| 1925 | 26,353 | 9 | 59 | 1,836 | 1,904 | .1 | .8 | 23.2 | 24.1 | .7 | .5 | .4 | 1.6 |

FABRICATING SHOPS

For fabricating shops both accident frequency and accident severity rates testify that the production of the structural elements of bridges and building is a matter of considerable hazard.

The year to year changes are rather irregular, with a drop in frequency from 1910 to 1925 of 87.4 per cent; and in severity of 68.5 per cent.

From the first 5-year period to the third, frequency declined 34 per cent and severity 29.4 per cent.

TABLE 63.—ACCIDENTS AND ACCIDENT RATES IN FABRICATING SHOPS, 1907 TO 1925, BY YEARS AND 5-YEAR PERIODS

| Year or period | Full-year workers | Number of cases | | | | Accident frequency rates (per 1,000,000 hours' exposure) | | | | Accident severity rates (per 1,000 hours' exposure) | | | |
|----------------|-------------------|-----------------|------------------------|------------------------|--------|--|------------------------|------------------------|-------|---|------------------------|------------------------|-------|
| | | Death | Perma-nent disa-bility | Tempo-rary disa-bility | Total | Death | Perma-nent disa-bility | Tempo-rary disa-bility | Total | Death | Perma-nent disa-bility | Tempo-rary disa-bility | Total |
| 1907..... | 2,081 | 6 | 12 | 571 | 589 | 1.0 | 1.9 | 91.5 | 94.4 | 5.8 | 2.9 | 0.8 | 9.5 |
| 1910..... | 8,713 | 11 | 33 | 3,901 | 3,945 | .4 | 1.3 | 149.2 | 150.9 | 2.5 | 1.0 | 1.9 | 5.4 |
| 1911..... | 19,530 | 8 | 92 | 3,244 | 3,344 | .1 | 1.6 | 55.4 | 57.1 | .7 | 1.0 | .6 | 2.3 |
| 1912..... | 28,988 | 32 | 119 | 6,890 | 7,041 | .4 | 1.4 | 79.2 | 81.0 | 2.1 | .9 | .8 | 3.8 |
| 1913..... | 30,470 | 34 | 104 | 7,368 | 7,506 | .4 | 1.1 | 80.6 | 82.1 | 2.2 | .8 | .8 | 3.8 |
| 1914..... | 20,837 | 13 | 77 | 4,103 | 4,193 | .2 | 1.2 | 65.6 | 67.0 | 1.2 | 1.0 | .7 | 2.9 |
| 1915..... | 3,818 | 3 | 15 | 471 | 489 | .3 | 1.3 | 41.1 | 42.7 | 1.6 | .6 | .7 | 2.9 |
| 1916..... | 4,980 | 7 | 25 | 708 | 735 | .5 | 1.7 | 47.1 | 49.3 | 2.8 | .7 | .9 | 4.4 |
| 1917..... | 23,614 | 21 | 67 | 4,192 | 4,280 | .3 | .9 | 59.2 | 60.4 | 1.8 | .6 | .7 | 3.1 |
| 1918..... | 29,166 | 22 | 29 | 5,077 | 5,128 | .3 | .3 | 58.0 | 58.6 | 1.5 | .5 | .6 | 2.6 |
| 1919..... | 19,407 | 6 | 27 | 2,752 | 2,785 | .1 | .5 | 47.3 | 47.9 | .7 | .3 | .5 | 1.5 |
| 1920..... | 17,216 | 14 | 68 | 2,721 | 2,803 | .2 | 1.3 | 52.7 | 54.2 | 1.6 | 1.1 | .6 | 3.3 |
| 1921..... | 12,508 | 5 | 45 | 1,971 | 2,021 | .1 | 1.2 | 50.9 | 52.2 | .8 | .7 | .6 | 2.1 |
| 1922..... | 16,194 | 14 | 41 | 3,381 | 3,436 | .3 | .8 | 69.6 | 70.7 | 1.7 | .8 | .8 | 3.3 |
| 1923..... | 22,547 | 9 | 52 | 4,019 | 4,090 | .1 | .8 | 59.4 | 60.3 | .8 | .7 | .7 | 2.2 |
| 1924..... | 10,626 | 5 | 63 | 1,787 | 1,855 | .1 | 1.0 | 28.3 | 29.4 | .5 | .8 | .5 | 1.8 |
| 1910-1914..... | 108,538 | 98 | 425 | 25,506 | 26,029 | .8 | 1.3 | 78.3 | 79.9 | 1.7 | .9 | .8 | 3.4 |
| 1915-1919..... | 80,965 | 59 | 163 | 13,195 | 13,417 | .2 | .7 | 54.3 | 55.2 | 1.5 | .5 | .6 | 2.6 |
| 1920-1924..... | 89,880 | 47 | 269 | 13,879 | 14,195 | .2 | 1.0 | 61.5 | 62.7 | 1.0 | .8 | .6 | 2.4 |
| 1925..... | 15,718 | 3 | 35 | 857 | 895 | .1 | .7 | 18.2 | 19.0 | .4 | .9 | .4 | 1.7 |

FORGE SHOPS

Accident data for forge shops are available only for 1917 and succeeding years. Such data are shown in Table 64.

TABLE 64.—ACCIDENTS AND ACCIDENT RATES IN FORGE SHOPS, 1917 TO 1925, BY YEARS AND 5-YEAR PERIODS

| Year or period | Full-year workers | Number of cases | | | | Accident frequency rates (per 1,000,000 hours' exposure) | | | | Accident severity rates (per 1,000 hours' exposure) | | | |
|----------------|-------------------|-----------------|------------------------|------------------------|-------|--|------------------------|------------------------|-------|---|------------------------|------------------------|-------|
| | | Death | Perma-nent disa-bility | Tempo-rary disa-bility | Total | Death | Perma-nent disa-bility | Tempo-rary disa-bility | Total | Death | Perma-nent disa-bility | Tempo-rary disa-bility | Total |
| 1917..... | 3,881 | 3 | 15 | 917 | 935 | 0.3 | 1.3 | 78.8 | 80.4 | 1.5 | 1.6 | 1.3 | 4.4 |
| 1918..... | 6,408 | 4 | 23 | 1,009 | 1,039 | .2 | 1.4 | 53.2 | 54.8 | 1.2 | 1.1 | .7 | 3.0 |
| 1919..... | 2,169 | 2 | 4 | 257 | 263 | .3 | .6 | 39.5 | 40.4 | 1.8 | .3 | .6 | 2.7 |
| 1920..... | 2,197 | 5 | 5 | 380 | 385 | .8 | .8 | 53.6 | 59.4 | .8 | .8 | .7 | 1.5 |
| 1921..... | 902 | 1 | 3 | 107 | 111 | .4 | 1.1 | 39.5 | 41.0 | 2.2 | 1.0 | .7 | 3.9 |
| 1922..... | 1,514 | 2 | 3 | 233 | 243 | .4 | 1.8 | 51.3 | 53.5 | 2.6 | 1.7 | .9 | 5.2 |
| 1923..... | 2,049 | 1 | 9 | 309 | 319 | .2 | 1.5 | 60.2 | 51.9 | 1.0 | .9 | .7 | 2.6 |
| 1924..... | 2,272 | 4 | 9 | 567 | 576 | .3 | 1.3 | 53.2 | 54.8 | .8 | 1.5 | 1.2 | 2.7 |
| 1910-1914..... | 6,249 | 8 | 19 | 1,080 | 1,107 | .4 | 1.0 | 57.6 | 59.0 | 2.6 | .6 | .7 | 3.9 |
| 1915-1919..... | 12,667 | 9 | 45 | 2,189 | 2,243 | .2 | 1.2 | 67.6 | 59.0 | 1.4 | 1.1 | .9 | 3.4 |
| 1920-1924..... | 8,901 | 4 | 34 | 1,596 | 1,634 | .1 | 1.3 | 59.8 | 61.2 | .9 | 1.2 | .9 | 3.0 |
| 1925..... | 3,794 | 3 | 11 | 893 | 907 | .3 | 1.0 | 78.5 | 79.7 | 1.6 | .9 | .8 | 3.3 |

WIRE DRAWING

From 1910 to 1925 accident frequency in wire drawing declined 69.2 per cent and accident severity 55.8 per cent. From the first 5-year period frequency dropped 63.5 per cent and severity 28.1 per cent.

When the 5-year periods are considered they show a rather remarkable regularity of decrease. So far as severity is concerned this is unquestionably due to the replacement of old equipment by improved machinery, which is more efficient and much safer.

TABLE 65.—ACCIDENTS AND ACCIDENT RATES IN WIRE DRAWING, 1910 TO 1925, BY YEARS AND 5-YEAR PERIODS

| Year or period | Full-year workers | Number of cases | | | | Accident frequency rates (per 1,000,000 hours' exposure) | | | | Accident severity rates (per 1,000 hours' exposure) | | | |
|----------------|-------------------|-----------------|------------------------|------------------------|--------|--|------------------------|------------------------|-------|---|------------------------|------------------------|-------|
| | | Death | Perma- nent disability | Tempo- rary disability | Total | Death | Perma- nent disability | Tempo- rary disability | Total | Death | Perma- nent disability | Tempo- rary disability | Total |
| 1910..... | 10,370 | 5 | 84 | 2,323 | 2,412 | 0.2 | 2.7 | 74.7 | 77.6 | 1.0 | 2.6 | 0.7 | 4.3 |
| 1911..... | 11,819 | 4 | 89 | 2,270 | 2,363 | .1 | 2.3 | 59.0 | 61.4 | .6 | 2.0 | .6 | 3.2 |
| 1912..... | 13,059 | 4 | 104 | 2,627 | 2,735 | .1 | 2.7 | 67.1 | 69.9 | .6 | 2.5 | .7 | 3.8 |
| 1913..... | 12,709 | 6 | 59 | 2,542 | 2,607 | .2 | 1.5 | 66.4 | 68.1 | .9 | 1.1 | .7 | 2.7 |
| 1914..... | 11,468 | 2 | 47 | 1,742 | 1,791 | .1 | 1.4 | 50.6 | 52.1 | .4 | 1.3 | .5 | 2.2 |
| 1915..... | 7,839 | 1 | 62 | 1,831 | 1,894 | .8 | 2.6 | 77.7 | 80.3 | .8 | 2.4 | .8 | 3.5 |
| 1916..... | 9,551 | 4 | 104 | 1,764 | 1,872 | .1 | 3.6 | 61.6 | 65.3 | .8 | 2.9 | .6 | 4.3 |
| 1917..... | 13,727 | 3 | 63 | 1,700 | 1,766 | .1 | 1.5 | 41.3 | 42.9 | .4 | 1.0 | .6 | 2.0 |
| 1918..... | 12,790 | 4 | 60 | 991 | 1,035 | .1 | 1.6 | 25.8 | 27.5 | .6 | 1.2 | .4 | 2.2 |
| 1919..... | 8,739 | 2 | 32 | 626 | 658 | ..... | 1.2 | 23.9 | 25.1 | ..... | 1.0 | .4 | 1.4 |
| 1920..... | 13,243 | 2 | 63 | 1,252 | 1,317 | .1 | 1.6 | 31.5 | 33.2 | .3 | 1.7 | .5 | 2.5 |
| 1921..... | 9,186 | 4 | 36 | 527 | 567 | .1 | 1.3 | 19.1 | 20.6 | .9 | 1.4 | .4 | 2.7 |
| 1922..... | 13,886 | 3 | 53 | 837 | 893 | .1 | 1.3 | 20.2 | 21.6 | .4 | 1.2 | .4 | 2.1 |
| 1923..... | 14,783 | 2 | 54 | 919 | 975 | .4 | 1.2 | 20.7 | 21.9 | .3 | 1.2 | .4 | 1.9 |
| 1924..... | 11,567 | ..... | 44 | 711 | 755 | ..... | 1.3 | 20.5 | 21.8 | ..... | 1.3 | .3 | 2.1 |
| 1910-1914..... | 59,481 | 21 | 383 | 11,504 | 11,908 | .1 | 2.1 | 63.5 | 65.7 | .7 | 1.9 | .6 | 3.2 |
| 1915-1919..... | 52,666 | 12 | 321 | 6,912 | 7,215 | .1 | 2.0 | 43.7 | 45.3 | .5 | 1.6 | .5 | 2.6 |
| 1920-1924..... | 62,614 | 11 | 250 | 4,246 | 4,507 | .1 | 1.3 | 22.6 | 24.0 | .4 | 1.5 | .4 | 2.3 |
| 1925..... | 13,758 | 2 | 47 | 938 | 987 | .1 | 1.1 | 22.7 | 23.9 | .3 | 1.2 | .4 | 1.9 |

ELECTRICAL DEPARTMENT

The accident experience of the electrical department does not run a uniform course and is less satisfactory in its reductions than is indicated as possible by the experience of some of the plants.

From 1910 to 1925 frequency declined 78.9 per cent and severity 9.5 per cent. If the 5-year periods be considered, there was a decline from the first period to the third of 56.5 per cent in frequency and 52.4 per cent in severity.

TABLE 66.—ACCIDENTS AND ACCIDENT RATES IN THE ELECTRICAL DEPARTMENT, 1910 TO 1925, BY YEARS AND 5-YEAR PERIODS

| Year or period | Full-year workers | Number of cases | | | | Accident frequency rates (per 1,000,000 hours' exposure) | | | | Accident severity rates (per 1,000 hours' exposure) | | | |
|----------------|-------------------|-----------------|------------------------|------------------------|-------|--|------------------------|------------------------|-------|---|------------------------|------------------------|-------|
| | | Death | Perma-nent disabil-ity | Tempo-rary disabil-ity | Total | Death | Perma-nent disabil-ity | Tempo-rary disabil-ity | Total | Death | Perma-nent disabil-ity | Tempo-rary disabil-ity | Total |
| 1910 | 1,526 | 2 | 3 | 282 | 287 | 0.4 | 0.7 | 61.6 | 62.7 | 2.6 | 0.7 | 4.2 | |
| 1911 | 2,700 | 3 | 9 | 356 | 368 | .4 | 1.1 | 43.0 | 44.5 | .9 | .5 | 3.6 | |
| 1912 | 3,796 | 6 | 15 | 523 | 544 | .5 | 1.3 | 41.1 | 47.7 | 1.7 | .5 | 5.3 | |
| 1913 | 4,012 | 14 | 15 | 495 | 524 | 1.2 | 1.2 | 41.1 | 43.5 | 7.0 | 1.2 | 8.7 | |
| 1914 | 2,327 | 8 | 6 | 301 | 315 | 1.1 | .9 | 43.1 | 45.1 | 6.9 | 1.0 | 8.4 | |
| 1915 | 612 | 1 | 1 | 23 | 25 | .5 | .5 | 12.5 | 13.5 | 3.3 | .2 | 3.6 | |
| 1916 | 1,635 | 6 | 6 | 289 | 301 | 1.2 | 1.2 | 55.9 | 45.8 | 4.4 | .8 | 8.5 | |
| 1917 | 4,385 | 16 | 16 | 571 | 603 | 1.2 | 1.2 | 43.4 | 45.8 | 7.3 | 1.3 | 9.3 | |
| 1918 | 4,747 | 10 | 10 | 485 | 506 | .7 | .7 | 34.7 | 38.5 | 4.2 | 1.1 | 5.7 | |
| 1919 | 4,644 | 13 | 7 | 483 | 503 | .9 | .5 | 34.7 | 36.1 | 2.9 | .9 | 7.0 | |
| 1920 | 4,473 | 5 | 3 | 403 | 411 | .4 | .2 | 30.0 | 30.6 | 2.2 | .4 | 2.7 | |
| 1921 | 3,028 | 2 | 3 | 188 | 193 | .2 | .3 | 20.7 | 21.2 | 1.3 | .6 | 2.2 | |
| 1922 | 3,328 | 2 | 1 | 164 | 169 | .4 | .1 | 15.5 | 16.0 | 2.3 | 1.1 | 2.8 | |
| 1923 | 4,325 | 5 | 8 | 215 | 228 | .4 | .6 | 16.6 | 17.6 | 3.3 | .4 | 3.0 | |
| 1924 | 3,959 | 7 | 6 | 171 | 184 | .6 | .5 | 14.3 | 15.4 | 3.5 | .3 | 5.2 | |
| 1910-1914 | 14,921 | 33 | 48 | 1,957 | 2,038 | .8 | 1.1 | 45.2 | 47.1 | 4.4 | 1.2 | 6.3 | |
| 1915-1919 | 16,023 | 46 | 40 | 1,851 | 1,937 | 1.0 | .8 | 38.5 | 40.3 | 5.7 | 1.0 | 7.2 | |
| 1920-1924 | 19,339 | 23 | 21 | 1,141 | 1,185 | .4 | .4 | 19.7 | 20.5 | 2.4 | .3 | 3.0 | |
| 1925 | 4,011 | 6 | 5 | 149 | 159 | .5 | .4 | 12.3 | 13.2 | 3.0 | .6 | 3.9 | |

MECHANICAL DEPARTMENT

The mechanics employed about steel mills are exposed to a considerable hazard. Much of their work is urgent and difficult repair work which must be carried on under such conditions of lighting and location as add seriously to the danger.

From 1910 to 1925 there is recorded a decline of 70.6 per cent in accident frequency and 27.0 per cent in accident severity. The 5-year periods show from the first to the third a 62.2 per cent drop in frequency and a 30 per cent in severity.

TABLE 67.—ACCIDENTS AND ACCIDENT RATES IN THE MECHANICAL DEPARTMENT, 1906 TO 1925, BY YEARS AND 5-YEAR PERIODS

| Year or period | Full-year workers | Number of cases | | | | Accident frequency rates (per 1,000,000 hours' exposure) | | | | Accident severity rates (per 1,000 hours' exposure) | | | |
|----------------|-------------------|-----------------|------------------------|------------------------|--------|--|------------------------|------------------------|-------|---|------------------------|------------------------|-------|
| | | Death | Perma-nent disabil-ity | Tempo-rary disabil-ity | Total | Death | Perma-nent disabil-ity | Tempo-rary disabil-ity | Total | Death | Perma-nent disabil-ity | Tempo-rary disabil-ity | Total |
| 1908 | 1,619 | 4 | 7 | 430 | 441 | 0.8 | 1.4 | 89.1 | 91.3 | 4.9 | 0.6 | 1.1 | 6.6 |
| 1910 | 15,927 | 18 | 56 | 2,618 | 2,692 | .4 | 1.2 | 54.8 | 56.4 | 2.3 | .9 | .5 | 3.7 |
| 1911 | 17,863 | 13 | 80 | 3,015 | 3,108 | .2 | 1.5 | 56.3 | 58.0 | 1.5 | 1.1 | .7 | 3.3 |
| 1912 | 21,591 | 19 | 95 | 4,040 | 4,154 | .3 | 1.5 | 62.4 | 64.2 | 1.8 | 1.2 | .8 | 3.8 |
| 1913 | 24,009 | 36 | 103 | 4,972 | 5,111 | .5 | 1.4 | 69.0 | 70.9 | 2.9 | 1.0 | .9 | 4.8 |
| 1914 | 17,772 | 18 | 60 | 3,149 | 3,227 | .3 | 1.1 | 59.1 | 60.5 | 2.0 | 1.0 | .7 | 3.7 |
| 1915 | 5,967 | 3 | 27 | 573 | 603 | .2 | 1.5 | 31.9 | 33.6 | 1.0 | .7 | .4 | 2.1 |
| 1916 | 16,920 | 9 | 86 | 2,245 | 2,340 | .2 | 1.7 | 44.2 | 46.1 | 1.1 | 1.5 | .6 | 3.2 |
| 1917 | 33,328 | 43 | 134 | 5,201 | 5,378 | .4 | 1.3 | 52.0 | 53.7 | 2.6 | 1.0 | .8 | 4.4 |
| 1918 | 58,002 | 54 | 162 | 6,054 | 6,270 | .3 | .9 | 34.8 | 36.0 | 1.9 | 1.0 | .4 | 3.3 |
| 1919 | 40,609 | 45 | 83 | 4,483 | 4,611 | .4 | .7 | 36.8 | 37.9 | 2.2 | .7 | .5 | 3.4 |
| 1920 | 34,648 | 26 | 68 | 3,767 | 3,861 | .3 | .7 | 36.2 | 37.2 | 1.5 | .6 | .5 | 2.6 |
| 1921 | 25,036 | 21 | 41 | 1,703 | 1,775 | .3 | .5 | 22.7 | 23.6 | 1.7 | .5 | .4 | 2.5 |
| 1922 | 30,324 | 25 | 75 | 1,626 | 1,726 | .3 | .8 | 17.9 | 19.0 | 1.6 | .7 | .3 | 2.6 |
| 1923 | 37,449 | 37 | 102 | 2,045 | 2,184 | .3 | .9 | 18.2 | 19.4 | 2.0 | 1.0 | .3 | 3.3 |
| 1924 | 31,331 | 29 | 80 | 1,855 | 1,964 | .3 | .8 | 17.8 | 18.9 | 1.7 | .6 | .3 | 2.6 |
| 1910-1914 | 97,161 | 104 | 392 | 17,794 | 18,292 | .4 | 1.3 | 61.0 | 62.7 | 2.1 | 1.1 | .8 | 4.0 |
| 1915-1919 | 154,846 | 154 | 492 | 18,556 | 19,202 | .3 | 1.1 | 39.9 | 41.3 | 2.0 | 1.0 | .5 | 3.5 |
| 1920-1924 | 162,121 | 138 | 366 | 10,996 | 11,510 | .3 | .8 | 22.6 | 23.7 | 1.7 | .7 | .4 | 2.8 |
| 1925 | 36,666 | 31 | 71 | 1,717 | 1,819 | .3 | .7 | 15.6 | 16.6 | 1.7 | .7 | .3 | 2.7 |

POWER HOUSES

The shift in the relatively low accident rates of the power-house department is best shown by consideration of the 5-year periods. From the first to the third, frequency declined 49.4 per cent and severity 11.5 per cent.

TABLE 68.—ACCIDENTS AND ACCIDENT RATES IN POWER HOUSES, 1917 TO 1925, BY YEARS AND 5-YEAR PERIODS

| Year or period | Full-year workers | Number of cases | | | | Accident frequency rates (per 1,000,000 hours' exposure) | | | | Accident severity rates (per 1,000 hours' exposure) | | | |
|----------------|-------------------|-----------------|------------------------|------------------------|--------|--|------------------------|------------------------|--------|---|------------------------|------------------------|--------|
| | | Death | Perma-nent disa-bility | Tempo-rary disa-bility | To-tal | Death | Perma-nent disa-bility | Tempo-rary disa-bility | To-tal | Death | Perma-nent disa-bility | Tempo-rary disa-bility | To-tal |
| 1917..... | 4,552 | 7 | 7 | 210 | 224 | 0.5 | 0.5 | 15.4 | 16.4 | 3.1 | 1.0 | 0.3 | 4.4 |
| 1918..... | 8,699 | 9 | 10 | 254 | 273 | .8 | .9 | 22.9 | 24.6 | 4.9 | .5 | .4 | 5.8 |
| 1919..... | 4,093 | 11 | 2 | 213 | 226 | .9 | .2 | 17.3 | 18.4 | 5.4 | .1 | .2 | 5.7 |
| 1920..... | 4,591 | 4 | 1 | 172 | 177 | .3 | .1 | 12.5 | 12.9 | 1.7 | (¹) | .2 | 1.9 |
| 1921..... | 2,344 | 2 | | 77 | 79 | .3 | | 10.9 | 11.2 | 1.7 | | .2 | 1.9 |
| 1922..... | 3,361 | | 5 | 115 | 120 | | .5 | 11.4 | 11.9 | | .7 | .2 | .9 |
| 1923..... | 4,070 | 6 | 4 | 117 | 127 | .5 | .3 | 9.6 | 10.4 | 2.9 | .4 | .1 | 3.4 |
| 1924..... | 4,511 | 5 | 8 | 157 | 170 | .4 | .6 | 11.6 | 12.6 | 2.2 | .6 | .2 | 3.0 |
| 1912-1914..... | 8,083 | 6 | 21 | 544 | 571 | .2 | .9 | 22.4 | 23.5 | 1.5 | .8 | .3 | 2.6 |
| 1915-1919..... | 13,219 | 27 | 21 | 739 | 787 | .7 | .5 | 18.6 | 19.8 | 4.1 | .6 | .3 | 5.0 |
| 1920-1924..... | 18,878 | 17 | 16 | 638 | 673 | .8 | .3 | 11.3 | 11.9 | 1.8 | .3 | .2 | 2.3 |
| 1925..... | 4,218 | 3 | 4 | 183 | 190 | .2 | .3 | 14.5 | 15.0 | 1.4 | .8 | .3 | 2.0 |

¹ Less than one-tenth of 1.

YARDS

The yard department presents many difficulties in accident reduction. The fact that the units of hazard are moving from place to place and that often conditions render vision difficult or impossible complicates the situation. Inspection of the accident rates shows that these difficulties have not been entirely overcome.

From 1910 to 1925 frequency declined 23.4 per cent and severity 18.5 per cent. The accident experience of the third 5-year period is below that of the first, 48 per cent in frequency and 31.7 per cent in severity.

TABLE 69.—ACCIDENTS AND ACCIDENT RATES IN YARDS, 1907 TO 1925, BY YEARS AND 5-YEAR PERIODS

| Year or period | Full-year work-ers | Number of cases | | | | Accident frequency rates (per 1,000,000 hours' exposure) | | | | Accident severity rates (per 1,000 hours' exposure) | | | |
|----------------|--------------------|-----------------|------------------------|------------------------|-------|--|------------------------|------------------------|-------|---|------------------------|------------------------|-------|
| | | Death | Perma-nent disabil-ity | Tempo-rary disabil-ity | Total | Death | Perma-nent disabil-ity | Tempo-rary disabil-ity | Total | Death | Perma-nent disabil-ity | Tempo-rary disabil-ity | Total |
| 1907..... | 2,618 | 5 | 10 | 509 | 524 | 0.6 | 1.2 | 64.8 | 66.6 | 3.8 | 2.6 | 1.1 | 7.5 |
| 1910..... | 15,932 | 40 | 49 | 2,054 | 2,143 | .8 | 1.0 | 43.0 | 44.8 | 5.0 | 1.0 | .5 | 6.5 |
| 1911..... | 9,085 | 11 | 43 | 1,336 | 1,390 | .4 | 1.6 | 49.0 | 51.0 | 2.4 | 1.9 | .7 | 5.0 |
| 1912..... | 11,180 | 23 | 64 | 1,940 | 2,027 | .7 | 1.9 | 57.8 | 60.4 | 4.1 | 1.4 | .8 | 6.3 |
| 1913..... | 11,859 | 28 | 60 | 1,807 | 1,885 | .8 | 1.4 | 52.0 | 54.2 | 4.7 | 1.0 | .7 | 6.4 |
| 1914..... | 7,879 | 10 | 37 | 976 | 1,022 | .4 | 1.6 | 41.2 | 43.2 | 2.5 | 1.4 | .6 | 4.5 |
| 1915..... | 3,843 | ----- | 15 | 417 | 432 | ----- | 1.3 | 36.2 | 37.5 | ----- | 1.0 | .4 | 1.4 |
| 1916..... | 7,853 | 12 | 56 | 929 | 997 | .5 | 2.4 | 39.4 | 42.3 | 3.1 | 2.2 | .6 | 5.9 |
| 1917..... | 15,732 | 36 | 77 | 1,792 | 1,905 | .8 | 1.6 | 38.0 | 40.4 | 4.6 | 1.7 | .6 | 6.9 |
| 1918..... | 16,354 | 33 | 62 | 1,526 | 1,621 | .7 | 1.2 | 31.1 | 33.0 | 4.0 | 1.2 | .6 | 5.8 |
| 1919..... | 10,108 | 25 | 48 | 1,021 | 1,094 | .8 | 1.6 | 33.7 | 36.1 | 4.9 | 1.9 | .6 | 7.4 |
| 1920..... | 12,087 | 10 | 33 | 922 | 965 | .3 | .9 | 25.4 | 26.6 | 1.7 | 1.3 | .4 | 3.4 |
| 1921..... | 5,840 | 6 | 22 | 422 | 450 | .3 | 1.3 | 24.1 | 25.7 | 2.1 | 1.9 | .5 | 4.4 |
| 1922..... | 7,969 | 15 | 16 | 536 | 567 | .6 | .7 | 22.4 | 23.7 | 3.3 | .5 | .5 | 4.8 |
| 1923..... | 8,331 | 12 | 35 | 693 | 740 | .5 | 1.4 | 27.5 | 29.4 | 2.9 | 1.9 | .4 | 5.2 |
| 1924..... | 8,269 | 10 | 19 | 617 | 644 | .4 | .8 | 24.9 | 26.1 | 2.4 | .9 | .5 | 3.8 |
| 1910-1914..... | 55,932 | 112 | 243 | 8,112 | 8,467 | .7 | 1.5 | 48.6 | 50.8 | 4.0 | 1.4 | .6 | 6.0 |
| 1915-1919..... | 53,890 | 106 | 258 | 5,685 | 6,049 | .7 | 1.6 | 35.2 | 37.5 | 3.9 | 1.6 | .6 | 6.1 |
| 1920-1924..... | 42,546 | 53 | 125 | 3,190 | 3,366 | .4 | 1.0 | 26.0 | 28.4 | 2.5 | 1.2 | .4 | 4.1 |
| 1925..... | 7,683 | 12 | 24 | 756 | 791 | .5 | 1.0 | 32.8 | 34.3 | 3.1 | 1.6 | .6 | 5.8 |

ERECTION OF STRUCTURAL STEEL

The small size of the exposure from year to year impairs the significance of this group but the 5-year periods may be regarded as giving a true picture of conditions. From the first 5-year period to the third, accident frequency rates declined from 121.7 to 97.5, or 19.9 per cent. Accident severity rates dropped from 31.4 to 19.9, or 36.6 per cent.

Thus far no other industrial group has been found which has a ratio as high as these for the erection of structural steel. It remains the most hazardous occupation after a steady and fairly large reduction.

Oregon worked out rates for logging and logging railways in 1920, and the severity rates for that year were 21.6 for logging and 20.2 for logging railways. In the same year erection of structural steel had a severity rate of 25.9. There is a very wide gap between these rates and the next lower ones.

This situation in erection work is due to two important elements: (1) Activities of this nature constantly shift from place to place, making it difficult to apply the methods which have been found effective in settled industry. (2) There is nearly always strong pressure for speed both from the owner and from the contractor. It is therefore to be considered gratifying that there is evidence of material improvement.

TABLE 70.—ACCIDENTS AND ACCIDENT RATES IN THE ERECTION OF STRUCTURAL STEEL, 1915 TO 1925, BY YEARS AND 5-YEAR PERIODS

| Year or period | Full-year workers | Number of cases | | | | Accident frequency rates (per 1,000,000 hours' exposure) | | | | Accident severity rates (per 1,000 hours' exposure) | | | |
|----------------|-------------------|-----------------|------------------------|------------------------|-------|--|------------------------|------------------------|-------|---|------------------------|------------------------|-------|
| | | Death | Perma-nent disabil-ity | Tempo-rary disabil-ity | Total | Death | Perma-nent disabil-ity | Tempo-rary disabil-ity | Total | Death | Perma-nent disabil-ity | Tempo-rary disabil-ity | Total |
| 1915..... | 803 | 8 | 7 | 251 | 266 | 3.3 | 2.9 | 104.2 | 110.4 | 19.9 | 4.3 | 1.2 | 25.4 |
| 1916..... | 1,011 | 10 | 3 | 251 | 264 | 3.3 | 1.0 | 82.7 | 87.0 | 19.8 | 1.7 | 1.7 | 23.2 |
| 1917..... | 1,156 | 12 | 15 | 442 | 469 | 3.5 | 4.3 | 127.5 | 135.3 | 20.8 | 4.0 | 2.2 | 27.0 |
| 1918..... | 1,234 | 10 | 3 | 364 | 377 | 2.7 | .8 | 98.3 | 101.8 | 16.2 | 2.0 | 1.4 | 19.6 |
| 1919..... | 776 | 5 | 7 | 214 | 226 | 2.2 | 3.0 | 86.8 | 92.0 | 12.9 | 1.3 | 1.3 | 15.5 |
| 1920..... | 637 | 6 | 12 | 204 | 222 | 3.3 | 6.6 | 111.8 | 121.7 | 19.7 | 3.7 | 2.5 | 25.9 |
| 1921..... | 573 | 5 | 4 | 166 | 177 | 2.9 | 2.3 | 97.8 | 103.0 | 17.5 | 1.1 | 1.7 | 20.2 |
| 1922..... | 595 | 5 | 2 | 129 | 136 | 2.8 | 1.1 | 72.3 | 76.2 | 16.8 | 2.5 | 1.8 | 21.1 |
| 1923..... | 912 | 3 | 7 | 234 | 244 | 1.1 | 2.6 | 85.5 | 89.2 | 6.6 | 1.6 | 1.2 | 9.4 |
| 1924..... | 1,009 | 10 | 10 | 291 | 311 | 3.3 | 3.3 | 96.1 | 102.7 | 19.8 | 3.4 | 1.9 | 25.1 |
| 1912-1914..... | 2,157 | 26 | 24 | 738 | 788 | 4.0 | 3.7 | 114.0 | 121.7 | 24.1 | 5.5 | 1.8 | 31.4 |
| 1915-1919..... | 4,979 | 45 | 35 | 1,522 | 1,602 | 3.0 | 2.3 | 101.9 | 107.2 | 18.1 | 2.0 | 1.6 | 22.3 |
| 1920-1924..... | 3,726 | 29 | 35 | 1,026 | 1,090 | 2.6 | 3.1 | 91.8 | 97.5 | 15.6 | 2.5 | 1.8 | 19.9 |
| 1925..... | 937 | 9 | 3 | 188 | 200 | 3.2 | 1.1 | 66.9 | 71.2 | 19.2 | 2.2 | 1.0 | 22.4 |

COKE OVENS

From 1915 to 1925 accident frequency in coke ovens declined 74.2 per cent while accident severity declined 33.3 per cent. The 5-year periods show a positive decline, frequency dropping from the first to the third period 65.9 per cent and severity 62.9 per cent.

TABLE 71.—ACCIDENTS AND ACCIDENT RATES IN COKE OVENS, 1915 TO 1925, BY YEARS AND 5-YEAR PERIODS

| Year or period | Full-year workers | Number of cases | | | | Accident frequency rates (per 1,000,000 hours' exposure) | | | | Accident severity rates (per 1,000 hours' exposure) | | | |
|----------------|-------------------|-----------------|------------------------|------------------------|-------|--|------------------------|------------------------|-------|---|------------------------|------------------------|-------|
| | | Death | Perma-nent disabil-ity | Tempo-rary disabil-ity | Total | Death | Perma-nent disabil-ity | Tempo-rary disabil-ity | Total | Death | Perma-nent disabil-ity | Tempo-rary disabil-ity | Total |
| 1915..... | 1,648 | 2 | 4 | 128 | 134 | 0.4 | 0.8 | 25.9 | 27.1 | 2.4 | 0.6 | 0.3 | 3.3 |
| 1916..... | 2,195 | 5 | 6 | 150 | 161 | .8 | .9 | 22.7 | 24.4 | 4.6 | .5 | .4 | 5.5 |
| 1917..... | 6,641 | 26 | 10 | 508 | 544 | 1.3 | .5 | 25.5 | 27.3 | 7.8 | .5 | .4 | 8.7 |
| 1918..... | 9,395 | 21 | 14 | 662 | 697 | .7 | .5 | 23.5 | 24.7 | 4.5 | .5 | .4 | 5.4 |
| 1919..... | 9,022 | 12 | 10 | 647 | 669 | .4 | .4 | 23.9 | 24.7 | 2.7 | .6 | .4 | 3.7 |
| 1920..... | 8,620 | 6 | 11 | 518 | 535 | .2 | .4 | 10.0 | 10.6 | 1.4 | .7 | .3 | 2.4 |
| 1921..... | 5,768 | 2 | 4 | 182 | 188 | .1 | .2 | 10.5 | 10.8 | .7 | .3 | .2 | 1.1 |
| 1922..... | 6,554 | 2 | 1 | 207 | 210 | .1 | .1 | 10.5 | 10.7 | .6 | .2 | .2 | 1.0 |
| 1923..... | 8,961 | 7 | 14 | 410 | 437 | .3 | .5 | 15.5 | 16.3 | 1.6 | 1.1 | .3 | 3.0 |
| 1924..... | 7,506 | 9 | 15 | 254 | 278 | .4 | .7 | 11.3 | 12.4 | 2.4 | .9 | .2 | 3.5 |
| 1912-1914..... | 13,282 | 27 | 39 | 1,651 | 1,717 | .7 | 1.0 | 41.4 | 43.1 | 4.1 | 1.5 | .6 | 6.2 |
| 1915-1919..... | 28,901 | 66 | 44 | 2,095 | 2,205 | .8 | .5 | 24.1 | 25.4 | 4.6 | .5 | .4 | 5.5 |
| 1920-1924..... | 37,409 | 26 | 45 | 1,577 | 1,648 | .2 | .4 | 14.1 | 14.7 | 1.4 | .7 | .2 | 2.3 |
| 1925..... | 7,599 | 4 | 14 | 142 | 160 | .2 | .6 | 6.2 | 7.0 | 1.1 | .9 | .2 | 2.2 |

¹ This table covers only those coke ovens operated in connection with steel works. For more complete information see publications of the Bureau of Mines.

OTHER DEPARTMENTS

Accident data and accident frequency and severity rates for other departments of the iron and steel industry, for the years for which they are available, are shown in Table 72.

TABLE 72.—ACCIDENTS AND ACCIDENT RATES IN MISCELLANEOUS DEPARTMENTS OF THE IRON AND STEEL INDUSTRY, 1915 TO 1925, BY YEARS AND 5-YEAR PERIODS

| Year or period | Full-year workers | Number of cases | | | | Accident frequency rates (per 1,000,000 hours' exposure) | | | | Accident severity rates (per 1,000 hours' exposure) | | | |
|----------------------------|-------------------|-----------------|-----------------------|-----------------------|-------|--|-----------------------|-----------------------|-------|---|-----------------------|-----------------------|-------|
| | | Death | Perma-nent disability | Tempo-rary disability | Total | Death | Perma-nent disability | Tempo-rary disability | Total | Death | Perma-nent disability | Tempo-rary disability | Total |
| Axle works | | | | | | | | | | | | | |
| 1915 | 191 | | 1 | 21 | 22 | | 1.7 | 36.6 | 38.3 | | 3.1 | 0.3 | 3.4 |
| 1916 | 372 | | | 17 | 17 | | | 15.2 | 15.2 | | | .1 | .1 |
| 1917 | 713 | | | 81 | 81 | | | 37.9 | 37.9 | | | .9 | .9 |
| 1918 | 609 | | 3 | 156 | 159 | | 1.6 | 85.4 | 87.0 | | 3.9 | 1.1 | 5.0 |
| 1919 | 582 | | | 63 | 63 | | | 36.1 | 36.1 | | | .7 | .7 |
| 1920 | 743 | | | 100 | 100 | | | 44.8 | 44.8 | | | .7 | .7 |
| 1921 | 242 | | 1 | 12 | 13 | 1.3 | | 16.5 | 17.9 | 8.3 | | .5 | 8.7 |
| 1922 | 490 | | | 11 | 11 | | | 7.5 | 7.5 | | | .1 | .1 |
| 1923 | 774 | | | 30 | 30 | | | 12.9 | 12.9 | | | .1 | .1 |
| 1924 | 516 | | 1 | 1 | 24 | .6 | .6 | 14.2 | 15.4 | 3.9 | .2 | .2 | 4.3 |
| 1912-1914 | 1,326 | | 2 | 4 | 438 | .5 | 1.0 | 110.1 | 111.6 | 8.0 | 2.1 | 1.6 | 6.7 |
| 1915-1919 | 2,467 | | | 4 | 338 | | .5 | 45.7 | 46.2 | | 1.2 | .7 | 1.9 |
| 1920-1924 | 2,764 | | 2 | 1 | 175 | .2 | .1 | 21.1 | 21.5 | 1.4 | (?) | .8 | 1.7 |
| 1925 | 436 | | | | 6 | | | 4.6 | 4.6 | | | .1 | .1 |
| Car wheels | | | | | | | | | | | | | |
| 1915 | 389 | | 1 | 25 | 26 | | 0.9 | 21.4 | 22.3 | | 0.3 | 6.7 | 1.0 |
| 1916 | 734 | | 2 | 348 | 352 | 0.9 | .9 | 158.0 | 159.0 | 5.4 | 1.0 | 2.1 | 8.6 |
| 1917 | 1,296 | | 3 | 250 | 257 | .8 | 1.0 | 64.3 | 66.1 | 4.6 | .4 | .9 | 5.9 |
| 1918 | 1,866 | | 1 | 837 | 838 | .2 | | 60.2 | 60.4 | 1.1 | | .6 | 1.7 |
| 1919 | 1,619 | | 1 | 353 | 365 | .2 | 2.3 | 72.6 | 75.1 | 1.2 | 1.0 | 1.0 | 8.2 |
| 1920 | 1,215 | | | 170 | 174 | | 1.0 | 48.7 | 47.7 | | .0 | .6 | 1.5 |
| 1921 | 552 | | 1 | 2 | 92 | .6 | 1.2 | 56.7 | 58.6 | 3.0 | .5 | .7 | 4.6 |
| 1922 | 1,102 | | | 78 | 78 | | | 23.6 | 23.6 | | | .6 | .6 |
| 1923 | 1,096 | | 1 | 116 | 118 | .3 | .3 | 35.2 | 35.8 | 1.8 | .2 | .8 | 2.8 |
| 1924 | 1,083 | | 1 | 3 | 137 | .3 | .9 | 42.2 | 43.4 | 1.8 | .3 | .8 | 2.9 |
| 1912-1914 | 2,307 | | 3 | 15 | 609 | .4 | 2.1 | 85.8 | 88.3 | 2.5 | .9 | 1.3 | 4.7 |
| 1915-1919 | 5,904 | | 7 | 18 | 1,313 | .4 | 1.9 | 74.1 | 75.5 | 2.4 | .5 | 1.0 | 3.9 |
| 1920-1924 | 5,050 | | 3 | 10 | 585 | .2 | .7 | 39.3 | 40.2 | 1.2 | .4 | .7 | 2.3 |
| 1925 | 931 | | | 3 | 69 | | 1.1 | 24.7 | 25.8 | | 1.3 | .6 | 1.9 |
| Docks and ore yards | | | | | | | | | | | | | |
| 1915 | 115 | | 2 | 7 | 9 | | 5.8 | 20.3 | 26.1 | | 2.3 | 0.1 | 2.4 |
| 1916 | 196 | | 3 | 16 | 21 | 5.1 | 3.4 | 27.4 | 35.9 | 30.8 | 7.3 | .5 | 38.6 |
| 1917 | 353 | | 2 | 1 | 78 | 1.9 | .9 | 73.6 | 76.4 | 11.3 | .7 | 1.0 | 13.0 |
| 1918 | 368 | | 1 | 1 | 85 | .9 | .9 | 31.7 | 33.5 | 5.4 | .3 | .3 | 6.0 |
| 1919 | 352 | | | 6 | 39 | | 5.7 | 37.0 | 42.7 | | 10.4 | .5 | 10.9 |
| 1920 | 379 | | 1 | 2 | 12 | .9 | 1.8 | 10.6 | 13.3 | 5.3 | 2.9 | .1 | 8.3 |
| 1921 | 235 | | | 11 | 11 | | | 15.6 | 15.6 | | | .5 | 1.5 |
| 1922 | 271 | | 3 | 3 | 13 | 3.7 | 3.7 | 8.6 | 16.0 | 22.2 | 7.6 | .3 | 30.1 |
| 1923 | 538 | | 3 | 15 | 18 | | 1.9 | 9.2 | 11.1 | | 3.9 | .2 | 4.1 |
| 1924 | 340 | | 3 | 4 | 12 | .8 | 3.9 | 11.8 | 15.7 | | 14.4 | .3 | 14.7 |
| 1911-1914 | 1,293 | | 3 | 11 | 139 | .8 | 2.8 | 35.8 | 39.4 | 4.6 | 2.8 | .8 | 8.2 |
| 1915-1919 | 1,383 | | 6 | 12 | 175 | 1.4 | 2.9 | 42.2 | 46.5 | 8.7 | 4.1 | .5 | 13.3 |
| 1920-1924 | 1,761 | | 4 | 12 | 67 | .8 | 2.3 | 10.8 | 13.9 | 4.5 | 5.8 | .3 | 10.6 |
| 1925 | 388 | | 2 | | 7 | | 1.7 | 6.0 | 7.7 | 10.3 | | .3 | 10.6 |
| Woven wire fence | | | | | | | | | | | | | |
| 1915 | 1,552 | | 10 | 294 | 304 | | 2.1 | 63.1 | 65.2 | | 1.2 | 0.5 | 1.7 |
| 1916 | 1,623 | | 18 | 180 | 198 | | 3.7 | 37.0 | 40.7 | | 3.0 | .4 | 3.4 |
| 1917 | 1,269 | | 10 | 98 | 108 | | 2.6 | 25.7 | 28.3 | | 2.1 | .4 | 2.5 |
| 1918 | 1,531 | | 5 | 77 | 82 | | 1.1 | 16.8 | 17.9 | | 1.0 | .2 | 1.2 |
| 1919 | 1,336 | | 1 | 4 | 35 | | 1.0 | 8.7 | 9.9 | 1.5 | .6 | .2 | 2.3 |
| 1920 | 1,097 | | 6 | 48 | 54 | 0.2 | 1.8 | 14.6 | 16.4 | | 2.9 | .2 | 3.1 |
| 1921 | 1,095 | | 3 | 79 | 82 | | .9 | 24.1 | 30.0 | | .7 | .4 | 1.1 |
| 1922 | 1,528 | | 6 | 85 | 91 | | 1.3 | 18.5 | 19.8 | | .8 | .4 | 1.2 |
| 1923 | 1,603 | | 1 | 3 | 124 | .2 | .6 | 25.8 | 26.6 | 1.2 | .5 | .2 | 1.9 |
| 1924 | 1,361 | | 6 | 63 | 69 | | 1.5 | 16.1 | 17.6 | | 1.3 | .2 | 1.5 |
| 1915-1919 | 7,311 | | 1 | 47 | 684 | .1 | 2.1 | 31.2 | 33.4 | .3 | 1.6 | .3 | 2.2 |
| 1920-1924 | 6,623 | | 1 | 24 | 399 | .1 | 1.2 | 20.1 | 21.4 | .3 | 1.2 | .3 | 1.8 |
| 1925 | 1,290 | | | 2 | 105 | | .5 | 27.1 | 27.6 | | .2 | .4 | .6 |

TABLE 72.—ACCIDENTS AND ACCIDENT RATES IN MISCELLANEOUS DEPARTMENTS OF THE IRON AND STEEL INDUSTRY, 1915 TO 1925, BY YEARS AND 5-YEAR PERIODS—Continued

| Year or period | Full-year workers | Number of cases | | | | Accident frequency rates (per 1,000,000 hours' exposure) | | | | Accident severity rates (per 1,000 hours' exposure) | | | |
|--------------------------|-------------------|-----------------|----------------------|-----------------------|--------|--|----------------------|-----------------------|-------|---|----------------------|-----------------------|-------|
| | | Death | Perma-ent disability | Tempo-rary disability | Total | Death | Perma-ent disability | Tempo-rary disability | Total | Death | Perma-ent disability | Tempo-rary disability | Total |
| Nails and staples | | | | | | | | | | | | | |
| 1915 | 1,546 | 1 | 12 | 181 | 194 | 0.2 | 2.6 | 39.0 | 41.8 | 1.3 | 1.7 | 0.3 | 3.3 |
| 1916 | 1,993 | | 10 | 230 | 246 | | .2 | 39.5 | 39.7 | | 1.0 | 1.4 | 2.4 |
| 1917 | 2,323 | 1 | 16 | 184 | 201 | .1 | 2.3 | 26.4 | 28.8 | .9 | 2.1 | .3 | 3.3 |
| 1918 | 1,916 | | 10 | 123 | 133 | | 1.7 | 21.4 | 23.1 | | 1.2 | .2 | 1.4 |
| 1919 | 2,040 | | 8 | 58 | 66 | | 1.3 | 9.5 | 10.8 | | .5 | .1 | .6 |
| 1920 | 2,364 | | 8 | 164 | 172 | | 1.1 | 23.1 | 24.2 | | .8 | .1 | .9 |
| 1921 | 1,718 | 1 | 6 | 91 | 98 | .2 | 1.2 | 17.7 | 19.0 | 1.2 | .6 | .3 | 2.1 |
| 1922 | 2,366 | 1 | 10 | 121 | 132 | .1 | 1.4 | 17.0 | 18.5 | .8 | 1.3 | .3 | 2.4 |
| 1923 | 3,404 | 1 | 7 | 131 | 139 | .1 | .9 | 17.4 | 18.5 | .8 | 1.2 | .2 | 2.2 |
| 1924 | 1,639 | | 6 | 81 | 87 | | 1.0 | 13.9 | 14.9 | | 1.0 | .2 | 1.2 |
| 1915-1919 | 9,818 | 2 | 56 | 782 | 840 | .1 | 1.9 | 26.5 | 28.5 | .4 | 1.3 | .3 | 2.0 |
| 1920-1924 | 10,890 | 3 | 37 | 588 | 628 | .1 | 1.1 | 18.0 | 19.2 | .6 | 1.0 | .2 | 1.8 |
| 1925 | 1,925 | | 6 | 88 | 94 | | 1.0 | 15.2 | 16.2 | | 1.6 | .2 | 1.8 |
| Hot mills | | | | | | | | | | | | | |
| 1923 | 6,374 | 2 | 9 | 820 | 831 | 0.1 | 0.5 | 42.9 | 43.5 | 0.6 | 0.4 | 0.5 | 1.5 |
| 1924 | 5,780 | 1 | 7 | 634 | 642 | .1 | .4 | 36.6 | 37.1 | .3 | .5 | .6 | 1.4 |
| 1920-1924 | 30,018 | 11 | 39 | 3,223 | 3,273 | .1 | .4 | 35.8 | 36.3 | .7 | .4 | .5 | 1.6 |
| 1925 | 7,773 | 4 | 19 | 913 | 936 | .17 | .81 | 39.1 | 40.1 | 1.08 | .74 | .60 | 2.37 |
| Unclassified | | | | | | | | | | | | | |
| 1915 | 21,547 | 16 | 41 | 2,749 | 2,806 | 0.2 | 0.6 | 42.5 | 43.3 | 1.5 | 0.6 | 0.6 | 2.7 |
| 1916 | 24,216 | 17 | 72 | 2,714 | 2,803 | .2 | 1.0 | 37.4 | 38.6 | 1.4 | 1.4 | .6 | 3.4 |
| 1917 | 71,249 | 65 | 164 | 8,165 | 8,394 | .3 | .8 | 38.2 | 39.3 | 1.8 | .8 | .5 | 3.1 |
| 1918 | 97,513 | 79 | 284 | 9,930 | 10,293 | .3 | 1.0 | 33.9 | 35.2 | 1.6 | .9 | .5 | 2.9 |
| 1919 | 78,804 | 60 | 145 | 7,054 | 7,259 | .3 | .6 | 29.8 | 30.7 | 1.5 | .7 | .4 | 2.6 |
| 1920 | 104,741 | 72 | 261 | 11,208 | 11,541 | .2 | .8 | 35.7 | 36.7 | 1.4 | .9 | .5 | 2.8 |
| 1921 | 53,403 | 36 | 134 | 4,468 | 4,638 | .2 | .8 | 27.9 | 28.9 | 1.3 | .8 | .5 | 2.6 |
| 1922 | 79,405 | 39 | 233 | 6,848 | 7,120 | .2 | 1.0 | 28.7 | 29.9 | 1.0 | .8 | .4 | 2.2 |
| 1923 | 95,138 | 52 | 273 | 9,719 | 10,044 | .2 | 1.0 | 34.1 | 35.3 | 1.1 | .9 | .5 | 2.5 |
| 1924 | 93,018 | 66 | 285 | 8,032 | 8,383 | .2 | 1.0 | 28.8 | 30.0 | 1.4 | .9 | .5 | 2.8 |
| 1915-1919 | 248,329 | 237 | 706 | 30,612 | 31,555 | .3 | .8 | 34.8 | 35.9 | 1.6 | 1.3 | .5 | 3.4 |
| 1920-1924 | 425,704 | 265 | 1,186 | 40,275 | 41,736 | .2 | .9 | 31.5 | 32.6 | 1.2 | .9 | .5 | 2.6 |
| 1925 | 132,291 | 45 | 308 | 10,648 | 11,001 | .1 | .8 | 26.8 | 27.7 | .7 | .7 | .4 | 1.8 |

¹ Less than one-tenth of 1.

ANALYSIS OF ACCIDENT CAUSES IN THE INDUSTRY

ACCIDENT EXPERIENCE OF THE DEPARTMENTS COMPARED

The tables in this section present the experience of 13 departments during two 5-year periods for 7 large cause groups. In the portion of the tables pertaining to 1915-1919 the departments were arranged in the order of their accident severity. To make comparison of the two periods as easy as possible, in the portion of the table relating to 1920-1924 the departments are given in the same order as for 1915-1919 and not according to their accident severity.

The most striking feature of these tables is the constancy with which practically every department records lower rates in the second period.

MACHINERY

In the first period the electrical department suffered most severely from accidents. In the second period there is but one department with a lower severity rate. Evidently the high severity rate of the first period is not wholly typical. Since the group of the second period is much larger, it may be assumed that it more accurately reflects the relations of the departments.

The highest accident frequency (158.7) of the first period is found in fabricating. In the second period the highest frequency (114) appears in foundries.

TABLE 73.—MACHINERY AS A CAUSE OF ACCIDENT: NUMBER OF CASES AND ACCIDENT FREQUENCY AND SEVERITY RATES, 1915 TO 1919, AND 1920 TO 1924, BY DEPARTMENTS

| Department | Full-year workers | Number of cases | | | | Accident frequency rates (per 10,000,000 hours' exposure) | | | | Accident severity rates (per 10,000 hours' exposure) | | | |
|--------------------------|-------------------|-----------------|-------------------------|-------------------------|-------|---|-------------------------|-------------------------|-------|--|-------------------------|-------------------------|-------|
| | | Death | Perma-nent dis-abil-ity | Tempo-rary dis-abil-ity | Total | Death | Perma-nent dis-abil-ity | Tempo-rary dis-abil-ity | Total | Death | Perma-nent dis-abil-ity | Tempo-rary dis-abil-ity | Total |
| 1915-1919 | | | | | | | | | | | | | |
| Electrical..... | 4,191 | 5 | 6 | 65 | 76 | 4.0 | 4.8 | 51.7 | 60.5 | 23.86 | 6.44 | 1.08 | 31.38 |
| Open hearths..... | 20,625 | 16 | 22 | 365 | 403 | 2.6 | 3.6 | 59.3 | 65.5 | 15.59 | 2.12 | 1.54 | 19.25 |
| Fabricating..... | 11,110 | 5 | 40 | 484 | 529 | 1.5 | 12.0 | 145.2 | 158.7 | 9.00 | 6.74 | 2.81 | 18.55 |
| Bessemer..... | 5,450 | 4 | 4 | 46 | 54 | 2.4 | 2.4 | 23.1 | 33.0 | 14.68 | 1.28 | .78 | 16.74 |
| Blast furnaces..... | 17,621 | 9 | 19 | 125 | 153 | 1.7 | 3.6 | 23.6 | 28.9 | 10.22 | 3.72 | .58 | 14.82 |
| Yards..... | 9,819 | 5 | 9 | 87 | 101 | 1.7 | 3.1 | 29.5 | 34.3 | 10.18 | 2.78 | .60 | 13.67 |
| Foundries..... | 10,222 | 4 | 12 | 308 | 324 | 1.3 | 3.9 | 100.4 | 105.6 | 7.83 | 3.18 | 2.04 | 13.05 |
| Plate mills..... | 14,711 | 6 | 19 | 347 | 372 | 1.4 | 4.3 | 73.6 | 84.8 | 8.16 | 2.65 | 1.87 | 12.68 |
| Tube mills..... | 11,621 | 4 | 17 | 98 | 119 | 1.2 | 5.0 | 29.0 | 35.2 | 7.10 | 3.99 | 1.20 | 12.29 |
| Mechanical..... | 24,752 | 8 | 33 | 597 | 638 | 1.1 | 4.4 | 80.4 | 85.9 | 6.46 | 3.17 | 1.63 | 11.16 |
| Heavy rolling mills..... | 27,123 | 7 | 42 | 408 | 452 | .9 | 5.1 | 49.5 | 55.5 | 5.16 | 4.32 | 1.23 | 10.71 |
| Sheet mills..... | 5,920 | | 8 | 65 | 73 | | 4.5 | 36.6 | 41.1 | | 2.70 | .84 | 3.54 |
| Unclassified..... | 55,534 | 18 | 68 | 1,125 | 1,211 | 1.1 | 4.1 | 67.5 | 72.7 | 6.48 | 3.64 | 1.47 | 11.59 |
| 1920-1924 | | | | | | | | | | | | | |
| Electrical..... | 14,002 | 2 | 8 | 90 | 100 | .5 | 1.9 | 21.4 | 23.8 | 2.86 | 1.64 | .61 | 5.01 |
| Open hearths..... | 60,087 | 24 | 36 | 533 | 593 | 1.3 | 2.0 | 29.6 | 32.9 | 7.99 | 1.83 | .76 | 10.58 |
| Fabricating..... | 20,049 | 6 | 21 | 485 | 512 | 1.0 | 3.5 | 80.6 | 85.1 | 5.99 | 3.63 | 1.75 | 11.27 |
| Bessemer..... | 19,853 | 3 | 9 | 119 | 131 | .5 | 1.5 | 20.0 | 22.0 | 3.02 | 1.63 | .55 | 5.10 |
| Blast furnaces..... | 54,773 | 11 | 23 | 187 | 221 | .7 | 1.4 | 11.4 | 13.5 | 4.02 | 1.16 | .29 | 5.47 |
| Yards..... | 20,118 | 6 | 12 | 116 | 133 | .8 | 2.0 | 19.2 | 22.0 | 4.97 | 1.83 | .45 | 7.25 |
| Foundries..... | 37,129 | 6 | 49 | 1,215 | 1,270 | .5 | 4.4 | 109.1 | 114.0 | 3.23 | 2.56 | 2.05 | 7.84 |
| Plate mills..... | 22,428 | 7 | 18 | 220 | 245 | 1.0 | 2.7 | 32.7 | 36.4 | 6.24 | 1.23 | .84 | 8.31 |
| Tube mills..... | 68,335 | 8 | 53 | 416 | 477 | .4 | 2.6 | 20.3 | 23.3 | 2.34 | 1.62 | .56 | 4.42 |
| Mechanical..... | 89,481 | 12 | 61 | 793 | 866 | .5 | 2.3 | 29.5 | 32.3 | 2.68 | 1.78 | .68 | 5.04 |
| Heavy rolling mills..... | 48,082 | 16 | 35 | 505 | 556 | 1.1 | 2.4 | 35.0 | 38.6 | 6.66 | 1.39 | .97 | 9.02 |
| Sheet mills..... | 45,618 | 7 | 44 | 339 | 390 | .5 | 3.2 | 24.8 | 28.5 | 8.07 | 2.77 | .65 | 6.49 |
| Unclassified..... | 107,317 | 22 | 49 | 851 | 922 | .7 | 1.5 | 26.4 | 28.6 | 4.10 | 1.29 | .61 | 6.00 |

POWER VEHICLES

As might be expected yards have the greatest accident severity (54.35 in 1915-1919 and 31.83 in 1920-1924) from power vehicles. In accident frequency also this is the leading accident cause (165.3 in 1915-1919 and 66.4 in 1920-1924).

In the first period blast furnaces (18.96) stands next in severity while in the second period open hearths (7.24) occupies this position. It will be noticed that their rates are very much lower than those for yards. In fact, yards present a serious problem to any safety man. It has been noted elsewhere that motion is in many cases the

element of hazard. A localized machine with its moving parts presents dangers. When the machine adds a motion from place to place the dangers multiply. That the difficulties are not insoluble the records of the two periods strikingly indicate.

TABLE 74.—POWER VEHICLES AS A CAUSE OF ACCIDENT: NUMBER OF CASES AND ACCIDENT FREQUENCY AND SEVERITY RATES, 1915 TO 1919 AND 1920 TO 1924, BY DEPARTMENTS

| Department | Full-year workers | Number of cases | | | | Accident frequency rates (per 10,000,000 hours' exposure) | | | | Accident severity rates (per 10,000 hours' exposure) | | | |
|--------------------------|-------------------|-----------------|------------------------|------------------------|-------|---|------------------------|------------------------|-------|--|------------------------|------------------------|-------|
| | | Death | Perma-nent dis-ability | Tempo-rary dis-ability | Total | Death | Perma-nent dis-ability | Tempo-rary dis-ability | Total | Death | Perma-nent dis-ability | Tempo-rary dis-ability | Total |
| 1915-1919 | | | | | | | | | | | | | |
| Yards..... | 9,819 | 20 | 24 | 443 | 487 | 6.8 | 8.1 | 150.4 | 165.3 | 40.74 | 9.86 | 3.75 | 54.35 |
| Blast furnaces..... | 17,621 | 15 | 3 | 131 | 149 | 2.8 | .6 | 24.8 | 28.2 | 17.03 | 1.45 | .48 | 18.96 |
| Bessemer..... | 5,450 | 3 | 5 | 41 | 49 | 1.8 | 3.1 | 25.1 | 30.0 | 11.00 | 1.28 | 1.22 | 13.50 |
| Open hearths..... | 20,525 | 8 | 16 | 178 | 202 | 1.3 | 2.6 | 28.9 | 32.8 | 7.80 | 3.21 | .76 | 11.77 |
| Heavy rolling mills..... | 27,123 | 6 | 7 | 48 | 61 | .7 | .9 | 5.9 | 7.5 | 4.42 | 1.22 | .26 | 5.92 |
| Mechanical..... | 24,752 | 2 | 2 | 48 | 52 | .3 | .3 | 6.5 | 7.1 | 1.62 | .86 | .28 | 2.76 |
| Tube mills..... | 11,621 | 2 | 2 | 7 | 9 | ..... | ..... | 2.1 | 2.7 | ..... | .62 | .18 | .80 |
| Electrical..... | 4,191 | ..... | ..... | 7 | 7 | ..... | ..... | 5.6 | 5.6 | ..... | ..... | .16 | .16 |
| Foundries..... | 10,222 | ..... | ..... | 21 | 21 | ..... | ..... | 6.8 | 6.8 | ..... | ..... | .12 | .12 |
| Fabricating..... | 11,110 | ..... | ..... | 13 | 13 | ..... | ..... | 3.9 | 3.9 | ..... | ..... | .10 | .10 |
| Plate mills..... | 14,711 | ..... | ..... | 20 | 20 | ..... | ..... | 4.5 | 4.5 | ..... | ..... | .07 | .07 |
| Sheet mills..... | 5,920 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Unclassified..... | 55,534 | 14 | 7 | 192 | 213 | .8 | .4 | 11.5 | 12.7 | 5.04 | 1.17 | .23 | 6.44 |
| 1920-1924 | | | | | | | | | | | | | |
| Yards..... | 20,118 | 24 | 23 | 354 | 401 | 4.0 | 3.8 | 58.7 | 66.4 | 23.86 | 6.33 | 1.64 | 31.83 |
| Blast furnaces..... | 54,773 | 8 | 2 | 150 | 160 | .5 | .1 | 9.1 | 9.7 | 2.92 | .16 | .22 | 3.30 |
| Bessemer..... | 19,853 | 1 | ..... | 67 | 68 | .2 | ..... | 11.3 | 11.4 | 1.01 | ..... | .34 | 1.35 |
| Open hearths..... | 60,087 | 16 | 21 | 263 | 300 | .9 | 1.2 | 14.6 | 10.6 | 5.33 | 1.49 | .42 | 7.24 |
| Heavy rolling mills..... | 48,082 | 4 | 5 | 62 | 71 | .8 | .4 | 4.3 | 4.9 | 1.66 | .59 | .12 | 2.37 |
| Mechanical..... | 89,481 | 4 | 4 | 91 | 99 | .2 | .6 | 3.4 | 3.7 | .89 | .19 | .13 | 1.21 |
| Tube mills..... | 68,335 | 2 | 1 | 55 | 58 | .1 | .6 | 2.7 | 2.8 | .59 | .01 | .07 | .07 |
| Electrical..... | 14,002 | 2 | ..... | 12 | 14 | .5 | ..... | 2.9 | 3.3 | 2.86 | ..... | .06 | 2.92 |
| Foundries..... | 37,129 | 1 | 2 | 76 | 79 | .1 | .2 | 6.8 | 7.1 | .54 | .05 | .15 | .74 |
| Fabricating..... | 20,049 | 1 | ..... | 31 | 32 | .2 | ..... | 5.2 | 5.3 | 1.00 | ..... | .14 | 1.14 |
| Plate mills..... | 22,428 | ..... | ..... | 12 | 12 | ..... | ..... | 1.8 | 1.8 | ..... | ..... | .08 | .08 |
| Sheet mills..... | 45,618 | 1 | 4 | 60 | 65 | .1 | .3 | 4.4 | 4.7 | .44 | .48 | .08 | 1.00 |
| Unclassified..... | 107,317 | 13 | 8 | 311 | 332 | .4 | .3 | 9.7 | 10.3 | 2.42 | .51 | .24 | 3.17 |

HOT SUBSTANCES

Accidents due to hot metal and the electric current are characteristic accidents of the iron and steel industry. It is, however, somewhat surprising that the electrical department has, in both periods, the second highest accident frequency (98.7 in 1915-1919 and 42.1 in 1920-1924).

This is, of course, due to the instances where electricians handle live parts and get more or less severe burns. A comparison of the two periods will indicate that the precautions which have come into use in the last five years have been very effective.

TABLE 75.—HOT SUBSTANCES AS A CAUSE OF ACCIDENT: NUMBER OF CASES AND ACCIDENT FREQUENCY AND SEVERITY RATES, 1915 TO 1919 AND 1920 TO 1924, BY DEPARTMENTS

| Department | Full-year workers | Number of cases | | | | Accident frequency rates (per 10,000,000 hours' exposure) | | | | Accident severity rates (per 10,000 hours' exposure) | | | |
|--------------------------|-------------------|-----------------|------------------------|------------------------|-------|---|------------------------|------------------------|-------|--|------------------------|------------------------|-------|
| | | Death | Perma-nent dis-ability | Tempo-rary dis-ability | Total | Death | Perma-nent dis-ability | Tempo-rary dis-ability | Total | Death | Perma-nent dis-ability | Tempo-rary dis-ability | Total |
| 1915-1919 | | | | | | | | | | | | | |
| Electrical..... | 4,191 | 4 | 1 | 119 | 124 | 3.2 | 0.8 | 94.7 | 98.7 | 19.09 | 4.77 | 1.12 | 24.98 |
| Bessemer..... | 5,450 | 6 | | 114 | 120 | 3.7 | | 69.7 | 73.4 | 22.02 | | 2.01 | 24.03 |
| Blast furnaces..... | 17,621 | 13 | 5 | 418 | 436 | 2.5 | .9 | 79.1 | 82.5 | 14.76 | 2.21 | 1.57 | 18.54 |
| Open hearths..... | 20,525 | 14 | 3 | 764 | 781 | 2.3 | .5 | 124.1 | 126.9 | 13.64 | .66 | 2.35 | 16.65 |
| Foundries..... | 10,222 | 3 | | 167 | 170 | 1.0 | | 54.5 | 55.5 | 5.87 | | 1.16 | 7.02 |
| Heavy rolling mills..... | 27,123 | 6 | 3 | 236 | 245 | .7 | .4 | 29.0 | 30.1 | 4.42 | .66 | .62 | 6.70 |
| Plate mills..... | 14,711 | 2 | | 160 | 162 | .5 | | 36.3 | 36.8 | 2.72 | | .42 | 3.14 |
| Mechanical..... | 24,752 | 3 | | 181 | 184 | .4 | | 24.4 | 24.8 | 2.42 | | .37 | 2.79 |
| Tube mills..... | 11,621 | 1 | | 53 | 54 | .3 | | 15.7 | 16.0 | 1.78 | | .40 | 3.18 |
| Fabricating..... | 11,110 | 1 | | 40 | 41 | .3 | | 12.0 | 12.3 | 1.80 | | .15 | 1.95 |
| Sheet mills..... | 5,920 | | | 39 | 39 | | | 22.0 | 22.0 | | | .28 | .28 |
| Yards..... | 9,819 | | | 51 | 51 | | | 17.3 | 17.3 | | | .27 | .37 |
| Unclassified..... | 55,534 | 8 | 4 | 632 | 644 | .5 | .2 | 37.9 | 38.6 | 2.88 | .40 | .66 | 3.94 |
| 1920-1924 | | | | | | | | | | | | | |
| Electrical..... | 14,002 | 3 | | 174 | 177 | .7 | | 41.4 | 42.1 | 4.3 | | .7 | 4.9 |
| Bessemer..... | 19,853 | 3 | | 165 | 168 | .5 | | 27.7 | 28.2 | 3.0 | | .6 | 3.7 |
| Blast furnaces..... | 54,773 | 30 | 4 | 576 | 610 | 1.8 | .2 | 35.0 | 37.1 | 11.0 | .6 | .8 | 12.3 |
| Open hearths..... | 60,067 | 20 | 2 | 894 | 916 | 1.1 | .1 | 49.6 | 50.8 | 6.7 | .2 | .9 | 7.8 |
| Foundries..... | 37,129 | | 2 | 440 | 442 | | .2 | 39.5 | 39.7 | | .3 | .6 | .9 |
| Heavy rolling mills..... | 48,062 | 2 | 1 | 245 | 248 | .1 | .1 | 17.0 | 17.2 | .8 | .1 | .3 | 1.8 |
| Plate mills..... | 22,428 | 1 | 1 | 116 | 118 | .2 | .2 | 17.2 | 17.5 | .9 | .1 | .3 | 1.3 |
| Mechanical..... | 89,481 | 8 | 1 | 382 | 391 | .3 | .0 | 14.2 | 14.6 | 1.8 | .2 | .2 | 2.2 |
| Tube mills..... | 68,335 | 3 | | 302 | 305 | .2 | | 14.7 | 14.9 | .9 | | .8 | 1.2 |
| Fabricating..... | 20,049 | 2 | 1 | 78 | 81 | .3 | .2 | 13.0 | 13.5 | 2.0 | .9 | .2 | 2.5 |
| Sheet mills..... | 45,618 | 1 | | 300 | 301 | .1 | | 22.0 | 22.0 | .4 | | .3 | .8 |
| Yards..... | 20,118 | | | 68 | 68 | | | 11.3 | 11.3 | | | .2 | .2 |
| Unclassified..... | 107,317 | 12 | 5 | 628 | 645 | .4 | .2 | 19.5 | 20.0 | 2.2 | .3 | .3 | 2.8 |

FALLS OF PERSONS

That the electrical department again heads the list in the first period in severity (11.21) of accidents due to falls of persons and is next to the highest (3.40) in the second period is in part due to inclusion of linemen, whose duties call for work at a height from which a fall may easily occur. It is quite possible that some of these falls are chargeable to electric shock, which causes the fall to occur. In the first period the electrical department also has the highest accident frequency (58.1), followed by open hearths (45.8).

In the second period the highest accident frequency (28.0) is found in foundries; in the second period the highest severity rate (3.71) is in blast furnaces.

TABLE 76.—FALLS OF PERSONS AS A CAUSE OF ACCIDENT: NUMBER OF CASES AND ACCIDENT FREQUENCY AND SEVERITY RATES, 1915 TO 1919 AND 1920 TO 1924, BY DEPARTMENTS

| Department | Full-year workers | Number of cases | | | Accident frequency rates (per 10,000,000 hours' exposure) | | | Accident severity rates (per 10,000 hours' exposure) | | | | | |
|--------------------------|-------------------|-----------------|---|---|---|-------|---|--|-------|-------|---|---|-------|
| | | Death | Per- ma- nent dis- abil- ity | Tem- po- rary dis- abil- ity | Total | Death | Per- ma- nent dis- abil- ity | Tem- po- rary dis- abil- ity | Total | Death | Per- ma- nent dis- abil- ity | Tem- po- rary dis- abil- ity | Total |
| 1915-1919 | | | | | | | | | | | | | |
| Electrical..... | 4,191 | 2 | | 71 | 73 | 1.6 | | 56.5 | 68.1 | 9.54 | | 1.67 | 11.21 |
| Blast furnaces..... | 17,621 | 4 | 4 | 191 | 190 | .8 | 0.8 | 36.1 | 37.7 | 4.54 | 2.19 | .68 | 7.41 |
| Mechanical..... | 24,752 | 5 | | 289 | 294 | .7 | | 38.9 | 39.6 | 4.04 | | .89 | 4.93 |
| Foundries..... | 10,222 | 1 | 1 | 75 | 77 | .3 | .3 | 24.5 | 25.1 | 1.96 | .20 | .30 | 2.46 |
| Fabricating..... | 11,110 | 1 | | 93 | 94 | .3 | | 27.9 | 28.2 | 1.80 | | .50 | 2.30 |
| Tube mills..... | 11,621 | 1 | | 37 | 38 | .3 | | 10.9 | 11.2 | 1.78 | | .35 | 2.13 |
| Bessemer..... | 5,450 | | | 47 | 47 | | | 28.7 | 28.7 | | | 1.36 | 1.36 |
| Open hearths..... | 20,525 | | | 282 | 282 | | | 45.8 | 45.8 | | | 1.04 | 1.04 |
| Heavy rolling mills..... | 27,123 | | 1 | 203 | 204 | | .1 | 24.9 | 25.0 | | .09 | .53 | .62 |
| Plate mills..... | 14,711 | | | 120 | 120 | | | 27.2 | 27.2 | | | .41 | .41 |
| Sheet mills..... | 5,920 | | | 40 | 40 | | | 22.5 | 22.5 | | | .41 | .41 |
| Yards..... | 9,819 | | | 73 | 73 | | | 24.8 | 24.8 | | | .36 | .36 |
| Unclassified..... | 55,534 | 7 | 3 | 537 | 547 | .4 | .2 | 32.2 | 32.8 | 2.52 | .07 | .57 | 3.16 |
| 1920-1924 | | | | | | | | | | | | | |
| Electrical..... | 14,002 | 2 | | 85 | 87 | .5 | | 20.2 | 20.7 | 2.36 | | .54 | 3.40 |
| Blast furnaces..... | 54,773 | 9 | 3 | 274 | 286 | .6 | .2 | 16.3 | 17.4 | 3.29 | .06 | .36 | 3.71 |
| Mechanical..... | 89,481 | 12 | 4 | 506 | 522 | .5 | .2 | 18.9 | 19.5 | 2.68 | .09 | .50 | 3.27 |
| Foundries..... | 37,129 | | | 312 | 312 | | | 28.0 | 28.0 | | | .39 | .39 |
| Fabricating..... | 20,049 | 2 | | 138 | 140 | .3 | | 22.9 | 23.3 | 2.00 | | .47 | 2.47 |
| Tube mills..... | 68,335 | 2 | | 212 | 214 | .1 | | 10.3 | 10.4 | .59 | | .26 | .35 |
| Bessemer..... | 19,853 | | | 73 | 73 | | | 12.3 | 12.3 | | | .35 | .35 |
| Open hearths..... | 60,087 | 6 | 2 | 419 | 427 | .3 | .1 | 23.2 | 23.7 | 2.00 | .04 | .50 | 2.54 |
| Heavy rolling mills..... | 48,082 | 2 | 1 | 253 | 256 | .1 | .1 | 17.5 | 17.8 | .83 | .03 | .39 | 1.21 |
| Plate mills..... | 22,428 | 1 | 1 | 92 | 94 | .2 | .2 | 13.7 | 14.0 | .89 | .11 | .23 | 1.23 |
| Sheet mills..... | 45,618 | 2 | | 193 | 195 | .2 | | 14.1 | 14.3 | .88 | | .28 | 1.14 |
| Yards..... | 20,118 | 1 | | 148 | 149 | .2 | | 24.5 | 24.7 | .99 | | .45 | 1.44 |
| Unclassified..... | 107,317 | 12 | 1 | 684 | 687 | .4 | .0 | 21.3 | 21.7 | 2.24 | .01 | .40 | 2.65 |

FALLING OBJECTS

The accident severity rate (8.61) for falling objects in the Bessemer department in the first period is, in part at least, associated with the feeding of scrap into the converting vessels. In the older types of construction this was done in a manner permitting the material to fall rather frequently and endangering the men working below, but in recent construction this hazard has been largely overcome.

In the first period the highest accident frequency (78) is found in foundries. The same department also has the highest frequency (82.2) in the second period. This is one of the few cases in which the second period has a higher rate than the first.

TABLE 77.—FALLING OBJECTS AS A CAUSE OF ACCIDENT: NUMBER OF CASES AND ACCIDENT FREQUENCY AND SEVERITY RATES, 1915 TO 1919 AND 1920 TO 1924, BY DEPARTMENTS

| Department | Full-year work-ers | Number of cases | | | Accident frequency rates (per 10,000,000 hours' exposure) | | | | Accident severity rates (per 10,000 hours' exposure) | | | | |
|--------------------------|--------------------|-----------------|------------------------|------------------------|---|-------|------------------------|------------------------|--|-------|------------------------|------------------------|-------|
| | | Death | Perma-nent dis-ability | Tempo-rary dis-ability | Total | Death | Perma-nent dis-ability | Tempo-rary dis-ability | Total | Death | Perma-nent dis-ability | Tempo-rary dis-ability | Total |
| 1915-1919 | | | | | | | | | | | | | |
| Bessemer..... | 5,450 | 2 | 2 | 65 | 69 | 1.2 | 1.2 | 39.8 | 42.2 | 7.34 | 0.37 | 0.90 | 8.61 |
| Open hearths..... | 20,525 | 7 | 3 | 351 | 361 | 1.1 | .5 | 67.0 | 58.6 | 6.82 | .24 | 1.00 | 8.06 |
| Foundries..... | 10,222 | 2 | 2 | 235 | 239 | .7 | .7 | 76.6 | 78.0 | 3.92 | .20 | 1.08 | 5.80 |
| Blast furnaces..... | 17,621 | 4 | 1 | 185 | 190 | .8 | .2 | 35.0 | 36.0 | 4.54 | .14 | .82 | 5.50 |
| Fabricating..... | 11,110 | 1 | 4 | 192 | 197 | .3 | 1.2 | 67.6 | 59.1 | 1.80 | .36 | .94 | 3.10 |
| Yards..... | 9,819 | 1 | 1 | 102 | 104 | .3 | .3 | 34.6 | 35.2 | 2.04 | .10 | .80 | 2.94 |
| Mechanical..... | 24,752 | 2 | 2 | 390 | 394 | .3 | .3 | 61.8 | 52.4 | 1.62 | .08 | .84 | 2.54 |
| Plate mills..... | 14,711 | ----- | 3 | 299 | 302 | ----- | ----- | 67.7 | 68.4 | ----- | .75 | 1.11 | 1.87 |
| Heavy rolling mills..... | 27,123 | ----- | 9 | 307 | 316 | ----- | 1.1 | 37.7 | 38.8 | ----- | .92 | .75 | 1.67 |
| Sheet mills..... | 5,920 | ----- | 1 | 39 | 40 | ----- | .6 | 22.0 | 22.6 | ----- | .17 | .72 | .89 |
| Tube mills..... | 11,621 | 1 | ----- | 63 | 64 | ----- | .3 | 18.6 | 18.9 | ----- | .19 | .54 | .73 |
| Electrical..... | 4,191 | ----- | ----- | 32 | 32 | ----- | ----- | 25.5 | 25.5 | ----- | ----- | .53 | .53 |
| Unclassified..... | 55,534 | 7 | 8 | 800 | 875 | .4 | .5 | 61.6 | 52.5 | 2.52 | .61 | .96 | 4.99 |
| 1920-1924 | | | | | | | | | | | | | |
| Bessemer..... | 19,853 | 1 | 2 | 167 | 170 | .2 | .3 | 28.0 | 28.6 | 1.01 | .10 | .52 | 1.63 |
| Open hearths..... | 60,087 | 8 | 10 | 622 | 640 | .4 | .6 | 34.5 | 35.5 | 2.06 | .32 | .67 | 3.66 |
| Foundries..... | 37,129 | ----- | 3 | 912 | 915 | ----- | .3 | 61.9 | 62.2 | ----- | .17 | 1.30 | 1.47 |
| Blast furnaces..... | 54,773 | 2 | 3 | 291 | 296 | .1 | .2 | 17.7 | 18.0 | .73 | .22 | .38 | 1.33 |
| Fabricating..... | 20,049 | 2 | 5 | 255 | 262 | .3 | .8 | 42.4 | 43.6 | 2.00 | 1.20 | .88 | 4.08 |
| Yards..... | 20,118 | ----- | 1 | 146 | 147 | ----- | .2 | 24.2 | 24.4 | ----- | .10 | .49 | .59 |
| Mechanical..... | 89,481 | 3 | 8 | 626 | 637 | .1 | .3 | 23.3 | 23.7 | .67 | .24 | .52 | 1.43 |
| Plate mills..... | 22,428 | ----- | ----- | 202 | 204 | ----- | .3 | 38.9 | 39.2 | 1.78 | ----- | .62 | 2.40 |
| Heavy rolling mills..... | 48,082 | 2 | 7 | 359 | 396 | .1 | .5 | 27.0 | 27.6 | .83 | .20 | .63 | 1.66 |
| Sheet mills..... | 45,018 | ----- | 1 | 218 | 214 | ----- | .1 | 15.6 | 15.6 | ----- | .02 | .33 | .35 |
| Tube mills..... | 68,335 | 3 | 9 | 400 | 472 | .2 | .4 | 22.4 | 23.0 | .88 | .13 | .46 | 1.47 |
| Electrical..... | 14,002 | ----- | 1 | 70 | 71 | ----- | .2 | 16.7 | 16.9 | ----- | .07 | .32 | .39 |
| Unclassified..... | 107,317 | 6 | 6 | 790 | 802 | .2 | .2 | 24.5 | 24.9 | 1.12 | .19 | .53 | 1.94 |

HANDLING

It will be noted on inspecting Table 78 that the accidents recorded exhibit high frequency and relatively low severity. A moment's reflection will make it clear that it is natural that in the manual movement of material minor injuries might occur. In the absence of severity rates this fact has been the cause of a somewhat erroneous view regarding the importance of this type of injury. It has been thought that the rapid reduction of this sort of cases represented a highly successful accident prevention effort. In some instances attention has been so completely directed to methods bringing about decline in frequency that, while it was going on, the severity of accidents was actually increasing. It is very clear that sufficient study should be devoted to those departments and causes where severity is high to bring about as large a reduction as circumstances will allow, as it is the accidents of high severity which are costly and disastrous.

In all preceding tables, sheet mills have been well down the list. In the present cause group these mills are at the top in the first period in accident frequency (220.7) and in accident severity (5.49). In the second period they occupy the same place in accident severity (3.83) and are next to the top in accident frequency (127.4). This arises in connection with the process of opening the packs of sheets. No way has been discovered to do this except by hand. The sheets

have sharp and somewhat jagged edges on which the opener is often cut and lacerated. The striking decline from the first to the second period is evidence that care on the part of the worker will give results even in so distinctively a hand operation as this.

TABLE 78.—HANDLING OBJECTS AND TOOLS AS A CAUSE OF ACCIDENT: NUMBER OF CASES, AND ACCIDENT FREQUENCY AND SEVERITY RATES, 1915 TO 1919 AND 1920 TO 1924, BY DEPARTMENTS

| Department | Full-year workers | Number of cases | | | Accident frequency rates (per 10,000,000 hours' exposure) | | | Accident severity rates (per 10,000 hours' exposure) | | | | | |
|---------------------|-------------------|-----------------|--------------------------|--------------------------|---|-------|--------------------------|--|--------|-------|--------------------------|--------------------------|-------|
| | | Death | Perma- nent dis- ability | Tempo- rary dis- ability | Total | Death | Perma- nent dis- ability | Tempo- rary dis- ability | Total | Death | Perma- nent dis- ability | Tempo- rary dis- ability | Total |
| 1915-1919 | | | | | | | | | | | | | |
| Sheet mills | 5,920 | | 6 | 386 | 392 | 2.4 | 217.3 | 220.7 | | 1.86 | 3.63 | 5.49 | |
| Mechanical | 24,752 | 1 | 24 | 1,064 | 1,089 | 0.1 | 3.3 | 143.3 | 146.7 | 0.81 | 2.53 | 1.91 | 5.25 |
| Foundries | 10,222 | | 6 | 546 | 552 | 2.0 | 178.0 | 180.0 | | 2.18 | 2.21 | 4.39 | |
| Tube mills | 11,265 | 1 | 6 | 214 | 221 | .3 | 1.8 | 63.3 | 65.4 | 1.78 | 1.15 | 1.13 | 4.06 |
| Blast furnaces | 17,621 | 1 | 7 | 576 | 584 | .2 | 1.3 | 109.0 | 110.5 | 1.14 | 1.48 | 1.41 | 4.03 |
| Open hearths | 20,525 | 1 | 13 | 867 | 881 | .2 | 2.1 | 140.8 | 143.1 | .97 | .90 | 1.76 | 3.63 |
| Yards | 9,819 | | 6 | 294 | 300 | 2.0 | 99.8 | 101.8 | | 1.78 | 1.58 | 3.36 | |
| Heavy rolling mills | 27,123 | | 19 | 761 | 780 | 2.3 | 93.5 | 95.8 | | 1.47 | 1.38 | 2.83 | |
| Plate mills | 14,711 | | 8 | 613 | 621 | 1.8 | 138.9 | 140.7 | | .75 | 1.74 | 2.49 | |
| Bessemer | 5,450 | | 4 | 128 | 132 | 2.4 | 78.3 | 80.7 | | .73 | 1.52 | 2.26 | |
| Electrical | 4,191 | | 4 | 84 | 88 | 3.2 | 66.8 | 70.0 | | 1.31 | .93 | 2.24 | |
| Fabricating | 11,110 | | 4 | 405 | 409 | 1.2 | 121.5 | 122.7 | | .38 | 1.64 | 2.00 | |
| Unclassified | 55,534 | | 40 | 2,612 | 2,652 | 2.4 | 156.8 | 159.2 | | 1.39 | 2.24 | 3.63 | |
| 1920-1924 | | | | | | | | | | | | | |
| Sheet mills | 45,618 | 3 | 21 | 1,743 | 1,719 | .22 | 1.53 | 125.61 | 127.36 | 1.32 | .69 | 1.82 | 3.83 |
| Mechanical | 89,481 | 3 | 32 | 1,449 | 1,484 | .11 | 1.19 | 53.98 | 55.28 | .67 | .74 | .84 | 2.25 |
| Foundries | 37,129 | | 18 | 2,246 | 2,264 | 1.62 | 201.64 | 203.26 | | .74 | 2.46 | 3.20 | |
| Tube mills | 68,335 | 5 | 27 | 973 | 1,005 | .24 | 1.32 | 47.46 | 49.02 | 1.46 | .58 | .80 | 2.84 |
| Blast furnaces | 54,773 | 1 | 16 | 683 | 700 | .06 | .97 | 41.57 | 42.60 | .37 | .43 | .69 | 1.49 |
| Open hearths | 60,987 | 2 | 43 | 1,195 | 1,240 | .11 | 2.39 | 66.29 | 68.79 | .67 | 1.32 | 1.06 | 3.05 |
| Yards | 20,113 | 1 | 12 | 358 | 371 | .17 | 1.99 | 59.32 | 61.48 | .99 | 1.11 | .98 | 3.08 |
| Heavy rolling mills | 43,682 | | 28 | 827 | 855 | 1.94 | 57.33 | 59.27 | | .84 | .92 | 1.76 | |
| Plate mills | 22,428 | | 13 | 433 | 446 | 1.93 | 64.35 | 66.28 | | 1.60 | .90 | 2.50 | |
| Bessemer | 19,853 | | 13 | 351 | 364 | 2.18 | 58.93 | 61.11 | | .98 | .98 | 1.96 | |
| Electrical | 14,002 | | 4 | 154 | 158 | .95 | 36.69 | 37.61 | | .29 | .52 | .80 | |
| Fabricating | 20,949 | | 13 | 538 | 551 | 2.16 | 89.45 | 91.61 | | 2.12 | 1.50 | 3.62 | |
| Unclassified | 107,317 | 3 | 21 | 2,022 | 2,046 | .09 | .65 | 62.80 | 63.54 | .56 | .46 | 1.00 | 2.02 |

MISCELLANEOUS CAUSES

The causes grouped under the term "miscellaneous" are so varied from department to department that the rates are not of very great significance.

The high accident severity (14.03) in blast furnaces during the first period is due to asphyxiating gas, a hazard not found to any great extent in any other department. This department also leads in accident severity (5.15) during the second period.

TABLE 79.—MISCELLANEOUS CAUSES OF ACCIDENT: NUMBER OF CASES AND ACCIDENT FREQUENCY AND SEVERITY RATES, 1915 TO 1919 AND 1920 TO 1924, BY DEPARTMENTS

| Department | Full-year work-ers | Number of cases | | | Accident frequency rates (per 10,000,000 hours' exposure) | | | | Accident severity rates (per 10,000 hours' exposure) | | | | |
|---------------------|--------------------|-----------------|-------------------------|-------------------------|---|-------|-------------------------|-------------------------|--|-------|-------------------------|-------------------------|-------|
| | | Death | Perma-nent dis-abil-ity | Tem-porary dis-abil-ity | Total | Death | Perma-nent dis-abil-ity | Tem-porary dis-abil-ity | Total | Death | Perma-nent dis-abil-ity | Tem-porary dis-abil-ity | Total |
| 1915-1919 | | | | | | | | | | | | | |
| Blast furnaces | 17,621 | 11 | 3 | 400 | 414 | 2.1 | 0.6 | 75.7 | 78.4 | 12.49 | 1.02 | 0.52 | 14.03 |
| Yards | 9,819 | 4 | 4 | 177 | 185 | 1.4 | 1.4 | 60.1 | 62.9 | 8.15 | 3.19 | .75 | 12.09 |
| Electrical | 4,191 | 1 | | 88 | 89 | .8 | | 70.0 | 70.8 | 4.77 | | .48 | 5.25 |
| Tube mills | 11,265 | 2 | 2 | 113 | 117 | .6 | .6 | 33.4 | 34.6 | 3.55 | .27 | .63 | 4.35 |
| Mechanical | 24,752 | 2 | 7 | 540 | 549 | .3 | .9 | 72.7 | 73.9 | 1.62 | 1.04 | .61 | 4.17 |
| Plate mills | 14,711 | 2 | | 286 | 288 | .5 | | 64.8 | 65.3 | 2.72 | | .71 | 3.48 |
| Heavy rolling mills | 27,123 | 3 | 1 | 327 | 331 | .4 | .1 | 40.2 | 40.7 | 2.21 | .22 | .63 | 2.96 |
| Fabricating | 11,110 | 1 | 2 | 298 | 301 | .8 | .6 | 89.4 | 90.3 | 1.80 | .18 | .61 | 2.59 |
| Open hearths | 20,525 | 1 | 2 | 449 | 452 | .2 | .4 | 72.9 | 73.5 | .97 | .68 | .58 | 2.13 |
| Bessemer | 5,450 | | 1 | 90 | 91 | | .6 | 55.0 | 55.6 | | 1.10 | .64 | 1.74 |
| Foundries | 10,222 | | 3 | 263 | 266 | | 1.0 | 85.8 | 86.8 | | .78 | .79 | 1.57 |
| Sheet mills | 5,920 | | 1 | 129 | 130 | | .6 | 72.6 | 73.2 | | .17 | 1.20 | 1.37 |
| Unclassified | 55,534 | 10 | 11 | 997 | 1,018 | .6 | .7 | 59.8 | 61.1 | 3.60 | .97 | .74 | 5.30 |
| 1920-1924 | | | | | | | | | | | | | |
| Blast furnaces | 54,773 | 13 | 3 | 455 | 471 | .8 | .2 | 27.7 | 28.7 | 4.75 | .09 | .81 | 5.15 |
| Yards | 20,118 | | 1 | 208 | 209 | | .2 | 34.5 | 34.6 | | .30 | .45 | .75 |
| Electrical | 14,002 | 1 | 1 | 125 | 127 | .2 | .2 | 29.8 | 30.2 | 1.43 | .14 | .86 | 1.93 |
| Tube mills | 68,335 | 4 | 6 | 599 | 609 | .2 | .3 | 29.2 | 29.7 | 1.17 | .22 | .35 | 1.74 |
| Mechanical | 89,481 | 5 | 4 | 770 | 779 | .2 | .2 | 28.7 | 29.0 | 1.12 | .20 | .30 | 1.62 |
| Plate mills | 22,428 | 1 | 1 | 261 | 263 | .2 | .2 | 38.8 | 39.6 | .89 | .04 | .44 | 1.37 |
| Heavy rolling mills | 48,082 | | 4 | 374 | 378 | | .3 | 25.9 | 26.2 | | .44 | .40 | .84 |
| Fabricating | 20,049 | | | 297 | 297 | | | 49.4 | 49.4 | | | .51 | .51 |
| Open hearths | 60,087 | 6 | 4 | 608 | 618 | .3 | .2 | 33.7 | 34.3 | 2.00 | .37 | .37 | 2.74 |
| Bessemer | 19,853 | 1 | 4 | 196 | 201 | .2 | .7 | 32.9 | 33.8 | 1.01 | 1.06 | .88 | 2.45 |
| Foundries | 37,129 | | 2 | 988 | 990 | | .2 | 88.7 | 88.9 | | .23 | .77 | 1.00 |
| Sheet mills | 45,618 | 1 | 1 | 573 | 575 | .1 | .1 | 41.9 | 42.0 | .44 | .02 | .43 | .89 |
| Unclassified | 107,317 | 16 | 9 | 902 | 927 | .5 | .8 | 28.0 | 28.8 | 2.98 | .19 | .37 | 3.64 |

ACCIDENT EXPERIENCE OF THE DEPARTMENTS ANALYZED BY CAUSES

In order to show the extremes of change the tables in this section consist of two 5-year periods separated by a 5-year interval. In order to give readily comparable rates they are computed on the basis of 10,000,000 hours' exposure for frequency and 10,000 hours' for severity.

It is well to note in this connection that the severity rates are necessarily more irregular than the frequency rates. This is due to the fact that in frequency a case of injury counts as one unit while in severity the same case, if a death, is 6,000 units.

In a number of the tables which follow it will be observed that for the first period rates for the causes which may be regarded as characteristic of the department are given, while those which the department shares with other industries are not separately given but are included under "Unclassified." This omission which makes comparison of the two 5-year periods difficult, is due to the fact that when the rates for the first period were compiled only the characteristic causes were considered, and when at the close of the second period it seemed desirable to show all the primary cause groups it was not possible to go back and compute the missing items.

BLAST FURNACES

In 1910 the highest frequency rate (143) was for falling objects; in 1924 the highest (35.3) was for handling. In severity falls of persons was highest (34.3) in 1910 and hot substances (19.73) in 1924.

TABLE 80.—ACCIDENT FREQUENCY AND SEVERITY RATES FOR BLAST FURNACES, 1910 TO 1914 AND 1920 TO 1924, BY YEARS AND ACCIDENT CAUSES

| Accident cause | 1910 | 1911 | 1912 | 1913 | 1914 | 1920 | 1921 | 1922 | 1923 | 1924 |
|--|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| Accident frequency rates (per 10,000,000 hours' exposure) | | | | | | | | | | |
| Machinery..... | 21.6 | 38.3 | 23.0 | 28.0 | 8.7 | 17.6 | 7.2 | 10.1 | 12.2 | 15.2 |
| Vehicles..... | 19.7 | 2.3 | 6.0 | 4.0 | ----- | 13.7 | 8.7 | 8.1 | 9.1 | 6.8 |
| Hot substances..... | 113.2 | 132.7 | 99.3 | 86.6 | 57.4 | 50.0 | 30.2 | 32.6 | 34.5 | 30.2 |
| Falls of persons..... | 78.7 | 33.7 | 53.0 | 26.0 | 43.0 | 23.1 | 17.9 | 12.7 | 14.7 | 15.8 |
| Falling objects..... | 143.0 | 55.3 | 66.7 | 62.3 | 31.7 | 21.9 | 14.3 | 16.6 | 15.6 | 18.7 |
| Handling..... | 108.3 | 94.3 | 74.3 | 56.3 | 43.0 | 61.2 | 41.4 | 27.9 | 37.1 | 35.3 |
| Unclassified..... | 138.0 | 65.0 | 103.0 | 40.3 | 65.7 | 41.7 | 26.5 | 27.9 | 20.9 | 20.5 |
| Total..... | 622.5 | 421.6 | 415.3 | 303.5 | 249.5 | 229.2 | 146.2 | 135.9 | 144.1 | 142.5 |
| Accident severity rates (per 10,000 hours' exposure) | | | | | | | | | | |
| Machinery..... | 1.3 | 0.6 | 2.0 | 14.0 | 0.3 | 3.31 | 1.10 | 7.11 | 7.60 | 8.04 |
| Vehicles..... | 5.3 | 16.0 | ----- | ----- | ----- | 2.12 | .11 | 4.55 | 7.14 | 2.05 |
| Hot substances..... | 2.0 | 20.3 | 0.6 | 4.3 | 4.6 | 11.87 | 18.08 | 9.41 | 4.76 | 19.73 |
| Falls of persons..... | 34.3 | 1.0 | 0.7 | 14.0 | 1.0 | .31 | 13.38 | 2.80 | 3.79 | 2.32 |
| Falling objects..... | 1.7 | 0.7 | 0.7 | 0.3 | 0.7 | 1.08 | .28 | .37 | .43 | 4.35 |
| Handling..... | 3.3 | 1.3 | 1.3 | 2.3 | 2.3 | 1.56 | .83 | .83 | 1.14 | 2.82 |
| Unclassified..... | 20.3 | 16.7 | 14.3 | 14.0 | 39.0 | 3.00 | 5.68 | 2.81 | 7.01 | 7.76 |
| Total..... | 68.2 | 56.6 | 19.6 | 48.9 | 47.9 | 23.25 | 39.51 | 27.88 | 31.87 | 47.07 |

BESSEMER CONVERTERS

The exposure available in this department is not as large as could be desired. In general it is not considered good practice to compute rates unless the number of workers is 1,000 or more, but an exception has been made in the case of the Bessemer department because it is still an important steel-making process.

In both 1910 and 1924 the highest accident frequency is found to be due to handling (136 and 34.4, respectively). In severity hot substances are highest in 1910 and falling objects (5.32) in 1924.

TABLE 81.—ACCIDENT FREQUENCY AND SEVERITY RATES FOR BESSEMER CONVERTERS, 1910 TO 1914 AND 1920 TO 1924, BY YEARS AND ACCIDENT CAUSES

| Accident cause | 1910 | 1911 | 1912 | 1913 | 1914 | 1920 | 1921 | 1922 | 1923 | 1924 |
|--|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| Accident frequency rates (per 10,000,000 hours' exposure) | | | | | | | | | | |
| Machinery..... | 81.0 | 45.0 | 25.0 | 42.0 | 35.0 | 38.6 | 16.9 | 9.1 | 18.5 | 16.3 |
| Vehicles..... | 31.0 | 25.0 | 30.0 | 15.0 | ----- | 14.7 | 15.6 | 4.5 | 14.8 | 7.3 |
| Hot substances..... | 106.0 | 70.0 | 140.0 | 91.0 | 69.0 | 36.7 | 27.1 | 27.2 | 30.3 | 17.1 |
| Falls of persons..... | (1) | (1) | (1) | (1) | (1) | 17.3 | 11.6 | 6.4 | 16.3 | 7.2 |
| Falling objects..... | (1) | (1) | (1) | (1) | (1) | 35.2 | 30.9 | 17.3 | 34.8 | 22.9 |
| Handling..... | 136.0 | 85.0 | 21.0 | 65.0 | 17.0 | 99.9 | 66.9 | 40.0 | 65.2 | 34.4 |
| Unclassified..... | 463.0 | 259.0 | 334.0 | 206.0 | 98.0 | 64.4 | 36.2 | 29.1 | 17.8 | 17.2 |
| Total..... | 837.0 | 464.0 | 550.0 | 419.0 | 219.0 | 302.1 | 205.2 | 183.6 | 197.7 | 121.5 |
| Accident severity rates (per 10,000 hours' exposure) | | | | | | | | | | |
| Machinery..... | 2.0 | 1.0 | 1.0 | 1.0 | 6.0 | 6.19 | 8.09 | 0.22 | 9.14 | 1.79 |
| Vehicles..... | 1.0 | 1.0 | 1.0 | 37.0 | ----- | .41 | .38 | .13 | 4.97 | .24 |
| Hot substances..... | 61.0 | 2.9 | 2.0 | 2.0 | 2.0 | 4.69 | .64 | .67 | 9.57 | .42 |
| Falls of persons..... | (1) | (1) | (1) | (1) | (1) | .35 | .39 | .17 | .59 | .19 |
| Falling objects..... | (1) | (1) | (1) | (1) | (1) | .65 | .48 | .52 | .94 | 5.33 |
| Handling..... | 2.0 | 14.0 | 0.3 | 1.0 | 5.0 | 2.47 | 1.75 | 1.72 | 2.38 | 1.22 |
| Unclassified..... | 37.0 | 3.0 | 8.7 | 3.0 | 46.0 | 1.70 | 1.01 | .40 | 3.03 | 8.09 |
| Total..... | 103.0 | 21.0 | 13.0 | 34.0 | 59.0 | 10.46 | 13.34 | 3.83 | 30.62 | 14.27 |

¹Not separately shown; included in "Unclassified."

OPEN HEARTHES

In the first period the greatest accident frequency (133) in open hearths is found in hot substances in 1911 while hot substances leads in severity (23) in 1914. In the second period frequency is highest in handling (99) and severity in machinery (15.37), both in 1920.

Frequency shows a very marked decline from period to period, while severity is irregular with only a slight tendency downward.

TABLE 82.—ACCIDENT FREQUENCY AND SEVERITY RATES FOR OPEN HEARTHES, 1910 TO 1914 AND 1920 TO 1924, BY YEARS AND ACCIDENT CAUSES

| Accident cause | 1910 | 1911 | 1912 | 1913 | 1914 | 1920 | 1921 | 1922 | 1923 | 1924 |
|--|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| Accident frequency rates (per 10,000,000 hours' exposure) | | | | | | | | | | |
| Machinery..... | 86.0 | 70.0 | 61.0 | 44.0 | 47.0 | 49.6 | 26.0 | 25.9 | 33.5 | 23.2 |
| Vehicles..... | 28.0 | 27.0 | 42.0 | 49.0 | 8.0 | 28.0 | 15.0 | 13.3 | 13.6 | 10.1 |
| Hot substances..... | 122.0 | 133.0 | 127.0 | 110.0 | 83.0 | 72.1 | 50.2 | 39.8 | 47.1 | 43.4 |
| Falls of persons..... | (1) | (1) | (1) | (1) | (1) | 27.8 | 28.1 | 21.4 | 21.7 | 23.2 |
| Falling objects..... | (1) | (1) | (1) | (1) | (1) | 41.0 | 42.7 | 37.5 | 29.7 | 33.1 |
| Handling..... | 111.0 | 82.0 | 84.0 | 77.0 | 75.0 | 99.0 | 87.9 | 57.8 | 47.6 | 59.8 |
| Unclassified..... | 292.0 | 198.9 | 209.0 | 225.0 | 169.0 | 51.7 | 43.2 | 30.5 | 26.7 | 21.4 |
| Total..... | 639.0 | 510.0 | 523.0 | 505.0 | 382.0 | 369.2 | 293.1 | 226.2 | 219.9 | 214.2 |
| Accident severity rates (per 10,000 hours' exposure) | | | | | | | | | | |
| Machinery..... | 19.3 | 10.0 | 2.0 | 1.0 | 1.0 | 15.37 | 3.40 | 6.62 | 13.28 | 10.87 |
| Vehicles..... | 11.0 | 10.0 | 12.0 | 17.0 | 4.0 | 11.15 | 2.90 | 2.41 | 11.08 | 6.24 |
| Hot substances..... | 3.0 | 3.0 | 9.0 | 18.0 | 23.0 | 8.62 | 6.62 | 7.56 | 9.49 | 6.48 |
| Falls of persons..... | (1) | (1) | (1) | (1) | (1) | 1.75 | .50 | .38 | 5.03 | 4.69 |
| Falling objects..... | (1) | (1) | (1) | (1) | (1) | 5.66 | .73 | 2.69 | 4.07 | 2.62 |
| Handling..... | 3.0 | 1.0 | 1.0 | 1.0 | 2.0 | 3.76 | 5.43 | 1.30 | 2.21 | 3.05 |
| Unclassified..... | 13.7 | 3.0 | 10.0 | 44.0 | 3.0 | 8.55 | 5.11 | .90 | 3.89 | .28 |
| Total..... | 60.0 | 27.0 | 34.0 | 81.0 | 33.0 | 49.86 | 23.09 | 21.76 | 49.05 | 33.12 |

¹ Not separately shown; included in "Unclassified."

FOUNDRIES

The foundries show on the whole high accident frequency and moderate accident severity. The downward trend is not clearly traceable, although a different presentation indicates that there was such a trend, though not very pronounced.

The irregular character of the rates in this department is illustrated when it is noticed that the highest frequency (251.6) occurs in handling in 1923 of the second period, while the highest severity (57) is in machinery in 1912 of the first period.

The failure of the foundries to make a significant change for the better is disappointing, since some large concerns have done excellent safety work with marked success.

TABLE 83.—ACCIDENT FREQUENCY AND SEVERITY RATES FOR FOUNDRIES, 1910 TO 1914 AND 1920 TO 1924, BY YEARS AND ACCIDENT CAUSES

| Accident cause | 1910 | 1911 | 1912 | 1913 | 1914 | 1920 | 1921 | 1922 | 1923 | 1924 |
|---|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Accident frequency rates (per 10,000,000 hours' exposure) | | | | | | | | | | |
| Machinery..... | 131.0 | 84.0 | 183.0 | 74.0 | 108.0 | 116.6 | 98.1 | 123.8 | 62.4 | 84.1 |
| Vehicles..... | 3.0 | | 3.0 | 7.0 | 6.0 | 6.0 | 7.0 | 7.6 | 10.0 | 5.0 |
| Hot substances..... | 118.0 | 91.0 | 79.0 | 81.0 | 34.0 | 38.4 | 20.5 | 48.4 | 45.4 | 38.8 |
| Falls of persons..... | (1) | (1) | (1) | (1) | (1) | 23.0 | 27.5 | 32.7 | 33.6 | 23.9 |
| Falling objects..... | (1) | (1) | (1) | (1) | (1) | 80.6 | 53.7 | 118.6 | 79.7 | 69.9 |
| Handling..... | 165.0 | 206.0 | 206.0 | 145.0 | 120.0 | 195.1 | 151.3 | 236.2 | 251.6 | 151.8 |
| Unclassified..... | 320.0 | 236.0 | 275.0 | 191.0 | 260.0 | 94.5 | 84.1 | 109.1 | 112.2 | 111.3 |
| Total..... | 737.0 | 617.0 | 745.0 | 498.0 | 428.0 | 554.2 | 442.2 | 676.4 | 594.9 | 484.8 |
| Accident severity rates (per 10,000 hours' exposure) | | | | | | | | | | |
| Machinery..... | 3.0 | 32.0 | 57.0 | 1.0 | 1.0 | 8.83 | 2.73 | 9.10 | 10.66 | 4.96 |
| Vehicles..... | | | | | .3 | .24 | 4.50 | .23 | .22 | .07 |
| Hot substances..... | 2.0 | 1.0 | 4.0 | 27.0 | 1.0 | 1.27 | 1.63 | .60 | .70 | .62 |
| Falls of persons..... | (1) | (1) | (1) | (1) | (1) | .26 | .34 | .62 | .44 | .28 |
| Falling objects..... | (1) | (1) | (1) | (1) | (1) | 1.22 | 1.18 | 1.73 | 1.10 | 2.19 |
| Handling..... | 1.0 | 6.0 | 2.0 | 4.0 | 7.0 | 2.74 | 3.10 | 3.26 | 4.56 | 2.03 |
| Unclassified..... | 6.0 | 33.0 | 3.0 | 3.0 | .7 | 1.55 | .81 | .94 | 1.05 | 1.17 |
| Total..... | 12.0 | 72.0 | 66.0 | 35.0 | 10.0 | 16.11 | 14.29 | 14.48 | 18.73 | 11.32 |

¹ Not separately shown; included in "Unclassified."

HEAVY ROLLING MILLS

In Table 84 there is a very conspicuous decline in frequency in the second period and a less marked decline in severity.

The highest frequency (82) appears in machinery in 1911 and the highest severity (14) is also in machinery in 1910 and in hot substances in 1913.

TABLE 84.—ACCIDENT FREQUENCY AND SEVERITY RATES FOR HEAVY ROLLING MILLS, 1910 TO 1914 AND 1920 TO 1924, BY YEARS AND ACCIDENT CAUSES

| Accident cause | 1910 | 1911 | 1912 | 1913 | 1914 | 1920 | 1921 | 1922 | 1923 | 1924 |
|---|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Accident frequency rates (per 10,000,000 hours' exposure) | | | | | | | | | | |
| Machinery..... | 75.0 | 82.0 | 56.0 | 51.0 | 45.0 | 44.8 | 36.1 | 34.4 | 33.9 | 40.6 |
| Vehicles..... | 13.0 | 10.0 | 11.0 | 11.0 | 3.0 | 7.4 | 3.4 | 3.8 | 5.0 | 3.0 |
| Hot substances..... | 40.0 | 34.0 | 37.0 | 30.0 | 25.0 | 25.9 | 15.4 | 12.6 | 15.1 | 11.0 |
| Falls of persons..... | (1) | (1) | (1) | (1) | (1) | 22.3 | 16.8 | 13.2 | 15.4 | 13.9 |
| Falling objects..... | (1) | (1) | (1) | (1) | (1) | 33.1 | 23.7 | 30.6 | 21.2 | 24.9 |
| Handling..... | (1) | (1) | (1) | (1) | (1) | 89.7 | 60.9 | 45.9 | 42.0 | 38.8 |
| Unclassified..... | 343.0 | 339.0 | 339.0 | 240.0 | 118.0 | 37.8 | 21.4 | 23.6 | 18.8 | 21.4 |
| Total..... | 471.0 | 465.0 | 443.0 | 332.0 | 191.0 | 261.0 | 177.7 | 203.5 | 151.4 | 158.6 |
| Accident severity rates (per 10,000 hours' exposure) | | | | | | | | | | |
| Machinery..... | 14.0 | 12.0 | 2.0 | 1.0 | 2.0 | 9.09 | 6.87 | 7.30 | 8.91 | 13.52 |
| Vehicles..... | 1.0 | .3 | 1.0 | .3 | 1.0 | .51 | 1.17 | 4.27 | 3.71 | 2.87 |
| Hot substances..... | 5.0 | 6.0 | 6.0 | 14.0 | 8.0 | 1.82 | .38 | 2.37 | .92 | .15 |
| Falls of persons..... | (1) | (1) | (1) | (1) | (1) | 1.79 | .45 | 2.44 | .38 | .29 |
| Falling objects..... | (1) | (1) | (1) | (1) | (1) | 2.10 | .92 | 1.16 | 2.52 | .94 |
| Handling..... | (1) | (1) | (1) | (1) | (1) | 1.68 | 2.01 | 1.63 | 1.93 | 1.56 |
| Unclassified..... | 23.0 | 20.7 | 7.0 | 4.7 | 4.0 | .45 | .20 | 1.18 | 1.74 | .44 |
| Total..... | 43.0 | 39.0 | 16.0 | 20.0 | 15.0 | 17.44 | 12.09 | 20.35 | 20.11 | 19.79 |

¹ Not separately shown; included in "Unclassified."

PLATE MILLS

Plate mills are among the most regular in declining accident rates of any department covered by this study. Machinery in 1910 has the highest accident frequency (164) and the same cause has the highest accident severity (34) in the same year.

Table 85 illustrates again rather forcibly that frequency rates are not a complete indication regarding the places where accident prevention may be profitably applied. If in the second period frequency alone be considered, it would appear that in every year of the period except 1924 accidents due to handling should have the major share of attention. Turning to severity, however, it will be found that from that standpoint only in 1922 is handling of paramount importance.

TABLE 85.—ACCIDENT FREQUENCY AND SEVERITY RATES FOR PLATE MILLS, 1910 TO 1914 AND 1920 TO 1924, BY YEARS AND ACCIDENT CAUSES

| Accident cause | 1910 | 1911 | 1912 | 1913 | 1914 | 1920 | 1921 | 1922 | 1923 | 1924 |
|---|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Accident frequency rates (per 10,000,000 hours' exposure) | | | | | | | | | | |
| Machinery..... | 164.0 | 120.0 | 135.0 | 93.0 | 49.0 | 49.3 | 31.9 | 35.4 | 27.5 | 32.0 |
| Vehicles..... | 18.0 | 12.0 | 18.0 | 17.0 | 2.0 | 1.6 | 2.2 | 1.6 | 8.4 | 12.9 |
| Hot substances..... | 53.0 | 47.0 | 55.0 | 55.0 | 24.0 | 23.0 | 15.4 | 24.4 | 11.0 | 17.6 |
| Falls of persons..... | (1) | (1) | (1) | (1) | (1) | 16.1 | 11.0 | 15.0 | 8.9 | 17.6 |
| Falling objects..... | (1) | (1) | (1) | (1) | (1) | 40.3 | 27.5 | 53.5 | 33.7 | 33.4 |
| Handling..... | (1) | (1) | (1) | (1) | (1) | 101.0 | 37.6 | 62.1 | 41.2 | 34.4 |
| Unclassified..... | 491.0 | 450.0 | 552.0 | 434.0 | 220.0 | 63.4 | 39.5 | 40.1 | 9.6 | 23.3 |
| Total..... | 726.0 | 629.0 | 760.0 | 599.0 | 295.0 | 300.2 | 215.1 | 232.1 | 135.3 | 163.3 |
| Accident severity rates (per 10,000 hours' exposure) | | | | | | | | | | |
| Machinery..... | 24.0 | 2.0 | 3.0 | 17.0 | 1.3 | 18.83 | 1.52 | 1.66 | 5.35 | 8.06 |
| Vehicles..... | 15.0 | .3 | .3 | 14.0 | ----- | .01 | .02 | .20 | .16 | ----- |
| Hot substances..... | 1.0 | 1.0 | 1.0 | 1.0 | .3 | 3.77 | .19 | .54 | .20 | .39 |
| Falls of persons..... | (1) | (1) | (1) | (1) | (1) | .21 | .11 | .33 | 4.72 | .42 |
| Falling objects..... | (1) | (1) | (1) | (1) | (1) | .56 | 3.82 | .82 | .64 | 5.57 |
| Handling..... | (1) | (1) | (1) | (1) | (1) | 1.12 | 3.77 | 2.36 | 3.88 | 2.49 |
| Unclassified..... | 11.0 | 10.7 | 21.7 | 6.0 | 5.4 | 3.76 | .70 | .44 | .23 | .66 |
| Total..... | 61.0 | 14.0 | 31.0 | 38.0 | 7.0 | 23.26 | 13.13 | 6.35 | 14.88 | 17.63 |

¹ Not separately shown; included in "Unclassified."

SHEET MILLS

It was found in an earlier study ⁷ of these mills that, in the 5-year period ending in 1914 the hot-mill crews had rising accident rates both in frequency and severity. While Table 86 does not go into details as did the table in the earlier study, the rates shown for machinery and handling give an approximate idea of what is happening among hot-mill workers. An examination of these groups in the second 5-year period will show somewhat lower rates and a tendency to decline.

⁷ United States Bureau of Labor Statistics Bul. No. 296, p. 31.

Since neither the machines nor the handling operations have been materially modified in the second period as compared with the first, this improvement must be largely due to greater skill and care on the part of the workers.

The highest frequency (186) is found in handling in 1912 and the highest severity (11) in machinery in 1911.

TABLE 86.—ACCIDENT FREQUENCY AND SEVERITY RATES FOR SHEET MILLS, 1910 TO 1914 AND 1920 TO 1924, BY YEARS AND ACCIDENT CAUSES

| Accident cause | 1910 | 1911 | 1912 | 1913 | 1914 | 1920 | 1921 | 1922 | 1923 | 1924 |
|--|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| Accident frequency rates (per 10,000,000 hours' exposure) | | | | | | | | | | |
| Machinery..... | 43.0 | 64.0 | 59.0 | 66.0 | 61.0 | 32.0 | 29.2 | 34.0 | 29.9 | 15.6 |
| Vehicles..... | (1) | (1) | (1) | (1) | (1) | 3.1 | 3.9 | 8.7 | 4.1 | 4.0 |
| Hot substances..... | 16.0 | 15.0 | 25.0 | 10.0 | 21.0 | 28.3 | 23.5 | 30.4 | 15.3 | 11.8 |
| Falls of persons..... | (1) | (1) | (1) | (1) | (1) | 13.3 | 15.2 | 24.6 | 10.5 | 7.8 |
| Falling objects..... | (1) | (1) | (1) | (1) | (1) | 14.2 | 18.4 | 29.3 | 14.0 | 7.8 |
| Handling..... | 147.0 | 103.0 | 186.0 | 125.0 | 61.0 | 168.7 | 154.9 | 179.6 | 85.8 | 57.3 |
| Unclassified..... | 135.0 | 181.0 | 306.0 | 283.0 | 166.0 | 59.5 | 54.0 | 55.0 | 27.1 | 13.4 |
| Total..... | 341.0 | 363.0 | 491.0 | 381.0 | 309.0 | 309.3 | 299.1 | 361.6 | 187.3 | 117.2 |
| Accident severity rates (per 10,000 hours' exposure) | | | | | | | | | | |
| Machinery..... | 4.0 | 11.0 | 5.0 | 8.0 | 2.0 | 5.58 | 8.09 | 4.99 | 8.24 | 5.74 |
| Vehicles..... | (1) | (1) | (1) | (1) | (1) | 2.08 | .06 | .19 | 2.18 | .08 |
| Hot substances..... | .3 | .3 | .3 | .3 | .3 | .31 | .23 | 2.64 | .32 | .29 |
| Falls of persons..... | (1) | (1) | (1) | (1) | (1) | .27 | 2.90 | .33 | .17 | 2.56 |
| Falling objects..... | (1) | (1) | (1) | (1) | (1) | .14 | .39 | 1.07 | .39 | .23 |
| Handling..... | 2.0 | 1.0 | 2.0 | 2.0 | 1.0 | 4.30 | 2.98 | 5.43 | 3.56 | 2.50 |
| Unclassified..... | 40.7 | 35.7 | 12.7 | 13.7 | 15.7 | .44 | 3.23 | .62 | .30 | .32 |
| Total..... | 47.0 | 48.0 | 20.0 | 24.0 | 19.0 | 13.12 | 17.88 | 15.27 | 15.16 | 11.72 |

1 Not separately shown; included in "Unclassified."

TUBE MILLS

While accident frequency rates in tube mills were very high in the early part of the first 5-year period, a very rapid decline occurred before the close of that period and continued to 1924. A decline in accident severity in the first 5-year period is not easily observable and in the second period the irregularities obscure the trend, but if a 12-month moving average be computed a downward trend will be indicated.

When the two periods are considered in comparison it will be evident that a remarkable reduction of both frequency and severity has taken place.

Accident frequency (150) is highest in 1910 in machinery, while accident severity (28) is highest in 1912 in machinery.

TABLE 87.—ACCIDENT FREQUENCY AND SEVERITY RATES FOR TUBE MILLS, 1910 TO 1914 AND 1920 TO 1924, BY YEARS AND ACCIDENT CAUSES

| Accident cause | 1910 | 1911 | 1912 | 1913 | 1914 | 1920 | 1921 | 1922 | 1923 | 1924 |
|--|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| Accident frequency rates (per 10,000,000 hours' exposure) | | | | | | | | | | |
| Machinery..... | 150.0 | 149.0 | 89.0 | 52.0 | 20.0 | 33.8 | 23.9 | 21.2 | 26.0 | 11.1 |
| Vehicles..... | (1) | (1) | (1) | (1) | (1) | 3.6 | 1.6 | 4.6 | 2.6 | 1.0 |
| Hot substances..... | 60.0 | 82.0 | 50.0 | 16.0 | 17.0 | 23.5 | 17.1 | 17.7 | 11.6 | 5.5 |
| Falls of persons..... | (1) | (1) | (1) | (1) | (1) | 10.1 | 9.3 | 15.0 | 10.3 | 7.0 |
| Falling objects..... | (1) | (1) | (1) | (1) | (1) | 20.0 | 23.3 | 27.2 | 27.8 | 17.0 |
| Handling..... | (1) | (1) | (1) | (1) | (1) | 73.9 | 48.7 | 50.9 | 46.6 | 25.5 |
| Unclassified..... | 552.0 | 522.0 | 422.0 | 194.0 | 114.0 | 48.6 | 39.4 | 35.7 | 18.4 | 12.0 |
| Total..... | 762.0 | 753.0 | 561.0 | 262.0 | 151.0 | 213.5 | 163.3 | 172.3 | 143.3 | 79.1 |
| Accident severity rates (per 10,000 hours' exposure) | | | | | | | | | | |
| Machinery..... | 18.0 | 2.3 | 28.0 | 1.3 | 2.0 | 4.09 | 4.51 | 3.53 | 6.55 | 3.40 |
| Vehicles..... | (1) | (1) | (1) | (1) | (1) | 2.75 | .09 | .14 | .09 | .02 |
| Hot substances..... | 1.0 | 1.0 | .3 | 1.0 | (1) | 1.76 | 2.80 | .49 | 1.53 | .13 |
| Falls of persons..... | (1) | (1) | (1) | (1) | (1) | 1.53 | .22 | .41 | 1.60 | .17 |
| Falling objects..... | (1) | (1) | (1) | (1) | (1) | 1.79 | .58 | .51 | .88 | 3.06 |
| Handling..... | (1) | (1) | (1) | (1) | (1) | 1.47 | 3.34 | 2.60 | 4.10 | 2.88 |
| Unclassified..... | 9.0 | 7.7 | 4.7 | 28.7 | 8.0 | 1.76 | 1.23 | 3.38 | .76 | 1.43 |
| Total..... | 28.0 | 11.0 | 33.0 | 31.0 | 10.0 | 15.15 | 12.77 | 11.12 | 15.50 | 11.04 |

¹ Not separately shown; included in "Unclassified."

FABRICATING SHOPS

Machines, including cranes and hoists, are the important elements of hazard in these plants. Accident frequency reaches the top record (373) for machinery in 1912 and drops to 51.4 in 1924; the percentage of decline is 86.2.

Accident severity goes from 43 in 1910 to 8.68 in 1924, a drop of 19.8 per cent.

TABLE 88.—ACCIDENT FREQUENCY AND SEVERITY RATES FOR FABRICATING SHOPS, 1910 TO 1914 and 1920 TO 1924, BY YEARS AND ACCIDENT CAUSES

| Accident cause | 1910 | 1911 | 1912 | 1913 | 1914 | 1920 | 1921 | 1922 | 1923 | 1924 |
|--|--------------|--------------|----------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| Accident frequency rates (per 10,000,000 hours' exposure) | | | | | | | | | | |
| Machinery..... | 293.0 | 292.0 | 373.0 | 357.0 | 220.0 | 116.2 | 84.9 | 92.6 | 77.2 | 51.4 |
| Vehicles..... | (1) | (1) | (1) | (1) | (1) | 7.8 | 4.8 | 3.9 | 6.0 | 3.5 |
| Hot substances..... | 21.0 | 20.0 | 35.0 | 29.0 | 11.0 | 20.5 | 10.9 | 10.4 | 12.7 | 10.5 |
| Falls of persons..... | (1) | (1) | (1) | (1) | (1) | 24.9 | 18.4 | 24.6 | 19.5 | 26.6 |
| Falling objects..... | (1) | (1) | (1) | (1) | (1) | 50.6 | 49.2 | 44.4 | 36.0 | 33.3 |
| Handling..... | (1) | (1) | (1) | (1) | (1) | 140.2 | 98.3 | 88.9 | 74.9 | 57.2 |
| Unclassified..... | 633.0 | 673.0 | 640.0 | 580.0 | 430.0 | 96.0 | 47.9 | 67.1 | 16.5 | 21.9 |
| Total..... | 947.0 | 991.0 | 1,048.0 | 966.0 | 661.0 | 462.2 | 314.4 | 331.9 | 242.3 | 204.9 |
| Accident severity rates (per 10,000 hours' exposure) | | | | | | | | | | |
| Machinery..... | 43.0 | 18.0 | 33.0 | 5.0 | 18.0 | 11.94 | 17.80 | 13.68 | 7.39 | 8.68 |
| Vehicles..... | (1) | (1) | (1) | (1) | (1) | .11 | .28 | .09 | 4.62 | .14 |
| Hot substances..... | (1) | (1) | 1.0 | 0.3 | (1) | 4.58 | 2.83 | .15 | .28 | 4.34 |
| Falls of persons..... | (1) | (1) | (1) | (1) | (1) | .35 | .16 | .57 | .35 | 0.25 |
| Falling objects..... | (1) | (1) | (1) | (1) | (1) | .94 | 1.54 | 6.41 | 7.25 | 3.85 |
| Handling..... | (1) | (1) | (1) | (1) | (1) | 2.96 | 2.81 | 2.66 | 4.74 | 4.34 |
| Unclassified..... | 31.0 | 7.0 | 24.0 | 18.0 | 8.0 | .81 | .47 | .74 | .20 | .84 |
| Total..... | 74.0 | 25.0 | 58.0 | 23.3 | 26.0 | 21.69 | 25.39 | 24.62 | 24.33 | 30.94 |

¹ Not separately shown; included in "Unclassified."

MECHANICAL DEPARTMENT

Machinery is naturally a more important hazard in the mechanical department than in most of the other departments. While frequency of machine accidents declines, the rate going from 140 in 1910 to 19.3 in 1924, the severity of such accidents seems rather to increase. However, the general frequency and severity are decidedly lower in the second period than in the first. In the second period, accidents due to handling are the most frequent in each of the five years. The severity rates are on the whole highest for machinery, followed by those due to falls of persons.

TABLE 89.—ACCIDENT FREQUENCY AND SEVERITY RATES FOR MECHANICAL DEPARTMENTS, 1910 TO 1914 AND 1920 TO 1924, BY YEARS AND ACCIDENT CAUSES

| Accident cause | 1910 | 1911 | 1912 | 1913 | 1914 | 1920 | 1921 | 1922 | 1923 | 1924 |
|---|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Accident frequency rates (per 10,000,000 hours' exposure) | | | | | | | | | | |
| Machinery..... | 140.0 | 125.0 | 101.0 | 51.0 | 64.0 | 54.0 | 36.2 | 24.9 | 20.3 | 19.3 |
| Vehicles..... | (1) | (1) | (1) | (1) | (1) | 4.8 | 2.9 | 3.6 | 3.9 | 2.5 |
| Hot substances..... | 33.0 | 50.0 | 30.0 | 35.0 | 18.0 | 24.8 | 15.0 | 11.4 | 10.5 | 8.4 |
| Falls of persons..... | (1) | (1) | (1) | (1) | (1) | 27.3 | 20.6 | 20.2 | 14.2 | 13.2 |
| Falling objects..... | (1) | (1) | (1) | (1) | (1) | 34.1 | 30.1 | 21.3 | 14.6 | 16.8 |
| Handling..... | (1) | (1) | (1) | (1) | (1) | 95.5 | 65.8 | 50.0 | 34.0 | 23.6 |
| Unclassified..... | 442.0 | 311.0 | 279.0 | 282.0 | 273.0 | 53.1 | 34.5 | 26.9 | 16.5 | 16.3 |
| Total..... | 615.0 | 456.0 | 410.0 | 368.0 | 355.0 | 293.6 | 205.1 | 158.3 | 114.0 | 100.1 |
| Accident severity rates (per 10,000 hours' exposure) | | | | | | | | | | |
| Machinery..... | 3.0 | 3.0 | 4.0 | 2.0 | 7.0 | 5.73 | 3.41 | 4.04 | 5.89 | 5.49 |
| Vehicles..... | (1) | (1) | (1) | (1) | (1) | 1.04 | .12 | 3.70 | 1.29 | .20 |
| Hot substances..... | .3 | .3 | .3 | 10.0 | .3 | 2.99 | .23 | 2.44 | 2.40 | 2.27 |
| Falls of persons..... | (1) | (1) | (1) | (1) | (1) | 5.08 | 4.51 | .79 | 1.52 | 3.78 |
| Falling objects..... | (1) | (1) | (1) | (1) | (1) | .75 | 1.31 | .55 | 2.67 | 1.53 |
| Handling..... | (1) | (1) | (1) | (1) | (1) | 2.12 | 1.69 | 4.70 | 2.36 | .79 |
| Unclassified..... | 40.0 | 27.0 | 16.0 | 25.0 | 6.0 | .35 | .76 | 2.48 | 4.66 | .66 |
| Total..... | 43.3 | 30.3 | 20.3 | 37.0 | 13.3 | 18.06 | 12.23 | 18.70 | 20.89 | 14.61 |

¹ Not separately shown; included with "Unclassified."

YARDS

The interest as to yards centers around the experience with power vehicles. The frequency rates of such accidents go from 123 in 1910 to 41.9 in 1924. This would be an excellent record if severity were not considered. In 1910 severity of vehicular accidents was 26 and in 1924 it was 37.03. In four of the five years the second period records higher severity rates than corresponding years of the first period.

It is a well-recognized fact that the hazards of power-vehicle operation are difficult to combat. The steel mills have always had the dangers arising from the steam locomotive, both standard gauge where the railways enter for bringing raw material and narrow gauge for intraplant transportation. In recent years there has been an increased use of motor trucks, thus transferring to new localities the hazard of such moving bodies. Whether this has influenced the severity rates it is not possible to determine from the available data.

The severity rates for handling are, in general, next to those for vehicles.

TABLE 90.—ACCIDENT FREQUENCY AND SEVERITY RATES FOR YARDS, 1910 TO 1914 AND 1920 TO 1924, BY YEARS AND ACCIDENT CAUSES

| Accident cause | 1910 | 1911 | 1912 | 1913 | 1914 | 1920 | 1921 | 1922 | 1923 | 1924 |
|---|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| Accident frequency rates (per 10,000,000 hours' exposure) | | | | | | | | | | |
| Machinery..... | 23.0 | 18.0 | 40.0 | 22.0 | 17.0 | 19.0 | 23.0 | 17.7 | 31.7 | 21.6 |
| Vehicles..... | 123.0 | 79.0 | 112.0 | 67.0 | 74.0 | 88.9 | 69.5 | 40.8 | 73.6 | 41.9 |
| Hot substances..... | 19.0 | 17.0 | 14.0 | 11.0 | 5.0 | 16.5 | 15.0 | 2.6 | 9.2 | 8.8 |
| Falls of persons..... | (1) | (1) | (1) | (1) | (1) | 21.5 | 27.1 | 14.2 | 36.8 | 28.9 |
| Falling objects..... | 109.0 | 83.0 | 67.0 | 36.0 | 27.0 | 17.5 | 31.3 | 13.6 | 37.8 | 24.8 |
| Handling..... | (1) | (1) | (1) | (1) | (1) | 70.4 | 94.9 | 40.8 | 50.1 | 44.0 |
| Unclassified..... | 209.0 | 166.0 | 172.0 | 104.0 | 118.0 | 46.9 | 36.2 | 19.5 | 33.7 | 25.7 |
| Total..... | 483.0 | 363.0 | 405.0 | 240.0 | 241.0 | 280.7 | 297.0 | 154.2 | 272.9 | 195.7 |
| Accident severity rates (per 10,000 hours' exposure) | | | | | | | | | | |
| Machinery..... | 1.0 | 1.0 | 14.0 | 0.3 | 2.0 | 0.51 | 11.24 | 11.59 | 11.13 | 8.17 |
| Vehicles..... | 26.0 | 27.0 | 11.0 | 4.0 | 3.0 | 37.33 | 23.31 | 22.29 | 35.20 | 37.08 |
| Hot substances..... | 1.0 | .3 | .3 | | | .22 | .24 | .05 | .14 | .22 |
| Falls of persons..... | (1) | (1) | (1) | (1) | (1) | .38 | .37 | 5.68 | .56 | 1.45 |
| Falling objects..... | 1.0 | 2.0 | 3.0 | 1.0 | 1.0 | .36 | .56 | .49 | .72 | 1.13 |
| Handling..... | (1) | (1) | (1) | (1) | (1) | 2.83 | 2.11 | 6.37 | 2.70 | 1.07 |
| Unclassified..... | 6.0 | 4.0 | 2.0 | 2.0 | 19.0 | .44 | 2.23 | .24 | .45 | .76 |
| Total..... | 35.0 | 34.3 | 30.3 | 7.3 | 28.0 | 42.07 | 40.26 | 46.71 | 50.90 | 48.83 |

1 Not separately shown; included in "Unclassified."

MISCELLANEOUS ROLLING MILLS

The group of miscellaneous rolling mills is of interest because it contains a large number of hand-operated mills and may be regarded as giving a fair idea of the experience of such mills. The records cover only the last 5-year period. In that period there has been a marked decline in accident frequency and a definite downward trend in accident severity.

TABLE 91.—ACCIDENT FREQUENCY AND SEVERITY RATES FOR MISCELLANEOUS ROLLING MILLS, 1920 TO 1924, BY YEARS AND ACCIDENT CAUSES

| Accident cause | 1920 | 1921 | 1922 | 1923 | 1924 |
|---|--------------|--------------|--------------|--------------|--------------|
| Accident frequency rates (per 10,000,000 hours' exposure) | | | | | |
| Machinery..... | 64.5 | 54.5 | 39.7 | 44.4 | 29.1 |
| Vehicles..... | 5.0 | 5.6 | 6.0 | 2.8 | 2.9 |
| Hot substances..... | 44.1 | 28.6 | 27.2 | 18.0 | 22.6 |
| Falls of persons..... | 22.5 | 16.0 | 7.8 | 15.6 | 16.0 |
| Falling objects..... | 31.5 | 31.4 | 41.9 | 27.1 | 34.3 |
| Handling..... | 124.0 | 94.8 | 49.7 | 60.4 | 58.5 |
| Unclassified..... | 31.9 | 30.0 | 27.6 | 22.9 | 18.2 |
| Total..... | 323.5 | 260.9 | 199.9 | 191.2 | 181.6 |
| Accident severity rates (per 10,000 hours' exposure) | | | | | |
| Machinery..... | 3.62 | 4.02 | 3.39 | 4.97 | 7.97 |
| Vehicles..... | 2.26 | .18 | 2.82 | .04 | .14 |
| Hot substances..... | 3.65 | .51 | 4.87 | .37 | .53 |
| Falls of persons..... | 1.83 | .20 | 2.83 | .40 | .29 |
| Falling objects..... | 3.17 | .67 | .97 | 2.61 | .66 |
| Handling..... | 2.71 | 3.08 | 1.35 | 2.62 | 1.26 |
| Unclassified..... | .46 | .52 | .39 | .55 | .34 |
| Total..... | 17.70 | 9.13 | 16.62 | 11.56 | 11.40 |

ELECTRICAL DEPARTMENT

In the electrical department during the five years 1920 to 1924 accident frequency declined but accident severity increased. Since the same condition is found in the large group in which causes were not recorded, it seems necessary to conclude that safety effort in this department has not been so successful as in others.

Two observations are pertinent to the situation: 1. When there is a marked decline in accident frequency it is very easy to regard this as a true index and to overlook the fact that accident severity is rising; 2. The use of electricity has been increasing enormously and it may well be that this increase has outrun the precautions taken to render its use safe.

TABLE 92.—ACCIDENT FREQUENCY AND SEVERITY RATES FOR THE ELECTRICAL DEPARTMENT, 1920 TO 1924, BY YEARS AND ACCIDENT CAUSES

| Accident cause | 1920 | 1921 | 1922 | 1923 | 1924 |
|--|---|--------------|--------------|--------------|--------------|
| | Accident frequency rates (per 10,000,000 hours' exposure) | | | | |
| Machinery..... | 14.5 | 23.9 | 27.6 | 25.7 | 13.1 |
| Vehicles..... | 5.8 | 2.6 | 1.3 | 6.1 | ..... |
| Hot substances..... | 72.6 | 38.8 | 40.7 | 24.4 | 26.2 |
| Falls of persons..... | 42.5 | 29.5 | 26.3 | 23.1 | 17.8 |
| Falling objects..... | 27.0 | 17.4 | 18.4 | 9.8 | 9.5 |
| Handling..... | 80.2 | 49.5 | 14.4 | 24.4 | 8.4 |
| Unclassified..... | 42.6 | 52.4 | 18.4 | 19.6 | 16.7 |
| Total..... | 284.2 | 214.1 | 147.1 | 138.1 | 91.7 |
| Accident severity rates (per 10,000 hours' exposure) | | | | | |
| Machinery..... | 1.48 | 0.37 | 2.82 | 2.30 | 11.98 |
| Vehicles..... | 5.85 | .01 | 7.88 | 7.20 | 7.00 |
| Hot substances..... | .85 | 8.64 | .56 | 7.89 | 7.82 |
| Falls of persons..... | 5.78 | .48 | .71 | 8.55 | .65 |
| Falling objects..... | .77 | .26 | .41 | .15 | .25 |
| Handling..... | 1.64 | .57 | .21 | .82 | .49 |
| Unclassified..... | .31 | 1.53 | .19 | .34 | .41 |
| Total..... | 16.68 | 11.86 | 12.78 | 20.25 | 28.60 |

WIRE DRAWING

Only the experience of the last 5-year period is available for the wire drawing department. The record shows that accident frequency declined to a considerable degree while accident severity was pretty nearly the same in three of the years, going up sharply in the other two. In 1921 there were serious accidents in the handling of material, while in 1923 machinery furnished the heaviest severity (22.50). With the old type of wire-drawing benches there was very great danger that a workman's hand would be caught in a kink of the wire. If this happened, the loss of part or all of the hand was almost sure to occur. The modern type of mill, now almost universal, has an automatic stop which greatly reduces this hazard.

TABLE 93.—ACCIDENT FREQUENCY AND SEVERITY RATES FOR WIRE DRAWING, 1920 TO 1924, BY YEARS AND ACCIDENT CAUSES

| Accident cause | 1920 | 1921 | 1922 | 1923 | 1924 |
|--|---|--------------|--------------|--------------|--------------|
| | Accident frequency rates (per 10,000,000 hours' exposure) | | | | |
| Machinery..... | 42.0 | 20.9 | 21.0 | 32.6 | 33.0 |
| Vehicles..... | 2.0 | 3.0 | 3.0 | 2.5 | 6.0 |
| Hot substances..... | 21.0 | 17.9 | 6.0 | 15.1 | 6.0 |
| Falls of persons..... | 21.0 | 18.0 | 8.0 | 7.5 | 6.0 |
| Falling objects..... | 17.0 | 6.0 | 9.0 | 12.6 | 8.0 |
| Handling..... | 123.0 | 66.0 | 68.0 | 50.2 | 34.0 |
| Unclassified..... | 39.0 | 29.9 | 50.0 | 60.2 | 22.0 |
| Total..... | 315.0 | 161.7 | 165.0 | 180.7 | 109.0 |
| Accident severity rates (per 10,000 hours' exposure) | | | | | |
| Machinery..... | 8.20 | 4.70 | 3.60 | 22.50 | 13.60 |
| Vehicles..... | (1) | 2.00 | (1) | .70 | .20 |
| Hot substances..... | .10 | .10 | .10 | .23 | .20 |
| Falls of persons..... | .10 | 4.20 | .20 | .11 | (4) |
| Falling objects..... | .20 | .70 | .20 | .30 | .30 |
| Handling..... | 4.70 | 14.30 | 1.30 | 1.22 | .50 |
| Unclassified..... | .80 | 5.20 | 8.60 | 11.20 | .20 |
| Total..... | 14.10 | 31.10 | 14.00 | 36.27 | 14.90 |

¹Not separately shown; included in "Unclassified."

HOT ROLLING OF SHEETS

The group on which the accident rates for hot rolling of sheets are based is rather small and may not represent typical conditions. Both frequency and severity rates are highly irregular and do not exhibit a consistent trend.

TABLE 94.—ACCIDENT FREQUENCY AND SEVERITY RATES FOR HOT SHEET ROLLING, 1920 TO 1924, BY YEARS AND ACCIDENT CAUSES

| Accident cause | 1920 | 1921 | 1922 | 1923 | 1924 |
|--|---|--------------|--------------|--------------|--------------|
| | Accident frequency rates (per 10,000,000 hours' exposure) | | | | |
| Machinery..... | 28.0 | 11.7 | 36.0 | 90.0 | 36.0 |
| Vehicles..... | 2.0 | 23.0 | — | 26.0 | 3.0 |
| Hot substances..... | 14.0 | 17.0 | 18.0 | 19.3 | 3.0 |
| Falls of person..... | 26.0 | 41.0 | 16.0 | 77.0 | 11.0 |
| Falling objects..... | 25.0 | 30.0 | 53.0 | 77.0 | 15.0 |
| Handling..... | 180.0 | 153.0 | 181.0 | 180.0 | 67.0 |
| Unclassified..... | 72.0 | 30.0 | 71.0 | 23.2 | 17.0 |
| Total..... | 347.0 | 265.7 | 374.0 | 433.5 | 152.0 |
| Accident severity rates (per 10,000 hours' exposure) | | | | | |
| Machinery..... | 2.80 | 2.30 | 0.90 | 8.90 | 12.30 |
| Vehicles..... | — | .30 | .10 | 3.00 | .10 |
| Hot substances..... | .20 | 1.20 | .10 | 2.00 | .10 |
| Falls of person..... | .20 | 1.20 | 3.30 | 4.60 | .50 |
| Falling objects..... | .50 | 2.70 | 1.50 | 1.20 | 9.40 |
| Handling..... | 2.20 | 1.30 | 1.80 | 1.37 | 1.30 |
| Unclassified..... | .70 | 1.40 | 4.70 | 3.60 | .50 |
| Total..... | 6.60 | 10.40 | 12.40 | 24.67 | 24.20 |

The foregoing discussion gives a fair idea of the relative importance of the main cause groups. Considered from the standpoint of accident severity machinery still contributes the largest share of the damage. On the accident frequency side handling of tools and material is the major factor.

This situation suggests at once the nature and the point of application of remedial measures. Machine accidents are mainly controllable by various forms of "engineering revision" which are discussed at length elsewhere.⁸ The cases due to handling may be reduced by instruction, which renders the worker skillful and properly careful. Too much emphasis can not be placed upon the fact that the development of skill is much more important than cautionary exhortation.

MINES, QUARRIES, AND METALLURGICAL WORKS

COAL MINES

The following tables are derived from the publications of the Bureau of Mines, which issues a comprehensive annual statement. Rates in these tables are given in terms of 1,000,000 hours' exposure. This is an approximation, since it was impossible from the data available to determine exactly the number of hours worked. The relations of these rates among themselves are correct, but they are not perfectly comparable with similar rates found in other portions of this bulletin.

It will be noticed that in Table 95 there are two methods of presenting the facts; namely, the rate per 1,000,000 hours' exposure and the rate per 1,000,000 tons mined. It is desirable to consider both of these rates. That based on hours of exposure gives a measure of the hazard of fatal injury encountered by the men. The rate by quantity mined measures the cost of coal in terms of fatal accidents. It may be regarded as a satisfactory condition when both these rates are declining with reasonable rapidity.

From 1907 to 1924 fatalities per 1,000,000 hours' exposure declined 23.6 per cent, while fatalities per 1,000,000 tons mined declined 38.5 per cent. This more rapid decline of cost as compared with hazard is undoubtedly related to the introduction of machinery and improved methods. While a more rapid decline might fairly be expected, it is gratifying that the movement is in the right direction.

⁸ See United States Bureau of Labor Statistics Bul. No. 296, pp. 192-214.

TABLE 95.—MEN EMPLOYED, AVERAGE PRODUCTION PER MAN, MEN KILLED, AND FATALITY RATES IN COAL MINES IN THE UNITED STATES, 1907 TO 1924, BY YEARS

| Year | Tons mined (short tons) | Men employed | | Average production per man (tons) | | Men killed | Fatality rate per 1,000,000 hours' exposure | Production per death (short tons) | Fatalities per 1,000,000 tons mined |
|------|-------------------------|---------------|-------------------|-----------------------------------|---------|------------|---|-----------------------------------|-------------------------------------|
| | | Actual number | Full-year workers | Per year | Per day | | | | |
| 1907 | 477,892,536 | 674,613 | 519,452 | 708 | 3.07 | 3,242 | 2.06 | 147,407 | 6.78 |
| 1908 | 409,309,857 | 673,873 | 441,267 | 608 | 3.09 | 2,445 | 1.85 | 167,407 | 5.97 |
| 1909 | 460,807,263 | 666,535 | ..... | 691 | ..... | 2,642 | ..... | 174,416 | 5.73 |
| 1910 | 501,596,378 | 725,030 | 531,689 | 692 | 3.14 | 2,521 | 1.77 | 177,808 | 5.62 |
| 1911 | 486,371,126 | 728,348 | 534,122 | 682 | 3.10 | 2,656 | 1.66 | 186,887 | 5.35 |
| 1912 | 534,466,580 | 722,662 | 541,997 | 740 | 3.29 | 2,419 | 1.49 | 220,945 | 4.53 |
| 1913 | 570,048,125 | 747,644 | 593,131 | 762 | 3.20 | 2,785 | 1.57 | 204,685 | 4.89 |
| 1914 | 513,525,477 | 763,185 | 526,598 | 673 | 3.25 | 2,454 | 1.55 | 209,261 | 4.78 |
| 1915 | 531,619,487 | 734,008 | 511,598 | 724 | 3.46 | 2,269 | 1.48 | 234,297 | 4.27 |
| 1916 | 590,098,175 | 720,971 | 565,766 | 818 | 3.48 | 2,226 | 1.31 | 265,094 | 3.77 |
| 1917 | 651,402,374 | 757,317 | 634,666 | 860 | 3.42 | 2,696 | 1.42 | 241,618 | 4.14 |
| 1918 | 678,211,904 | 762,426 | 654,973 | 890 | 3.45 | 2,580 | 1.31 | 262,873 | 3.80 |
| 1919 | 553,952,259 | 776,569 | 542,217 | 713 | 3.41 | 2,317 | 1.42 | 239,082 | 4.13 |
| 1920 | 658,264,932 | 784,621 | 601,283 | 839 | 3.65 | 2,271 | 1.26 | 289,857 | 3.45 |
| 1921 | 506,395,401 | 823,253 | 474,529 | 615 | 3.56 | 1,987 | 1.40 | 254,854 | 3.92 |
| 1922 | 476,951,121 | 848,932 | 405,056 | 565 | 3.92 | 1,979 | 1.63 | 233,576 | 4.15 |
| 1923 | 667,903,671 | 860,560 | 560,000 | 764 | 3.91 | 2,458 | 1.46 | 267,492 | 3.74 |
| 1924 | 571,613,400 | 779,613 | 499,894 | 733 | 3.81 | 2,381 | 1.59 | 240,072 | 4.17 |
| 1925 | 585,083,000 | ..... | ..... | ..... | ..... | 2,230 | ..... | ..... | ..... |

LOCATION AND CAUSES OF ACCIDENTS

Table 96 summarizes the facts regarding the place of occurrence and the cause of accidents in coal mines from 1916 to 1924. The underground occupations have much the larger share of fatalities, and nearly or quite half of the underground fatalities result from falls of material from roof or face. Attention has perhaps been too much directed to those startling "major casualties" in which by explosion of gas or dust many hundreds of lives may be suddenly brought to a close. Inspection of the rates in Table 95 will show that such explosions stand third in order of importance.

Table 95 shows that since 1907 there has been a material improvement in hazard but from 1916 on, the record is irregular, with a tendency somewhat upward.

It would be advantageous if the underground and surface exposure could be separated. The underground rates would doubtless be higher and surface rates lower than those of the table, which are based upon the entire exposure, it not being possible from the data at hand to make this separation.

TABLE 96.—FATALITIES IN COAL MINES IN THE UNITED STATES, 1916 TO 1925, BY YEAR, PLACE OF OCCURRENCE, AND CAUSE

| Place and cause | 1916 | 1917 | 1918 | 1919 | 1920 | 1921 | 1922 | 1923 | 1924 | 1925 |
|---|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| Number of fatalities | | | | | | | | | | |
| Underground: | | | | | | | | | | |
| Falls of roof or face..... | 962 | 1, 218 | 1, 294 | 1, 100 | 1, 132 | 1, 024 | 905 | 1, 162 | 1, 062 | 1, 078 |
| Cars and locomotives..... | 390 | 482 | 506 | 381 | 408 | 341 | 341 | 415 | 350 | 360 |
| Explosions, gas or dust..... | 170 | 362 | 129 | 191 | 164 | 116 | 311 | 372 | 536 | 345 |
| Explosives..... | 146 | 111 | 135 | 206 | 128 | 152 | 92 | 114 | 100 | 102 |
| Electricity..... | 90 | 79 | 88 | 69 | 76 | 80 | 74 | 75 | 81 | 84 |
| Miscellaneous..... | 269 | 127 | 129 | 130 | 112 | 118 | 77 | 117 | 100 | 100 |
| Total underground..... | 2, 027 | 2, 379 | 2, 281 | 2, 077 | 2, 020 | 1, 831 | 1, 800 | 2, 255 | 2, 229 | 2, 060 |
| Shaft..... | 49 | 52 | 52 | 53 | 56 | 36 | 41 | 46 | 29 | 34 |
| Surface: | | | | | | | | | | |
| Haulage..... | 75 | 114 | 118 | 93 | 78 | 45 | 54 | 59 | 70 | 40 |
| Machinery..... | 26 | 51 | 47 | 28 | 29 | 17 | 23 | 26 | 8 | 9 |
| Miscellaneous..... | 49 | 100 | 82 | 66 | 88 | 58 | 61 | 72 | 60 | 78 |
| Total surface..... | 150 | 265 | 247 | 187 | 195 | 120 | 138 | 157 | 138 | 127 |
| Grand total..... | 2, 226 | 2, 696 | 2, 580 | 2, 317 | 2, 271 | 1, 967 | 1, 979 | 2, 458 | 2, 396 | 2, 280 |
| Fatality rates (per 1,000,000 hours' exposure) | | | | | | | | | | |
| Underground: | | | | | | | | | | |
| Falls of roof or face..... | 0.57 | 0.84 | 0.66 | 0.68 | 0.63 | 0.72 | 0.74 | 0.69 | 0.70 | ----- |
| Cars and locomotives..... | .23 | .25 | .26 | .23 | .23 | .24 | .25 | .25 | .23 | ----- |
| Explosions, gas or dust..... | .10 | .19 | .07 | .12 | .09 | .08 | .26 | .22 | .36 | ----- |
| Explosives..... | .09 | .06 | .07 | .13 | .07 | .11 | .08 | .07 | .07 | ----- |
| Electricity..... | .05 | .04 | .04 | .04 | .04 | .06 | .06 | .04 | .05 | ----- |
| Miscellaneous..... | .16 | .07 | .06 | .06 | .06 | .08 | .06 | .07 | .07 | ----- |
| Total underground..... | 1.19 | 1.25 | 1.16 | 1.28 | 1.12 | 1.29 | 1.48 | 1.34 | 1.48 | ----- |
| Shaft..... | .08 | .08 | .03 | .03 | .03 | .03 | .03 | .03 | .02 | ----- |
| Surface: | | | | | | | | | | |
| Haulage..... | .05 | .06 | .06 | .06 | .04 | .03 | .05 | .04 | .05 | ----- |
| Machinery..... | .02 | .03 | .02 | .02 | .02 | .01 | .02 | .01 | .01 | ----- |
| Miscellaneous..... | .03 | .05 | .04 | .04 | .05 | .04 | .05 | .04 | .03 | ----- |
| Total surface..... | .09 | .14 | .12 | .11 | .11 | .08 | .12 | .09 | .09 | ----- |
| Grand total..... | 1.31 | 1.42 | 1.31 | 1.42 | 1.26 | 1.40 | 1.63 | 1.46 | 1.59 | ----- |

Table 97 affords a comparison of the hazards of coal mining and railway operation. There is a common opinion that coal mining is an unusually hazardous occupation. This is due to the fact that from time to time, much too often, a sudden catastrophe overtakes the workers in a mine and many of them are killed. Then comes possibly prolonged rescue work, recorded from day to day in the public press. All this tends to impress the public, to the exclusion of consideration of the men, both in mining and in railway service, who are taken one or two at a time. The table indicates that railway service is about as hazardous as anthracite coal mining and is distinctly more hazardous than bituminous coal mining.

TABLE 97.—COAL-MINE FATALITIES VERSUS STEAM-RAILWAY FATALITIES: FATALITY RATES (PER 1,000 EMPLOYEES), 1909 TO 1918, BY YEARS

| Year | Fatality rates (per 1,000 employees) | | | Year | Fatality rates (per 1,000 employees) | | |
|-----------|--|------------|------------------|-----------|--|------------|------------------|
| | Underground workers in Pennsylvania coal mines | | Railway trainmen | | Underground workers in Pennsylvania coal mines | | Railway trainmen |
| | Anthracite | Bituminous | | | Anthracite | Bituminous | |
| 1909..... | 3.97 | 3.12 | 4.87 | 1914..... | 3.98 | 2.33 | 4.73 |
| 1910..... | 4.19 | 3.03 | 5.41 | 1915..... | 4.01 | 2.61 | 3.53 |
| 1911..... | 4.88 | 3.23 | 5.49 | 1916..... | 4.28 | 2.92 | 4.07 |
| 1912..... | 3.90 | 2.73 | 5.22 | 1917..... | 4.27 | 3.13 | 4.23 |
| 1913..... | 4.33 | 3.59 | 5.05 | 1918..... | 4.35 | 3.10 | 4.29 |

METAL MINES

Table 98, while not giving a very clear idea of the trend of accident experience in metal mining, does give an idea of the relative importance of various types of mining. It is noticeable that since 1917 there has been a considerable decrease in the number of men employed, there being 200,579 in 1917 and 123,128 in 1924. This is due in part to changed methods of mining.

TABLE 98.—NUMBER OF MEN EMPLOYED AND NUMBER KILLED AND INJURED IN METAL MINES IN THE UNITED STATES, 1917 TO 1924, BY KIND OF MINE

| Kind of mine | Active operators | Men employed | | | Men killed | | | Men injured (time lost more than 1 day) | | |
|--|------------------|----------------|---------------|----------------|-------------|------------|------------|---|--------------|---------------|
| | | Underground | Surface | Total | Underground | Surface | Total | Underground | Surface | Total |
| 1917 | | | | | | | | | | |
| Copper..... | 649 | 43,715 | 17,560 | 61,275 | 1,352 | 22 | 374 | 16,532 | 3,403 | 19,935 |
| Gold, silver, and miscellaneous metal..... | 3,166 | 35,812 | 16,080 | 51,892 | 165 | 30 | 195 | 7,144 | 1,241 | 8,385 |
| Iron..... | 205 | 31,549 | 25,681 | 57,230 | 135 | 56 | 191 | 8,872 | 3,406 | 12,278 |
| Lead and zinc (Mississippi Valley)..... | 369 | 15,075 | 5,194 | 20,269 | 65 | 3 | 68 | 3,777 | 767 | 4,544 |
| Nonmetallic mineral..... | 248 | 2,726 | 7,187 | 9,913 | 9 | 14 | 23 | 430 | 714 | 1,144 |
| Total..... | 4,637 | 128,877 | 71,702 | 200,579 | 727 | 125 | 852 | 36,755 | 9,531 | 46,286 |
| 1918 | | | | | | | | | | |
| Copper..... | 524 | 42,286 | 17,161 | 59,447 | 180 | 40 | 220 | 17,201 | 3,312 | 20,513 |
| Gold, silver, and miscellaneous metal..... | 2,429 | 28,061 | 15,582 | 43,643 | 152 | 29 | 181 | 5,429 | 2,418 | 7,847 |
| Iron..... | 176 | 28,775 | 24,890 | 53,665 | 128 | 51 | 179 | 6,858 | 2,763 | 9,621 |
| Lead and zinc (Mississippi Valley)..... | 268 | 10,344 | 3,660 | 14,004 | 43 | 4 | 47 | 3,145 | 601 | 3,746 |
| Nonmetallic mineral..... | 271 | 2,690 | 9,157 | 11,847 | 10 | 9 | 19 | 334 | 854 | 1,188 |
| Total..... | 3,636 | 112,156 | 70,459 | 182,606 | 513 | 133 | 646 | 32,967 | 9,948 | 42,915 |
| 1919 | | | | | | | | | | |
| Copper..... | 410 | 27,298 | 12,029 | 39,327 | 120 | 20 | 140 | 10,002 | 2,234 | 12,236 |
| Gold, silver, and miscellaneous metal..... | 2,430 | 21,868 | 10,262 | 32,130 | 113 | 13 | 126 | 4,656 | 813 | 5,469 |
| Iron..... | 157 | 28,234 | 19,442 | 47,676 | 107 | 32 | 139 | 6,907 | 2,191 | 9,098 |
| Lead and zinc (Mississippi Valley)..... | 141 | 10,075 | 2,893 | 12,968 | 42 | 3 | 45 | 2,322 | 363 | 3,185 |
| Nonmetallic mineral..... | 245 | 3,356 | 9,805 | 13,161 | 5 | 12 | 18 | 414 | 1,104 | 1,518 |
| Total..... | 3,393 | 90,831 | 54,431 | 145,262 | 388 | 80 | 468 | 24,801 | 6,705 | 31,506 |

¹ Includes 161 fatalities due to the North Butte mine fire, Butte, Mont.

TABLE 98.—NUMBER OF MEN EMPLOYED AND NUMBER KILLED AND INJURED IN METAL MINES IN THE UNITED STATES, 1917 TO 1924, BY YEARS AND KIND OF MINES—Continued

| Kind of mine | Active operators | Men employed | | | Men killed | | | Men injured (time lost more than 1 day) | | |
|--|------------------|--------------|---------|---------|-------------|---------|-------|---|---------|--------|
| | | Underground | Surface | Total | Underground | Surface | Total | Underground | Surface | Total |
| 1920 | | | | | | | | | | |
| Copper..... | 367 | 23,671 | 11,653 | 35,254 | 107 | 21 | 128 | 9,624 | 2,423 | 12,047 |
| Gold, silver, and miscellaneous metal..... | 2,358 | 20,077 | 9,856 | 29,933 | 100 | 17 | 117 | 4,794 | 910 | 5,704 |
| Iron..... | 154 | 25,627 | 20,363 | 45,990 | 86 | 20 | 106 | 6,734 | 2,338 | 9,072 |
| Lead and zinc (Mississippi Valley)..... | 119 | 8,861 | 2,777 | 11,638 | 33 | 3 | 36 | 3,223 | 384 | 3,607 |
| Nonmetallic mineral..... | 263 | 3,149 | 10,619 | 13,768 | 8 | 30 | 38 | 5,571 | 1,561 | 2,132 |
| Total..... | 3,281 | 81,385 | 55,196 | 136,583 | 334 | 91 | 425 | 24,946 | 7,616 | 32,562 |
| 1921 | | | | | | | | | | |
| Copper..... | 357 | 12,865 | 5,435 | 18,300 | 49 | 6 | 55 | 4,073 | 649 | 4,722 |
| Gold, silver, and miscellaneous metal..... | 2,135 | 17,642 | 8,874 | 25,516 | 66 | 12 | 78 | 4,439 | 913 | 5,352 |
| Iron..... | 122 | 17,501 | 13,038 | 30,559 | 45 | 20 | 65 | 3,126 | 1,381 | 4,507 |
| Lead and zinc (Mississippi Valley)..... | 66 | 5,302 | 1,646 | 6,498 | 14 | ----- | 14 | 1,875 | 187 | 2,062 |
| Nonmetallic mineral..... | 216 | 2,630 | 8,976 | 11,606 | 8 | 10 | 18 | 627 | 1,334 | 1,961 |
| Total..... | 2,896 | 55,940 | 37,989 | 93,929 | 182 | 48 | 230 | 14,140 | 4,464 | 18,604 |
| 1922 | | | | | | | | | | |
| Copper..... | 274 | 17,547 | 8,192 | 25,739 | 68 | 7 | 75 | 6,976 | 1,049 | 8,025 |
| Gold, silver, and miscellaneous metal..... | 1,942 | 18,362 | 9,252 | 27,614 | 131 | 9 | 140 | 5,923 | 882 | 6,805 |
| Iron..... | 110 | 17,696 | 14,645 | 32,241 | 64 | 19 | 83 | 3,700 | 1,201 | 4,901 |
| Lead and zinc (Mississippi Valley)..... | 74 | 6,747 | 2,243 | 8,990 | 22 | ----- | 22 | 3,470 | 398 | 3,868 |
| Nonmetallic mineral..... | 199 | 2,530 | 8,583 | 11,113 | 13 | 11 | 24 | 663 | 1,818 | 2,481 |
| Total..... | 2,599 | 62,782 | 42,915 | 105,697 | 298 | 46 | 344 | 20,732 | 5,348 | 26,080 |
| 1923 | | | | | | | | | | |
| Copper..... | 306 | 21,655 | 10,822 | 32,477 | 90 | 17 | 107 | 10,119 | 1,874 | 11,993 |
| Gold, silver, and miscellaneous metal..... | 2,104 | 20,772 | 9,853 | 30,525 | 102 | 12 | 114 | 7,078 | 1,594 | 8,672 |
| Iron..... | 115 | 20,086 | 18,338 | 38,419 | 62 | 27 | 89 | 4,260 | 1,356 | 5,616 |
| Lead and zinc (Mississippi Valley)..... | 82 | 7,728 | 2,498 | 10,226 | 25 | 2 | 27 | 4,455 | 439 | 4,894 |
| Nonmetallic minerals..... | 218 | 3,346 | 8,286 | 11,632 | 10 | 20 | 30 | 796 | 1,592 | 2,388 |
| Total..... | 2,825 | 73,587 | 49,692 | 123,279 | 289 | 78 | 367 | 26,708 | 6,855 | 33,563 |
| 1924 | | | | | | | | | | |
| Copper..... | 271 | 21,369 | 11,106 | 32,477 | 101 | 20 | 121 | 9,623 | 2,235 | 11,858 |
| Gold, silver, and miscellaneous metal..... | 2,097 | 19,617 | 10,101 | 29,718 | 135 | 10 | 145 | 7,402 | 1,247 | 8,649 |
| Iron..... | 104 | 20,325 | 16,304 | 36,629 | 71 | 26 | 97 | 3,708 | 1,251 | 4,959 |
| Lead and zinc (Mississippi Valley)..... | 87 | 9,431 | 3,303 | 12,734 | 34 | ----- | 34 | 5,226 | 492 | 5,718 |
| Nonmetallic minerals..... | 224 | 3,344 | 8,226 | 11,570 | 12 | 9 | 21 | 682 | 1,252 | 1,934 |
| Total..... | 2,783 | 74,066 | 49,042 | 123,108 | 353 | 65 | 418 | 26,641 | 6,477 | 33,118 |

Table 99 shows the accident rates for all metal mines from 1911 to 1924. The rate for injuries tends to rise. This is due, in considerable measure, to better reporting rather than to increased hazard. This appears when the fatality rates are considered. These decline for underground workers from 1.83 in 1911 to 1.62 in 1924 (12 per cent). Since fatalities are always more completely reported than are minor injuries, this change may fairly be taken as an index of the shift in hazard during this period. Inspection of the items of the table will convince that there has been a real, though not very great, downward tendency in accident frequency.

TABLE 99.—NUMBER OF FULL-YEAR WORKERS AND ACCIDENT FREQUENCY RATES FOR METAL MINES IN THE UNITED STATES (PER 1,000,000 HOURS' EXPOSURE), 1911 TO 1924, BY YEARS

| Year | Full-year workers | | | Accident frequency rates (per 1,000,000 hours' exposure) | | | | | |
|------|-------------------|---------|---------|--|---------|-------|--------------|---------|-------|
| | | | | Men killed | | | Men injured | | |
| | Under-ground | Surface | Total | Under-ground | Surface | Total | Under-ground | Surface | Total |
| 1911 | 98,389 | 57,700 | 156,089 | 1.83 | 0.88 | 1.48 | 72.43 | 30.03 | 56.76 |
| 1912 | 105,153 | 56,509 | 161,662 | 1.65 | .82 | 1.36 | 75.81 | 34.65 | 63.37 |
| 1913 | 121,293 | 62,300 | 183,593 | 1.51 | .72 | 1.24 | 70.15 | 39.84 | 59.86 |
| 1914 | 91,659 | 50,960 | 142,619 | 1.70 | .61 | 1.31 | 87.27 | 40.68 | 70.62 |
| 1915 | 89,821 | 52,178 | 141,997 | 1.67 | .65 | 1.30 | 106.62 | 41.95 | 82.85 |
| 1916 | 125,601 | 66,854 | 192,455 | 1.52 | .61 | 1.21 | 102.04 | 48.80 | 83.55 |
| 1917 | 126,815 | 65,270 | 192,085 | 1.91 | .64 | 1.48 | 96.61 | 48.67 | 80.32 |
| 1918 | 113,441 | 67,565 | 181,006 | 1.51 | .66 | 1.19 | 96.87 | 49.08 | 79.03 |
| 1919 | 85,769 | 50,513 | 136,282 | 1.51 | .53 | 1.14 | 96.39 | 44.25 | 77.06 |
| 1920 | 80,215 | 54,325 | 134,540 | 1.39 | .56 | 1.05 | 103.66 | 46.73 | 80.67 |
| 1921 | 45,199 | 29,311 | 74,510 | 1.34 | .55 | 1.03 | 104.28 | 50.76 | 83.23 |
| 1922 | 59,454 | 37,684 | 97,138 | 1.67 | .41 | 1.18 | 116.24 | 47.30 | 89.49 |
| 1923 | 73,669 | 48,197 | 121,866 | 1.31 | .54 | 1.00 | 120.85 | 47.40 | 91.80 |
| 1924 | 72,631 | 46,482 | 119,113 | 1.62 | .46 | 1.17 | 122.27 | 46.43 | 92.68 |

QUARRIES

The increase in injury rates for quarries which appears in Table 100 is undoubtedly due to more complete reporting. The fatality rate of the first five-year period is slightly higher than that for the second period and in the last four years there has been a further pronounced drop. The exposure during the interval has been singularly uniform. The slightly declining death rate reflects the improvement in equipment and in method.

TABLE 100.—NUMBER OF MEN EMPLOYED, NUMBER OF MEN KILLED AND INJURED, AND ACCIDENT FREQUENCY RATES FOR QUARRIES IN THE UNITED STATES, 1911 TO 1920, BY YEARS

| Year | Men employed | | Men killed | Men injured | Frequency rates (per 1,000,000 hours' exposure) | |
|-------------------|---------------|-------------------|------------|-------------|---|-------------|
| | Actual number | Full-year workers | | | Men killed | Men injured |
| 1911 | 110,954 | 84,417 | 188 | 5,390 | 0.74 | 21.28 |
| 1912 | 113,105 | 83,857 | 213 | 6,552 | .76 | 23.67 |
| 1913 | 106,278 | 87,141 | 183 | 7,739 | .70 | 29.60 |
| 1914 | 87,936 | 68,187 | 189 | 7,836 | .88 | 35.31 |
| 1915 | 100,740 | 82,447 | 148 | 9,671 | .60 | 39.10 |
| Average, 5 years | 103,803 | 83,206 | 182 | 7,437 | .73 | 29.80 |
| 1916 | 90,707 | 76,457 | 173 | 13,427 | .75 | 58.54 |
| 1917 | 82,290 | 71,525 | 131 | 13,242 | .61 | 61.71 |
| 1918 | 68,532 | 59,285 | 125 | 8,719 | .70 | 49.02 |
| 1919 | 75,506 | 63,794 | 123 | 9,198 | .64 | 48.07 |
| 1920 | 86,488 | 77,089 | 178 | 11,217 | .77 | 48.50 |
| Average, 5 years | 80,682 | 69,630 | 146 | 11,161 | .70 | 53.43 |
| Average, 10 years | 92,243 | 76,418 | 164 | 9,299 | .72 | 40.56 |
| 1921 | 77,185 | 59,958 | 120 | 10,465 | .67 | 58.18 |
| 1922 | 79,081 | 68,861 | 132 | 11,839 | .64 | 57.31 |
| 1923 | 92,455 | 85,153 | 143 | 14,990 | .56 | 58.68 |
| 1924 | 94,242 | 84,246 | 138 | 14,777 | .54 | 58.34 |

METALLURGICAL PLANTS

Ore-dressing plants and auxiliary works show no material improvement in accident experience in the interval under consideration in Table 101. In smelting plants the fatality rates declined from 0.64 to 0.18 (72 per cent) and injury rates declined from 58.24 to 37.55 (36 per cent).

TABLE 101.—ACCIDENTS AND ACCIDENT RATES IN METALLURGICAL PLANTS IN THE UNITED STATES, 1913 TO 1924, BY YEARS

| Kind of plant and year | Men employed | | Men killed | Men injured | Frequency rates (per 1,000,000 hours' exposure) | |
|-------------------------------------|---------------|-------------------|------------|-------------|---|-------------|
| | Actual number | Full-year workers | | | Men killed | Men injured |
| Ore-dressing plants: | | | | | | |
| 1913..... | 14,985 | 16,154 | 16 | 1,977 | 0.33 | 40.79 |
| 1914..... | 15,128 | 15,225 | 23 | 1,434 | .50 | 31.40 |
| 1915..... | 18,564 | 19,107 | 30 | 2,095 | .52 | 36.55 |
| 1916..... | 22,470 | 23,470 | 33 | 3,184 | .47 | 45.22 |
| 1917..... | 24,111 | 24,372 | 47 | 2,952 | .64 | 40.37 |
| 1918..... | 21,809 | 22,517 | 35 | 3,142 | .55 | 46.51 |
| 1919..... | 17,262 | 16,862 | 25 | 2,057 | .49 | 40.74 |
| 1920..... | 16,827 | 16,813 | 21 | 2,024 | .44 | 54.75 |
| 1921..... | 10,047 | 8,037 | 4 | 1,214 | .17 | 50.35 |
| 1922..... | 11,676 | 11,052 | 12 | 1,984 | .36 | 59.84 |
| 1923..... | 14,899 | 14,782 | 24 | 2,549 | .54 | 57.48 |
| 1924..... | 15,735 | 16,093 | 20 | 2,511 | .41 | 52.01 |
| Smelting plants:¹ | | | | | | |
| 1913..... | 20,564 | 24,309 | 47 | 4,247 | .64 | 58.24 |
| 1914..... | 27,879 | 32,336 | 33 | 5,673 | .34 | 58.45 |
| 1915..... | 31,327 | 36,262 | 88 | 5,718 | .35 | 52.86 |
| 1916..... | 43,829 | 49,363 | 96 | 9,656 | .24 | 65.20 |
| 1917..... | 44,376 | 50,650 | 53 | 7,745 | .35 | 50.96 |
| 1918..... | 39,809 | 45,439 | 42 | 6,743 | .31 | 49.47 |
| 1919..... | 28,777 | 31,324 | 34 | 4,431 | .36 | 47.15 |
| 1920..... | 26,099 | 30,411 | 20 | 4,147 | .23 | 47.44 |
| 1921..... | 14,621 | 14,204 | 14 | 2,129 | .33 | 49.96 |
| 1922..... | 19,495 | 20,887 | 16 | 3,002 | .26 | 47.90 |
| 1923..... | 22,439 | 26,677 | 17 | 3,487 | .21 | 43.57 |
| 1924..... | 24,941 | 29,231 | 16 | 3,298 | .18 | 37.55 |
| Auxiliary works: | | | | | | |
| 1913, 1914, 1915 ² | 14,007 | 15,763 | 14 | 2,240 | .30 | 47.37 |
| 1916..... | 15,555 | 17,014 | 16 | 2,381 | .31 | 56.44 |
| 1917..... | 18,044 | 20,111 | 17 | 2,808 | .28 | 46.54 |
| 1918..... | 15,081 | 16,172 | 5 | 1,638 | .10 | 33.76 |
| 1919..... | 16,306 | 18,363 | 20 | 2,022 | .37 | 38.73 |
| 1920..... | 8,762 | 8,308 | 9 | 1,151 | .86 | 46.18 |
| 1921..... | 12,829 | 14,069 | 17 | 1,692 | .40 | 40.09 |
| 1922..... | 16,533 | 18,040 | 17 | 2,388 | .31 | 44.12 |
| 1923..... | 15,520 | 17,024 | 19 | 2,422 | .36 | 45.81 |

¹ Not including auxiliary works such as shops, yards, etc.

² Not including iron blast furnaces.

³ Included under ore dressing and smelting plants.

COKE OVENS

A striking feature of Table 102 is the very great falling off in the number employed in the beehive ovens. There were less than a third as many in 1924 as there were in 1916. This, of course, means the discarding of a wasteful and inefficient method, but apparently the increased use of machinery gives accident rates rather higher in by-product ovens than in beehive ovens.

The beehive ovens tend to higher rates both for fatality and for injury. The by-product process records a decline in fatality rates from 1.04 in 1917 to 0.42 in 1924 (60 per cent), and from 100.02 in injury rates in 1917 to 23.78 in 1924 (76 per cent).

TABLE 102.—NUMBER OF MEN EMPLOYED AND ACCIDENTS AND ACCIDENT RATES IN BEEHIVE AND BY-PRODUCT COKE OVENS, 1916 TO 1924, BY YEARS

| Year | Men employed | | Men killed | Men injured | Frequency rates (per 1,000,000 hours' exposure) | |
|--------------------------|---------------|-------------------|------------|-------------|---|-------------|
| | Actual number | Full-year workers | | | Men killed | Men injured |
| Beehive ovens: | | | | | | |
| 1916..... | 18,570 | 18,591 | 24 | 1,866 | 0.43 | 33.46 |
| 1917..... | 18,820 | 19,295 | 25 | 1,822 | .43 | 31.45 |
| 1918..... | 16,412 | 16,436 | 19 | 2,155 | .39 | 43.70 |
| 1919..... | 13,333 | 10,829 | 19 | 1,364 | .31 | 41.09 |
| 1920..... | 10,955 | 10,094 | 11 | 1,035 | .36 | 34.13 |
| Average, 5 years..... | 15,624 | 15,049 | 18 | 1,049 | .40 | 33.53 |
| 1921..... | 6,011 | 2,835 | 5 | 396 | .59 | 39.51 |
| 1922..... | 7,871 | 4,823 | 8 | 474 | .55 | 32.76 |
| 1923..... | 8,515 | 7,144 | 12 | 875 | .56 | 40.83 |
| 1924..... | 6,490 | 4,025 | 3 | 457 | .25 | 37.85 |
| By-product ovens: | | | | | | |
| 1916..... | 13,033 | 15,528 | 21 | 3,371 | .45 | 72.36 |
| 1917..... | 13,597 | 16,300 | 51 | 4,891 | 1.04 | 100.02 |
| 1918..... | 15,947 | 19,040 | 64 | 5,037 | .95 | 98.09 |
| 1919..... | 15,499 | 16,845 | 43 | 2,667 | .85 | 52.78 |
| 1920..... | 17,184 | 19,827 | 38 | 2,390 | .64 | 49.01 |
| Average, 5 years..... | 15,034 | 17,508 | 41 | 3,789 | .78 | 72.14 |
| 1921..... | 10,193 | 11,063 | 12 | 1,517 | .36 | 45.88 |
| 1922..... | 11,407 | 13,413 | 21 | 1,296 | .52 | 30.72 |
| 1923..... | 15,214 | 18,493 | 33 | 1,718 | .60 | 30.96 |
| 1924..... | 14,001 | 16,656 | 21 | 1,188 | .42 | 23.79 |
| All coke ovens: | | | | | | |
| 1916..... | 31,603 | 34,119 | 45 | 5,237 | .44 | 51.18 |
| 1917..... | 32,417 | 35,595 | 76 | 6,713 | .71 | 62.86 |
| 1918..... | 32,369 | 35,476 | 78 | 7,792 | .69 | 78.26 |
| 1919..... | 28,741 | 27,674 | 33 | 4,031 | .64 | 48.35 |
| 1920..... | 28,139 | 29,921 | 49 | 3,415 | .55 | 38.04 |
| Average, 5 years..... | 30,658 | 32,557 | 59 | 5,438 | .60 | 55.68 |
| 1921..... | 16,204 | 13,868 | 17 | 1,853 | .41 | 44.54 |
| 1922..... | 19,278 | 18,236 | 29 | 1,710 | .53 | 31.26 |
| 1923..... | 23,729 | 25,827 | 45 | 2,593 | .60 | 33.78 |
| 1924..... | 20,451 | 20,681 | 24 | 1,645 | .39 | 26.51 |

MISCELLANEOUS INDUSTRIES

STATE RECORDS

In an earlier section of this report the accident record of the various States has been presented classified by industries. That record dealt solely with the number of casualties. Such a record has an informative value but fails entirely to afford any hint regarding relative hazard, and consequently gives no suggestion regarding the place where accident prevention methods may be profitably applied. For example, the fact that Indiana had 506 casualties in the manufacture of agricultural implements in the year 1925 while Ohio had 194 may mean simply that the production of such implements is on a larger scale in Indiana than in Ohio, or it may mean that danger of casualty

is much greater in Indiana. It is entirely impossible to determine the significance of the facts without further investigation.

The steps in the process of converting the bare facts into a form which has real meaning are these:

1. It must be determined how many man-hours of exposure occurred in the portion of the industry covered by the record in each State.

2. The number of casualties must be divided by the man-hours of exposure, giving frequency rates.

When the resulting rates are compared it is found that the concerns covered in Indiana had a frequency rate of 45.20 cases per 1,000,000 hours' exposure in the manufacture of agricultural implements, while Ohio had 60.02 cases; that is, frequency of accident was considerably greater in Ohio than in Indiana.

Of course, many other factors may need to be considered in reaching a final conclusion, but so far as it goes such a comparison of rates gives some real information regarding relative hazard and can therefore be used as a basis for accident-prevention study.

In view of the fact that rates have been so little used in accident studies, outside of railways, mines, and the iron and steel industry, the United States Bureau of Labor Statistics has sought to encourage the development of accident rates and has published such as were available from time to time. Recently the bureau has sought to utilize the information contained in the State accident reports by relating such data for selected establishments to data regarding the number of man-hours worked by such establishments. The accident data were obtained through the cooperation of the various State agencies. The employment data were obtained directly from the establishments.

The selection of the establishments was as follows: For some time the bureau has obtained monthly reports of volume of employment from some 10,000 concerns. This list had been carefully chosen to cover adequately the various important industries and to include plants of both large and small size. Fifty-two industrial groups are covered by the employment studies. From these 24 were selected as having the greatest significance from the standpoint of accident study. A small amount of additional information from each concern made possible the determination of a close approximation to the man-hours of exposure. The combination of these items—namely, exposure and accidents—gave the rates hereafter presented. Table 103 shows the accident rates for the only States (Ohio, Illinois, and Minnesota) for which information was available for both 1924 and 1925.

TABLE 103.—ACCIDENT FREQUENCY AND SEVERITY RATES FOR SPECIFIED INDUSTRIES IN OHIO, ILLINOIS, AND MINNESOTA, 1924 AND 1925

| Industry | Full-year workers | Number of cases | | | | Accident frequency rates (per 1,000,000 hours' exposure) | | | | Accident severity rates (per 1,000 hours' exposure) | | | |
|---|-------------------|-----------------|-------------------------|-------------------------|-------|--|-------------------------|-------------------------|-------|---|-------------------------|-------------------------|-------|
| | | Death | Perma-nent dis-abil-ity | Tempo-rary dis-abil-ity | Total | Death | Perma-nent dis-abil-ity | Tempo-rary dis-abil-ity | Total | Death | Perma-nent dis-abil-ity | Tempo-rary dis-abil-ity | Total |
| 1924 | | | | | | | | | | | | | |
| Agricultural imple-ments | 3,142 | | 19 | 361 | 380 | 2.02 | 33.32 | 40.34 | | 1.62 | 0.68 | 2.30 | |
| Automobiles | 5,648 | | 17 | 495 | 512 | 1.00 | 29.21 | 30.21 | | 1.00 | .55 | 1.55 | |
| Automobile tires | 5,772 | 1 | 25 | 1,741 | 1,767 | 0.06 | 1.40 | 97.18 | 98.64 | 0.33 | 1.60 | 1.18 | 3.11 |
| Boots and shoes | 1,614 | | 1 | 23 | 24 | | .21 | 4.75 | 4.96 | | | .11 | .17 |
| Brick | 3,514 | 2 | 13 | 622 | 537 | .19 | 1.23 | 49.52 | 50.94 | 1.14 | .68 | .97 | 2.79 |
| Electrical machinery | 4,626 | 1 | 46 | 364 | 411 | .07 | 3.31 | 28.23 | 29.61 | .43 | 2.99 | .34 | 3.76 |
| Flour | 2,921 | 1 | 6 | 113 | 120 | .11 | .68 | 12.89 | 13.68 | .68 | .85 | .18 | 1.71 |
| Foundry and machine shops | 17,774 | 9 | 79 | 1,928 | 2,016 | .15 | 1.32 | 32.14 | 33.61 | .90 | 1.08 | .45 | 2.45 |
| Furniture | 5,333 | 1 | 21 | 204 | 226 | .06 | 1.31 | 12.75 | 14.12 | .38 | .91 | .28 | 1.55 |
| Glass | 1,283 | 1 | 5 | 289 | 295 | .26 | 1.30 | 75.07 | 76.63 | 1.56 | 1.36 | .83 | 2.75 |
| Lumber—planing mills | 1,852 | 2 | 15 | 128 | 145 | .36 | 2.70 | 23.04 | 26.10 | 2.16 | 5.17 | .71 | 8.04 |
| Machine tools | 3,635 | 1 | 9 | 322 | 332 | .09 | .83 | 29.53 | 30.45 | .55 | .55 | .31 | 1.41 |
| Paper and pulp | 1,171 | 1 | 13 | 148 | 162 | .28 | 3.70 | 42.14 | 46.12 | 1.71 | 2.83 | .67 | 5.31 |
| Pottery | 953 | | 2 | 60 | 62 | | .70 | 21.00 | 21.70 | | .84 | .47 | 1.31 |
| Slaughtering and meat packing | 19,911 | 11 | 99 | 1,311 | 1,420 | .18 | 1.64 | 21.95 | 23.77 | 1.10 | 1.21 | .70 | 3.01 |
| Steam fittings, apparatus, and supplies | 1,424 | | 3 | 272 | 275 | | .70 | 63.68 | 64.38 | | .49 | .79 | 1.28 |
| Stoves | 3,278 | 3 | 3 | 325 | 331 | .31 | .31 | 83.05 | 83.67 | 1.83 | .24 | .31 | 2.38 |
| Structural-iron work | 1,187 | 1 | 6 | 303 | 310 | .28 | 1.68 | 85.06 | 87.02 | 1.68 | .94 | 1.04 | 3.67 |
| 1925 | | | | | | | | | | | | | |
| Agricultural imple-ments | 4,771 | 6 | 20 | 266 | 292 | .42 | 1.40 | 18.58 | 20.40 | 2.51 | 1.18 | .31 | 4.06 |
| Automobiles | 5,193 | 2 | 12 | 182 | 196 | .13 | .77 | 11.68 | 12.58 | .77 | .79 | .21 | 1.77 |
| Automobile tires | 14,832 | 3 | 62 | 2,962 | 3,017 | .07 | 1.16 | 66.32 | 67.55 | .40 | 1.06 | .74 | 2.20 |
| Boots and shoes | 3,336 | | | 124 | 124 | | | 12.39 | 12.39 | | | | 19.19 |
| Brick | 6,402 | 3 | 9 | 629 | 641 | .16 | .47 | 32.75 | 33.38 | .94 | 1.00 | .51 | 2.45 |
| Electrical machinery | 8,512 | 1 | 21 | 360 | 382 | .04 | .82 | 14.10 | 14.96 | .23 | .65 | .13 | 1.01 |
| Flour | 3,443 | 4 | 6 | 191 | 201 | .39 | .58 | 18.49 | 19.46 | 2.32 | .62 | .25 | 3.09 |
| Foundry and machine shops | 19,205 | 4 | 47 | 1,635 | 1,686 | .07 | .82 | 28.38 | 29.27 | .42 | .69 | .34 | 1.45 |
| Furniture | 5,289 | | 28 | 212 | 238 | | 1.64 | 13.37 | 15.01 | | 1.15 | .28 | 1.43 |
| Glass | 1,552 | | 2 | 414 | 416 | | .43 | 88.98 | 89.36 | | .77 | .75 | 1.52 |
| Lumber—planing mills | 1,563 | 3 | 6 | 57 | 66 | .64 | 1.28 | 12.15 | 14.07 | 3.84 | 1.66 | .30 | 5.90 |
| Machine tools | 2,960 | | 5 | 258 | 263 | | .56 | 29.05 | 29.61 | | .39 | .29 | .68 |
| Paper and pulp | 1,510 | 2 | 7 | 163 | 172 | .44 | 1.55 | 35.99 | 37.98 | 2.65 | 1.59 | .64 | 4.88 |
| Pottery | 1,206 | | 1 | 80 | 81 | | .28 | 22.12 | 22.40 | | .50 | .31 | .81 |
| Slaughtering and meat packing | 19,648 | 15 | 63 | 1,300 | 1,378 | .25 | 1.07 | 22.06 | 23.38 | 1.53 | .90 | .43 | 2.86 |
| Steam fittings, apparatus, and supplies | 692 | | 2 | 122 | 124 | | .96 | 58.80 | 59.76 | | .51 | .81 | 1.32 |
| Stoves | 1,753 | | 2 | 275 | 277 | | .38 | 52.30 | 52.68 | | .48 | .49 | .97 |
| Structural-iron work | 2,069 | 4 | 14 | 459 | 477 | .64 | 2.26 | 73.94 | 76.84 | 3.87 | 2.38 | .99 | 7.24 |

According to this table the frequency rates range in 1924 from 4.96 for boots and shoes to 98.64 for automobile tires. In 1925 the range is from 12.39 for boots and shoes to 89.36 for glass. In 12 industries there is a decline in the rate from 1924 to 1925 while 6 industries show a rising rate.

The declines are as follows: Agricultural implements from 40.34 to 20.40, or 49 per cent; automobiles from 30.21 to 12.58, or 58 per cent; automobile tires from 98.64 to 67.55, or 32 per cent; brick from 50.94 to 33.38, or 34 per cent; electrical machinery from 29.61 to 14.96, or 49 per cent; foundries and machine shops from 33.61 to 29.27, or 13 per cent; planing mills from 26.10 to 14.07, or 46 per cent; machine tools from 30.45 to 29.61, or 3 per cent; paper and pulp from 46.12 to 37.98, or 18 per cent; slaughtering and meat packing from 23.77 to 23.38, or 2 per cent; steam fittings from 64.38 to 59.76, or 7 per cent; structural-iron work from 87.02 to 76.84, or 12 per cent.

The increases are: Boots and shoes from 4.96 to 12.39, or 150 per cent; flour from 13.68 to 19.46, or 42 per cent; furniture from 14.12 to 15.01, or 6 per cent; glass from 76.63 to 89.36, or 17 per cent; pottery from 21.70 to 22.40, or 3 per cent; stoves from 33.67 to 52.68, or 56 per cent.

Two cautions are pertinent regarding conclusions to be drawn from these figures:

1. In several of the industrial groups the exposure is not large enough to be as authoritative as could be desired.
2. Percentages of increase and decrease are not comparable with each other. Increases can be compared with increases and declines with declines, but a per cent of increase is not comparable with a per cent of decline.

Not only is it desirable to consider the frequency of accidents, but if the whole story is to be told some device must be utilized which will bring out the relative severity. To this end the Bureau of Labor Statistics developed and has utilized the severity rate. This rate is coming to be more generally used as industrial managers come to be aware of the new light which it sheds on the accident problem.⁹

In the case of the three States from which data have been secured for the years 1924 and 1925 it was possible to compute severity rates and these are also shown in the table. They are expressed in terms of days lost per 1,000 man-hours of exposure; death and permanent disabilities are given a fixed time allowance in terms of days.

When these severity rates are examined it appears that in 12 industries there was a decline in severity and in 6 a rising severity rate.

The relation of the two rates to each other is indicated by the following: In 8 industries both frequency and severity declined. In 2 industries both rose. In 4 industries frequency declined and severity rose. In 4 industries frequency rose and severity declined.

The amount of decline in severity in the different industries is as follows: Automobile tires from 3.11 to 2.20, or 29 per cent; brick from 2.79 to 2.45, or 12 per cent; electrical machinery from 3.76 to 1.01, or 73 per cent; foundries and machine shops from 2.43 to 1.45, or 40 per cent; lumber from 8.04 to 5.80, or 28 per cent; machine tools from 1.41 to 0.68, or 52 per cent; paper and pulp from 5.21 to 4.88, or 6 per cent; slaughtering and meat packing from 3.01 to 2.86, or 5 per cent; furniture from 1.55 to 1.43, or 8 per cent; glass from 3.75 to 1.52, or 59 per cent; pottery from 1.31 to 0.81, or 38 per cent; stoves from 2.38 to 0.97, or 59 per cent.

⁹ For full account of standard method of computing frequency and severity rates, see U. S. Bureau of Labor Statistics Bul. No. 276, p. 68.

The rising severity rates are in the following industries: Boots and shoes from 0.17 to 0.19, or 12 per cent; flour from 1.71 to 3.09, or 81 per cent; agricultural implements from 2.30 to 4.00, or 74 per cent; automobiles from 1.55 to 1.77, or 14 per cent; steam fittings from 1.28 to 1.32, or 3 per cent; structural-iron work from 3.67 to 7.24, or 97 per cent.

Table 104 summarizes by industries the data gathered from 11 States for the year 1925. It represents a fair sample from 24 industries located in 11 States, operating 1,272 plants and employing the equivalent of 555,988 full-year workers. The exposure and the number of cases are sufficient in nearly every case to make the rates a fairly dependable index of average conditions. A further extension of collection of such data into other States and additional industries is greatly to be desired; in fact, it is necessary if a standard presentation is to be secured.

TABLE 104.—ACCIDENT FREQUENCY AND SEVERITY RATES FOR SPECIFIED INDUSTRIES IN 11 STATES, 1923

| Industry and State | Number of States or industries | Number of establishments | Full-year workers | Number of cases | | | | Accident frequency rates (per 1,000,000 hours' exposure) | | | | Accident severity rates (per 1,000 hours' exposure) | | | | | |
|--|--------------------------------|--------------------------|-------------------|-----------------|-----------------------------------|-----------------------------------|-------|--|-----------------------------------|-----------------------------------|-------|---|-----------------------------------|-----------------------------------|-------|--|--|
| | | | | Death | Perma- nent disa- bility | Tempo- rary disa- bility | Total | Death | Perma- nent disa- bility | Tempo- rary disa- bility | Total | Death | Perma- nent disa- bility | Tempo- rary disa- bility | Total | | |
| INDUSTRY ¹ | States | | | | | | | | | | | | | | | | |
| Agricultural implements..... | 8 | 55 | 16,295 | 9 | 78 | 1,050 | 1,137 | 0.18 | 1.60 | 23.31 | 25.09 | 1.10 | 1.26 | 0.42 | 2.78 | | |
| Automobiles..... | 8 | 73 | 189,385 | 56 | 704 | 4,247 | 5,007 | .10 | 1.24 | 7.80 | 9.14 | .59 | 1.02 | .16 | 1.77 | | |
| Automobile tires..... | 3 | 25 | 20,097 | 4 | 62 | 3,068 | 3,134 | .07 | 1.03 | 57.98 | 59.08 | .40 | 1.06 | .84 | 2.30 | | |
| Boots and shoes..... | 5 | 31 | 11,200 | ..... | 6 | 232 | 258 | ..... | .18 | 9.88 | 10.06 | ..... | .13 | .19 | .32 | | |
| Brick..... | 9 | 94 | 15,595 | 8 | 29 | 1,050 | 1,087 | .17 | .62 | 30.46 | 31.25 | 1.03 | .73 | .55 | 2.31 | | |
| Carpets..... | 3 | 19 | 10,999 | 5 | 33 | 94 | 132 | .15 | 1.00 | 4.87 | 6.02 | .91 | 1.45 | .15 | 2.51 | | |
| Chemicals..... | 4 | 31 | 11,609 | 3 | 35 | 192 | 230 | .09 | 1.00 | 5.63 | 6.72 | .52 | 1.49 | .18 | 2.19 | | |
| Electrical machinery..... | 8 | 71 | 60,653 | 13 | 229 | 1,170 | 1,412 | .07 | 1.26 | 9.46 | 10.79 | .43 | 1.12 | .24 | 1.79 | | |
| Flour..... | 3 | 27 | 3,616 | 4 | 7 | 203 | 214 | .37 | .65 | 18.71 | 19.73 | 2.21 | .57 | .27 | 3.05 | | |
| Foundry and machine shops..... | 11 | 256 | 75,404 | 18 | 324 | 3,421 | 3,763 | .08 | 1.43 | 23.62 | 25.13 | .48 | 1.24 | .43 | 2.15 | | |
| Furniture..... | 10 | 165 | 24,519 | ..... | 80 | 903 | 983 | ..... | 1.09 | 14.96 | 16.05 | ..... | .79 | .25 | 1.04 | | |
| Glass..... | 4 | 49 | 12,138 | 1 | 18 | 529 | 548 | .03 | .49 | 24.37 | 24.89 | .16 | .65 | .27 | 1.08 | | |
| Leather..... | 5 | 26 | 9,301 | 2 | 30 | 182 | 214 | .07 | 1.08 | 11.17 | 12.32 | .43 | .82 | .29 | 1.54 | | |
| Lumber—planing mills..... | 10 | 64 | 9,852 | 6 | 58 | 541 | 605 | .20 | 1.96 | 19.78 | 21.94 | 1.22 | 2.62 | .49 | 4.33 | | |
| Lumber—sawmills..... | 4 | 22 | 10,223 | 11 | 24 | 567 | 602 | .36 | .78 | 18.49 | 19.63 | 2.15 | .66 | .48 | 3.29 | | |
| Machine tools..... | 7 | 48 | 6,033 | 1 | 17 | 332 | 350 | .06 | .94 | 21.09 | 22.09 | .33 | .77 | .27 | 1.37 | | |
| Paper and pulp..... | 8 | 34 | 11,142 | 5 | 80 | 590 | 675 | .15 | 2.39 | 20.47 | 23.01 | .90 | 3.20 | .75 | 4.85 | | |
| Pottery..... | 2 | 13 | 3,148 | 1 | 3 | 156 | 160 | .11 | .32 | 16.52 | 16.95 | .64 | .87 | .37 | 1.88 | | |
| Slaughtering and meat packing..... | 3 | 13 | 23,900 | 15 | 81 | 1,645 | 1,741 | .21 | 1.13 | 22.94 | 24.28 | 1.26 | .94 | .42 | 2.62 | | |
| Stamped and enameled ware..... | 3 | 7 | 1,473 | ..... | 3 | 75 | 78 | ..... | .68 | 16.97 | 17.65 | ..... | .54 | .19 | .73 | | |
| Steam fittings, apparatus, and supplies..... | 6 | 44 | 6,212 | 1 | 38 | 335 | 374 | .05 | 2.04 | 31.52 | 33.61 | .32 | 1.89 | .74 | 2.95 | | |
| Stoves..... | 4 | 29 | 3,688 | 1 | 3 | 352 | 356 | .08 | .25 | 43.08 | 43.41 | .50 | .24 | .45 | 1.19 | | |
| Structural-iron work..... | 10 | 60 | 6,524 | 6 | 42 | 559 | 607 | .31 | 2.15 | 48.49 | 50.95 | 1.84 | 1.95 | .75 | 4.54 | | |
| Woolen goods..... | 2 | 25 | 12,682 | 1 | 13 | 33 | 47 | .03 | .34 | 1.59 | 1.96 | .16 | .24 | .05 | .45 | | |

| STATE | Indus-tries | | | | | | | | | | | | | | | | |
|-------------------|-------------|-------|---------|----|-----|-------|-------|-----|------|--------------------|-------|------|------|------------------|------|--|--|
| Illinois..... | 13 | 120 | 51,330 | 21 | 134 | 1,737 | 1,892 | .14 | .87 | ³ 11.28 | 12.29 | .82 | .69 | .27 | 1.78 | | |
| Indiana..... | 13 | 122 | 20,585 | 1 | 51 | 2,219 | 2,271 | .02 | .83 | 35.93 | 36.78 | .10 | .46 | .50 | 1.06 | | |
| Iowa..... | 9 | 54 | 11,074 | 2 | 40 | 880 | 922 | .06 | 1.20 | 26.49 | 27.75 | .36 | 1.01 | .40 | 1.77 | | |
| Maryland..... | 12 | 52 | 7,199 | 1 | 12 | 478 | 491 | .05 | .56 | 22.13 | 22.74 | .28 | .84 | .45 | 1.57 | | |
| Michigan..... | 7 | 44 | 165,918 | 48 | 580 | 3,624 | 4,252 | .10 | 1.17 | ² 7.28 | 8.55 | .58 | .90 | .16 | 1.64 | | |
| Minnesota..... | 12 | 60 | 13,744 | 14 | 55 | 1,141 | 1,210 | .34 | 1.33 | 27.67 | 29.34 | 2.04 | 1.46 | .49 | 3.99 | | |
| New Jersey..... | 14 | 113 | 46,060 | 7 | 223 | 1,010 | 1,240 | .03 | 1.08 | ² 4.65 | 5.71 | .30 | 1.57 | .21 | 2.09 | | |
| New York..... | 15 | 131 | 70,053 | 26 | 511 | 1,733 | 2,270 | .12 | 2.43 | ² 8.25 | 10.80 | .74 | 2.79 | .37 | 3.90 | | |
| Ohio..... | 15 | 161 | 43,213 | 13 | 120 | 7,043 | 7,176 | .10 | .93 | 54.32 | 55.35 | .60 | .93 | .56 | 2.09 | | |
| Pennsylvania..... | 19 | 342 | 93,733 | 26 | 226 | | 252 | .26 | 2.23 | (¹) | 2.48 | 1.54 | 1.66 | (¹) | 3.20 | | |
| Wisconsin..... | 11 | 73 | 28,083 | 12 | 95 | 1,631 | 1,738 | .14 | 1.13 | 19.36 | 20.63 | .85 | .55 | .41 | 1.81 | | |
| Total..... | | 1,272 | 555,988 | | | | | | | | | | | | | | |

¹ On p. 112 will be found a similar industries table based on data assembled by the National Safety Council.

² This rate is too low, since the industry is located so largely in Michigan, which does not report temporary disabilities terminating in the first week.

³ Does not include temporary disabilities terminating in the first week.

⁴ Data for temporary disabilities not available.

Table 105 shows accident rates by industries for each of the 11 States. In general the Bureau of Labor Statistics avoids computing rates where the exposure is less than the equivalent of 1,000 full-year workers. In this case, however, it seemed best for the sake of completeness to include even those groups in which the exposure was less than the standard amount.

Some unfortunate deficiencies in the data must be pointed out. The data for temporary disabilities in Pennsylvania could not be secured, therefore in computing rates for temporary disabilities Pennsylvania exposure was not used. Illinois, Michigan, and New Jersey do not report disabilities ending in the first week. New York has hitherto omitted those ending in the first two weeks. The effect of these omissions is to lower the frequency rates for temporary disabilities. The severity rates are so little influenced by these deficiencies that the effect may be disregarded.

TABLE 105.—ACCIDENT FREQUENCY AND SEVERITY RATES IN SPECIFIED INDUSTRIES, 1925, BY STATES

| AGRICULTURAL IMPLEMENTS | | | | | | | | | | | | | | |
|-------------------------|--------------------------|-------------------|-----------------|------------------------|------------------------|--|-------|------------------------|------------------------|---|-------|------------------------|------------------------|-------|
| State | Number of establishments | Full-year workers | Number of cases | | | Accident frequency rates (per 1,000,000 hours' exposure) | | | | Accident severity rates (per 1,000 hours' exposure) | | | | |
| | | | Death | Perma-nent disa-bility | Tempo-rary disa-bility | Total | Death | Perma-nent disa-bility | Tempo-rary disa-bility | Total | Death | Perma-nent disa-bility | Tempo-rary disa-bility | Total |
| Illinois..... | 13 | 2,808 | | 9 | 165 | 74 | | 1.07 | 17.72 | 8.79 | | 0.68 | 10.15 | 0.83 |
| Indiana..... | 9 | 3,732 | 1 | 17 | 483 | 506 | 0.09 | 1.52 | 43.59 | 45.20 | 0.54 | 1.38 | .72 | 2.04 |
| Iowa..... | 4 | 418 | | | 38 | 38 | | | 30.27 | 30.27 | | | .44 | .44 |
| Minnesota..... | 5 | 886 | 2 | 2 | 20 | 24 | .75 | .75 | 7.53 | 9.03 | 4.52 | .56 | .08 | 5.16 |
| New York..... | 3 | 1,615 | | 14 | 230 | 45 | .21 | 2.89 | 6.19 | 9.29 | 1.24 | 3.14 | 1.23 | 4.61 |
| Ohio..... | 13 | 1,077 | 4 | 9 | 181 | 194 | 1.24 | 2.78 | 56.00 | 60.02 | 7.43 | 3.02 | .90 | 11.35 |
| Pennsylvania..... | 5 | 1,282 | | 3 | (¹) | 3 | | .78 | | .78 | | | .34 | .34 |
| Wisconsin..... | 3 | 4,476 | 1 | 24 | 228 | 253 | .07 | 1.79 | 16.98 | 18.84 | .45 | .95 | .34 | 1.74 |
| Total..... | 55 | 16,295 | 9 | 78 | 1,050 | 1,137 | .18 | 1.60 | 23.31 | 25.09 | 1.10 | 1.26 | .42 | 2.78 |

| AUTOMOBILES | | | | | | | | | | | | | | |
|-------------------|--------------------------|-------------------|-----------------|------------------------|------------------------|--|-------|------------------------|------------------------|---|-------|------------------------|------------------------|-------|
| State | Number of establishments | Full-year workers | Number of cases | | | Accident frequency rates (per 1,000,000 hours' exposure) | | | | Accident severity rates (per 1,000 hours' exposure) | | | | |
| | | | Death | Perma-nent disa-bility | Tempo-rary disa-bility | Total | Death | Perma-nent disa-bility | Tempo-rary disa-bility | Total | Death | Perma-nent disa-bility | Tempo-rary disa-bility | Total |
| Illinois..... | 8 | 2,990 | 2 | 7 | 145 | 54 | 0.22 | 0.78 | 5.02 | 6.02 | 1.34 | 0.27 | 0.11 | 1.71 |
| Indiana..... | 4 | 2,239 | | 9 | 176 | 185 | | 1.34 | 26.21 | 27.55 | | .47 | .27 | .74 |
| Michigan..... | 25 | 152,620 | 42 | 599 | 3,210 | 3,801 | .09 | 1.20 | 7.01 | 8.30 | .55 | .91 | .14 | 1.60 |
| New Jersey..... | 5 | 3,113 | | 25 | 72 | 97 | | 2.68 | 7.71 | 10.39 | | 2.28 | .19 | 2.47 |
| New York..... | 15 | 11,919 | 6 | 85 | 189 | 279 | .17 | 2.38 | 5.26 | 7.81 | 1.01 | 2.42 | 1.25 | 3.68 |
| Ohio..... | 5 | 2,202 | | 5 | 137 | 142 | | .76 | 20.73 | 21.49 | | 1.50 | .35 | 1.85 |
| Pennsylvania..... | 5 | 7,851 | | 5 | 41 | (¹) | 1.46 | .21 | 1.74 | | 1.27 | 1.22 | | 2.49 |
| Wisconsin..... | 6 | 6,450 | 1 | 24 | 378 | 403 | .05 | 1.24 | 19.53 | 20.82 | .31 | .62 | .41 | 1.34 |
| Total..... | 73 | 189,385 | 56 | 704 | 4,247 | 5,007 | .10 | 1.24 | 7.80 | 9.14 | .59 | 1.02 | .16 | 1.77 |

| AUTOMOBILE TIRES | | | | | | | | | | | | | | |
|-------------------|--------------------------|-------------------|-----------------|------------------------|------------------------|--|-------|------------------------|------------------------|---|-------|------------------------|------------------------|-------|
| State | Number of establishments | Full-year workers | Number of cases | | | Accident frequency rates (per 1,000,000 hours' exposure) | | | | Accident severity rates (per 1,000 hours' exposure) | | | | |
| | | | Death | Perma-nent disa-bility | Tempo-rary disa-bility | Total | Death | Perma-nent disa-bility | Tempo-rary disa-bility | Total | Death | Perma-nent disa-bility | Tempo-rary disa-bility | Total |
| New Jersey..... | 7 | 2,749 | 1 | 10 | 197 | 108 | 0.12 | 1.21 | 11.76 | 13.09 | 0.73 | 2.03 | 0.37 | 3.13 |
| Ohio..... | 12 | 14,888 | 3 | 52 | 2,962 | 3,017 | .07 | 1.16 | 66.32 | 67.55 | .40 | 1.06 | .74 | 2.20 |
| Pennsylvania..... | 6 | 2,450 | | 9 | (²) | 9 | | 1.22 | | 1.22 | | 1.13 | | 1.13 |
| Total..... | 25 | 20,087 | 4 | 62 | 3,068 | 3,134 | .07 | 1.03 | 57.98 | 59.08 | .40 | 1.06 | .84 | 2.30 |

¹ Data for temporary disabilities ending in first week not available.

² Data for temporary disabilities ending in first two weeks not available.

³ Data for temporary disabilities not available.

TABLE 105.—ACCIDENT FREQUENCY AND SEVERITY RATES IN SPECIFIED INDUSTRIES, 1925, BY STATES—Continued

BOOTS AND SHOES

| State | Number of establishments | Full-year work-ers | Number of cases | | | Accident frequency rates (per 1,000,000 hours' exposure) | | | | Accident severity rates (per 1,000 hours' exposure) | | | | |
|-------------------|--------------------------|--------------------|-----------------|------------------------|------------------------|--|-------|------------------------|------------------------|---|-------|------------------------|------------------------|-------|
| | | | Death | Perma-nent disabil-ity | Tempo-rary disabil-ity | Total | Death | Perma-nent disabil-ity | Tempo-rary disabil-ity | Total | Death | Perma-nent disabil-ity | Tempo-rary disabil-ity | Total |
| Illinois..... | 5 | 3,336 | | | 124 | 124 | | | 12.39 | 12.39 | | | 0.19 | 0.19 |
| Maryland..... | 7 | 8,510 | | | 54 | 54 | | | 21.14 | 21.14 | | | .44 | .44 |
| New York..... | 7 | 2,238 | | 4 | 21 | 25 | | 0.60 | 3.13 | 3.73 | | 0.51 | 1.11 | .62 |
| Pennsylvania..... | 8 | 2,697 | | (¹) | (¹) | | | | | | | | | |
| Wisconsin..... | 4 | 2,079 | | 2 | 53 | 55 | | .32 | 8.50 | 8.82 | | .14 | .17 | .31 |
| Total..... | 31 | 11,200 | | 6 | 252 | 258 | | .18 | 9.88 | 10.06 | | .13 | .19 | .32 |

BRICK

| | | | | | | | | | | | | | | |
|-------------------|----|--------|---|----|------------------|-------|------|------|-------|-------|------|------|------|------|
| Illinois..... | 12 | 3,302 | 1 | 6 | 197 | 204 | 0.09 | 0.53 | 17.27 | 17.89 | 0.53 | 1.13 | 0.45 | 2.11 |
| Indiana..... | 10 | 696 | | 1 | 166 | 167 | | .48 | 79.56 | 80.04 | | .14 | .71 | .85 |
| Iowa..... | 16 | 1,013 | 1 | 1 | 74 | 76 | .33 | .33 | 24.36 | 25.02 | 1.98 | .10 | .45 | 2.53 |
| Maryland..... | 5 | 470 | | | 52 | 52 | | | 36.88 | 36.88 | | | .99 | .99 |
| Minnesota..... | 1 | 57 | | | 6 | 6 | | | 34.90 | 34.90 | | | .33 | .33 |
| New Jersey..... | 12 | 1,900 | | 8 | 170 | 78 | | 1.40 | 12.28 | 13.68 | | 1.01 | 1.28 | 1.29 |
| New York..... | 10 | 1,008 | | 7 | 259 | 69 | .66 | 2.31 | 19.51 | 22.48 | 3.97 | 1.62 | 1.03 | 6.62 |
| Ohio..... | 9 | 2,542 | 2 | 3 | 426 | 431 | .26 | .39 | 55.86 | 56.51 | 1.57 | .84 | .62 | 3.03 |
| Pennsylvania..... | 19 | 4,106 | 2 | 3 | (²) | 5 | .16 | .24 | | .40 | .97 | .30 | | 1.27 |
| Total..... | 94 | 15,995 | 8 | 29 | 1,050 | 1,087 | .17 | .62 | 30.46 | 31.25 | 1.63 | .73 | .55 | 2.31 |

CARPETS

| | | | | | | | | | | | | | | |
|-------------------|----|--------|---|----|------------------|-----|------|-------|-------|------|------|------|------|------|
| New Jersey..... | 3 | 857 | | 3 | 127 | 30 | 1.17 | 10.50 | 11.67 | | 3.23 | 1.09 | 3.52 | 3.52 |
| New York..... | 2 | 5,571 | 3 | 27 | 267 | 97 | 0.18 | 1.62 | 4.01 | 5.81 | 1.08 | 2.31 | 1.13 | 3.52 |
| Pennsylvania..... | 14 | 4,571 | 2 | 3 | (³) | 5 | .15 | .22 | | .37 | .88 | .08 | | .96 |
| Total..... | 19 | 10,999 | 5 | 33 | 94 | 132 | .15 | 1.00 | 4.87 | 6.02 | .91 | 1.45 | .15 | 2.51 |

CHEMICALS

| | | | | | | | | | | | | | | |
|-------------------|----|--------|---|----|-----|-----|------|-------|-------|------|------|------|------|------|
| Maryland..... | 5 | 1,330 | | 1 | 44 | 45 | 0.25 | 11.03 | 11.28 | | 0.08 | 0.25 | 0.32 | 0.32 |
| New Jersey..... | 17 | 6,778 | 1 | 12 | 189 | 102 | 0.05 | .59 | 4.38 | 5.02 | 0.30 | .65 | 1.13 | 1.08 |
| New York..... | 7 | 3,236 | 2 | 22 | 269 | 83 | .21 | 2.27 | 6.08 | 8.56 | 1.24 | 3.96 | 1.20 | 5.46 |
| Pennsylvania..... | 2 | 236 | | | | | | | | | | | | |
| Total..... | 31 | 11,600 | 3 | 35 | 192 | 230 | .09 | 1.00 | 5.63 | 6.72 | .52 | 1.49 | .18 | 2.19 |

ELECTRICAL MACHINERY

| | | | | | | | | | | | | | | |
|-------------------|----|--------|----|-----|------------------|-------|------|------|-------|-------|------|------|------|------|
| Illinois..... | 13 | 4,944 | 1 | 14 | 154 | 69 | 0.07 | 0.94 | 3.64 | 4.65 | 0.40 | 0.54 | 0.07 | 1.01 |
| Indiana..... | 3 | 3,080 | | 3 | 184 | 187 | | .32 | 19.91 | 20.23 | | .10 | .17 | .27 |
| Maryland..... | 2 | 851 | | | 30 | 30 | | | 11.75 | 11.75 | | | .24 | .24 |
| Minnesota..... | 1 | 8 | | | 1 | 1 | | | 43.17 | 43.17 | | | 2.37 | 2.37 |
| New Jersey..... | 13 | 8,329 | 1 | 62 | 1140 | 205 | .04 | 2.48 | 5.00 | 8.12 | .24 | 2.47 | 1.15 | 2.85 |
| New York..... | 9 | 20,454 | 4 | 74 | 2,456 | 534 | .07 | 1.21 | 7.43 | 8.71 | .39 | 1.29 | 1.33 | 2.01 |
| Ohio..... | 17 | 3,500 | | 7 | 305 | 312 | | .66 | 28.56 | 29.22 | | .81 | .22 | 1.03 |
| Pennsylvania..... | 13 | 19,441 | 7 | 69 | (⁴) | 76 | .12 | 1.18 | | 1.30 | .72 | .60 | | 1.52 |
| Total..... | 71 | 60,667 | 13 | 229 | 1,170 | 1,412 | .07 | 1.26 | 9.46 | 10.79 | .43 | 1.12 | .24 | 1.79 |

¹ Data for temporary disabilities ending in first week not available.
² Data for temporary disabilities ending in first two weeks not available.
³ Data for temporary disabilities not available.

TABLE 105.—ACCIDENT FREQUENCY AND SEVERITY RATES IN SPECIFIED INDUSTRIES, 1925, BY STATES—Continued

FLOUR

| State | Number of establishments | Full-year work-ers | Number of cases | | | | Accident frequency rates (per 1,000,000 hours' exposure) | | | | Accident severity rates (per 1,000 hours' exposure) | | | |
|----------------|--------------------------|--------------------|-----------------|------------------------|------------------------|-------|--|------------------------|------------------------|-------|---|------------------------|------------------------|-------|
| | | | Death | Perma-nent disa-bility | Tempo-rary disa-bility | Total | Death | Perma-nent disa-bility | Tempo-rary disa-bility | Total | Death | Perma-nent disa-bility | Tempo-rary disa-bility | Total |
| Iowa..... | 6 | 143 | | | 9 | 9 | | | 20.86 | 20.86 | | | 0.57 | 0.57 |
| Maryland..... | 2 | 29 | | 1 | 3 | 4 | 11.31 | 33.94 | 45.25 | | 8.48 | | .90 | 0.38 |
| Minnesota..... | 19 | 3,443 | 4 | 6 | 191 | 201 | 0.39 | .58 | 18.49 | 19.46 | 2.32 | .52 | .25 | 3.08 |
| Total..... | 27 | 3,616 | 4 | 7 | 203 | 214 | .37 | .65 | 18.71 | 19.73 | 2.21 | .57 | .27 | 3.05 |

FOUNDRY AND MACHINE-SHOP PRODUCTS

| | | | | | | | | | | | | | | |
|-------------------|-----|--------|----|-----|-------|-------|------|------|-------|-------|------|------|------|------|
| Illinois..... | 20 | 10,293 | 1 | 26 | 1,239 | 266 | 0.03 | 0.84 | 17.74 | 8.61 | 0.19 | 0.78 | 1.02 | 1.23 |
| Indiana..... | 15 | 1,889 | | 3 | 415 | 418 | | .53 | 73.23 | 73.76 | | .16 | .78 | .94 |
| Iowa..... | 10 | 2,785 | 1 | 15 | 316 | 332 | | 1.80 | 37.32 | 39.74 | | 1.38 | .52 | 2.62 |
| Maryland..... | 10 | 1,317 | 1 | 6 | 155 | 162 | .25 | 1.52 | 39.22 | 40.99 | 1.52 | 3.35 | .64 | 5.53 |
| Michigan..... | 5 | 4,078 | 1 | 15 | 133 | 149 | .06 | 1.23 | 10.57 | 12.18 | .49 | .94 | 1.26 | 1.69 |
| Minnesota..... | 9 | 1,252 | 1 | 4 | 70 | 75 | | 1.03 | 18.20 | 19.56 | 1.56 | 1.25 | .41 | 3.22 |
| New Jersey..... | 21 | 5,672 | 2 | 55 | 1,234 | 291 | .12 | 3.23 | 13.75 | 17.10 | .71 | 2.31 | 1.41 | 3.43 |
| New York..... | 15 | 10,104 | 3 | 128 | 1,327 | 433 | .10 | 4.22 | 10.62 | 14.94 | .59 | 3.90 | .58 | 5.07 |
| Ohio..... | 28 | 7,629 | 2 | 17 | 1,326 | 1,345 | .09 | .74 | 57.93 | 58.76 | .52 | .46 | .43 | 1.41 |
| Pennsylvania..... | 109 | 27,121 | 5 | 47 | (1) | 52 | .05 | .58 | | 64 | .37 | .53 | | .50 |
| Wisconsin..... | 14 | 3,232 | 1 | 8 | 211 | 220 | .10 | .82 | 21.76 | 22.68 | .62 | .32 | .43 | 1.37 |
| Total..... | 257 | 75,404 | 18 | 324 | 3,421 | 3,763 | .08 | 1.43 | 23.62 | 25.13 | .48 | 1.24 | .43 | 2.15 |

FURNITURE

| | | | | | | | | | | | | | |
|-------------------|-----|--------|--|----|-----|-----|------|-------|-------|--|------|------|------|
| Illinois..... | 16 | 2,828 | | 10 | 197 | 107 | 1.18 | 11.43 | 12.61 | | 0.71 | 1.02 | 0.97 |
| Indiana..... | 50 | 6,086 | | 11 | 458 | 469 | .00 | 25.09 | 25.69 | | .26 | .24 | .50 |
| Iowa..... | 5 | 504 | | | 36 | 36 | | 23.79 | 23.79 | | | | .19 |
| Maryland..... | 7 | 422 | | | 30 | 30 | | 23.72 | 23.72 | | | | .58 |
| Michigan..... | 5 | 2,013 | | | 32 | 32 | | 1.50 | 5.30 | | | | 1.20 |
| Minnesota..... | 8 | 634 | | 8 | 38 | 46 | 4.20 | 19.97 | 24.17 | | 2.76 | .36 | 3.12 |
| New York..... | 14 | 2,930 | | 23 | 53 | 76 | 2.62 | 6.03 | 8.65 | | 2.70 | .27 | 2.97 |
| Ohio..... | 15 | 1,821 | | 8 | 77 | 85 | 1.46 | 14.09 | 15.55 | | 1.26 | .29 | 1.55 |
| Pennsylvania..... | 32 | 4,393 | | 17 | (1) | 17 | 1.20 | | 1.29 | | .76 | | .76 |
| Wisconsin..... | 13 | 2,889 | | 3 | 82 | 85 | .35 | 9.46 | 9.81 | | .14 | .17 | .31 |
| Total..... | 165 | 24,519 | | 80 | 903 | 983 | 1.09 | 14.96 | 16.05 | | .79 | .25 | 1.04 |

GLASS

| | | | | | | | | | | | | | | |
|-------------------|----|--------|---|----|-----|-----|------|-------|-------|-------|------|------|------|------|
| Maryland..... | 4 | 1,051 | | 2 | 65 | 67 | 0.63 | 20.61 | 21.24 | | 0.19 | 0.31 | 0.50 | |
| New Jersey..... | 6 | 4,832 | 1 | 7 | 150 | 58 | 0.07 | .50 | 3.80 | 4.71 | 0.43 | .76 | 1.10 | |
| Ohio..... | 5 | 1,552 | | 2 | 414 | 416 | | .43 | 88.93 | 89.36 | | .77 | .75 | |
| Pennsylvania..... | 25 | 4,903 | | 7 | (1) | 7 | | .48 | | 48 | | .59 | .59 | |
| Total..... | 40 | 12,138 | 1 | 18 | 520 | 548 | .03 | .49 | 24.37 | 24.80 | .16 | .65 | .27 | 1.08 |

LEATHER

| | | | | | | | | | | | | | | |
|-------------------|----|-------|---|----|-----|-----|------|-------|-------|-------|------|------|------|------|
| Illinois..... | 5 | 1,378 | | 7 | 158 | 65 | 1.69 | 14.03 | 15.72 | | 1.91 | 1.34 | 2.25 | |
| New Jersey..... | 7 | 1,455 | | 15 | 133 | 48 | 3.43 | 7.56 | 10.99 | | 2.11 | 1.23 | 2.34 | |
| New York..... | 6 | 763 | 1 | 3 | 17 | 21 | 0.44 | 1.31 | 7.43 | 9.18 | 2.62 | 1.84 | 3.35 | |
| Pennsylvania..... | 14 | 3,870 | | 2 | (1) | 2 | | .17 | | .17 | | .06 | .05 | |
| Wisconsin..... | 4 | 1,835 | 1 | 3 | 74 | 78 | .18 | .55 | 13.44 | 14.17 | 1.09 | .16 | .28 | |
| Total..... | 26 | 9,301 | 2 | 30 | 182 | 214 | .07 | 1.08 | 11.17 | 12.32 | .43 | .82 | .29 | 1.54 |

¹ Data for temporary disabilities ending in first week not available.² Data for temporary disabilities ending in first two weeks not available.³ Data for temporary disabilities not available.

TABLE 105.—ACCIDENT FREQUENCY AND SEVERITY RATES IN SPECIFIED INDUSTRIES, 1925, BY STATES—Continued

LUMBER—PLANING MILLS

| State | Number of establishments | Full-year workers | Number of cases | | | | Accident frequency rates (per 1,000,000 hours' exposure) | | | | Accident severity rates (per 1,000 hours' exposure) | | | |
|-------------------|--------------------------|-------------------|-----------------|--------------------------------|--------------------------------|-------|--|--------------------------------|--------------------------------|-------|---|--------------------------------|--------------------------------|-------|
| | | | Death | Perma- nent disa- bility | Tempo- rary disa- bility | Total | Death | Perma- nent disa- bility | Tempo- rary disa- bility | Total | Death | Perma- nent disa- bility | Tempo- rary disa- bility | Total |
| Illinois..... | 8 | 667 | 2 | 3 | 128 | 33 | 1.00 | 1.50 | 14.00 | 16.50 | 6.00 | 2.40 | 1.048 | 8.88 |
| Indiana..... | 8 | 624 | | 2 | 93 | 95 | | 1.07 | 49.71 | 50.78 | | .32 | .35 | .67 |
| Iowa..... | 7 | 1,770 | | 5 | 44 | 49 | | .94 | 8.29 | 9.23 | | 1.24 | .20 | 1.44 |
| Maryland..... | 5 | 272 | | 1 | 38 | 39 | | 1.23 | 46.55 | 47.78 | | 3.68 | 1.15 | 4.83 |
| Michigan..... | 1 | 260 | 1 | 2 | 139 | 42 | 1.28 | 2.56 | 149.99 | 53.83 | 7.69 | 2.50 | 1.04 | 11.23 |
| Minnesota..... | 4 | 458 | | | 2 | 2 | | | 1.45 | 1.45 | | | .01 | .01 |
| New York..... | 14 | 2,682 | 1 | 31 | 84 | 116 | .12 | 3.85 | 10.44 | 14.41 | .75 | 6.03 | 1.51 | 7.29 |
| Ohio..... | 3 | 438 | 1 | 3 | 27 | 31 | .76 | 2.28 | 20.53 | 23.57 | 4.56 | 2.28 | .33 | 7.17 |
| Pennsylvania..... | 5 | 735 | | (¹) | 2 | 2 | | .91 | | .91 | | 1.91 | | 1.91 |
| Wisconsin..... | 9 | 1,946 | 1 | 9 | 186 | 196 | .17 | 1.54 | 31.86 | 33.57 | 1.03 | .80 | .76 | 2.59 |
| Total..... | 64 | 9,852 | 6 | 58 | 541 | 605 | .20 | 1.96 | 19.78 | 21.94 | 1.22 | 2.62 | .49 | 4.38 |

LUMBER—SAWMILLS

| | | | | | | | | | | | | | | |
|----------------|----|--------|----|----|-----|-----|------|------|-------|-------|------|------|------|------|
| Maryland..... | 1 | 26 | | | 2 | 2 | | | 33.17 | 33.17 | | | 1.18 | 1.18 |
| Michigan..... | 5 | 5,455 | 4 | 7 | 120 | 131 | 0.24 | 0.43 | 17.33 | 8.06 | 1.47 | 0.47 | 1.23 | 2.17 |
| Minnesota..... | 5 | 2,226 | 1 | 5 | 123 | 129 | .15 | .75 | 18.40 | 19.30 | .90 | .96 | .50 | 2.36 |
| Wisconsin..... | 11 | 2,520 | 6 | 12 | 322 | 340 | .79 | 1.59 | 42.59 | 44.97 | 4.76 | .79 | 1.01 | 6.56 |
| Total..... | 22 | 10,223 | 11 | 24 | 567 | 602 | .36 | .78 | 18.49 | 19.63 | 2.15 | .66 | .48 | 3.29 |

MACHINE TOOLS

| | | | | | | | | | | | | | | |
|-------------------|----|-------|---|----|-----|-----|------|-------|-------|-------|------|-------|------|------|
| Illinois..... | 5 | 1,197 | | 3 | 120 | 23 | 0.84 | 1.57 | 6.41 | | 0.25 | 1.019 | 0.44 | |
| Indiana..... | 3 | 124 | | | 15 | 15 | | | 40.32 | 40.32 | | | .00 | .60 |
| New Jersey..... | 5 | 477 | | 6 | 119 | 25 | 4.19 | 1.19 | 18.28 | 17.47 | 3.78 | 1.29 | 4.07 | |
| New York..... | 6 | 551 | 1 | 3 | 10 | 14 | 0.61 | 1.82 | 6.05 | 8.49 | 3.63 | 2.18 | 1.27 | 6.08 |
| Ohio..... | 19 | 1,763 | | 2 | 238 | 240 | | .38 | 44.99 | 45.37 | | .48 | .37 | .85 |
| Pennsylvania..... | 7 | 1,119 | | | | | | | | | | | | |
| Wisconsin..... | 2 | 802 | | 3 | 30 | 33 | 1.26 | 12.47 | 13.72 | | .62 | .22 | .84 | |
| Total..... | 46 | 6,033 | 1 | 17 | 332 | 350 | .06 | .94 | 21.09 | 22.09 | .33 | .77 | .27 | 1.37 |

PAPER AND PULP

| | | | | | | | | | | | | | | |
|-------------------|----|--------|---|----|------------------|-----|------|-------|--------|-------|------|------|-------|------|
| Illinois..... | 5 | 378 | 1 | | 14 | 15 | 0.88 | | 12.34 | 13.22 | 5.29 | | 1.021 | 5.50 |
| Indiana..... | 3 | 560 | | 3 | 50 | 53 | 1.79 | 29.78 | 31.57 | | 0.80 | 3.63 | 4.43 | |
| Iowa..... | 1 | 122 | | 1 | 18 | 19 | 2.73 | 49.11 | 51.84 | | 2.05 | 1.36 | 3.41 | |
| Michigan..... | 1 | 1,179 | | 3 | 173 | 76 | | .85 | 120.63 | 21.48 | | .25 | 1.54 | .79 |
| Minnesota..... | 3 | 1,132 | 1 | 7 | 149 | 157 | .29 | 2.06 | 43.89 | 46.24 | 1.77 | 2.12 | .78 | 4.67 |
| New York..... | 12 | 4,597 | 1 | 58 | 235 | 294 | .07 | 4.21 | 17.04 | 21.32 | .44 | 6.77 | 1.67 | 7.88 |
| Pennsylvania..... | 4 | 1,532 | 1 | 3 | (¹) | 4 | | .22 | .65 | | 1.31 | .30 | | 1.61 |
| Wisconsin..... | 5 | 1,642 | 1 | 5 | 51 | 57 | 2.01 | 1.01 | 10.35 | 11.56 | 1.22 | .40 | .23 | 1.85 |
| Total..... | 34 | 11,142 | 5 | 80 | 590 | 675 | .15 | 2.39 | 20.47 | 23.01 | .90 | 3.20 | .75 | 4.85 |

POTTERY

| | | | | | | | | | | | | | | |
|-----------------|----|-------|---|---|-----|-----|------|------|-------|-------|------|------|-------|------|
| New Jersey..... | 6 | 1,943 | 1 | 2 | 176 | 79 | 0.17 | 0.34 | 13.04 | 13.55 | 1.03 | 1.10 | 1.041 | 2.54 |
| Ohio..... | 7 | 1,206 | | 1 | 80 | 81 | | .28 | 22.12 | 22.40 | | .50 | .31 | .81 |
| Total..... | 13 | 3,148 | 1 | 3 | 156 | 160 | .11 | .32 | 18.52 | 16.95 | .64 | .87 | .37 | 1.88 |

¹ Data for temporary disabilities ending in first week not available.
² Data for temporary disabilities ending in first two weeks not available.
³ Data for temporary disabilities not available.

TABLE 105.—ACCIDENT FREQUENCY AND SEVERITY RATES IN SPECIFIED INDUSTRIES, 1923, BY STATES—Continued

SLAUGHTERING AND MEAT PACKING

| State | Number of establishments | Full-year workers | Number of cases | | | | Accident frequency rates (per 1,000,000 hours' exposure) | | | Accident severity rates (per 1,000 hours' exposure) | | | | |
|----------------|--------------------------|-------------------|-----------------|------------------------|------------------------|-------|--|------------------------|------------------------|---|-------|------------------------|------------------------|-------|
| | | | Death | Perma-nent disa-bility | Tempo-rary disa-bility | Total | Death | Perma-nent disa-bility | Tempo-rary disa-bility | Total | Death | Perma-nent disa-bility | Tempo-rary disa-bility | Total |
| Illinois..... | 7 | 16,412 | 12 | 41 | 1,767 | 820 | 0.24 | 0.83 | 15.53 | 16.65 | 1.46 | 0.50 | 0.33 | 2.29 |
| Iowa..... | 4 | 4,252 | 1 | 18 | 345 | 363 | 0.11 | 1.41 | 27.04 | 28.45 | 1.11 | 1.40 | 1.51 | |
| Minnesota..... | 2 | 3,236 | 3 | 22 | 533 | 538 | 0.31 | 2.27 | 34.91 | 57.49 | 1.85 | 2.94 | 5.70 | |
| Total..... | 13 | 23,900 | 15 | 81 | 1,645 | 1,741 | .21 | 1.13 | 22.94 | 24.28 | 1.20 | .94 | .42 | 2.63 |

STAMPED AND ENAMELED WARE

| | | | | | | | | | | | | | |
|---------------|---|-------|---|----|----|----|------|-------|-------|-------|------|------|------|
| Indiana..... | 2 | 588 | 1 | 24 | 24 | 24 | 0.17 | 1.36 | 13.61 | 13.61 | 0.17 | 0.14 | 0.14 |
| Maryland..... | 1 | 187 | 1 | 1 | 1 | 1 | 1.79 | 1.79 | 1.79 | 1.79 | 0.54 | 0.54 | 0.54 |
| Ohio..... | 4 | 698 | 2 | 51 | 53 | 53 | 0.95 | 24.34 | 23.29 | 23.29 | 1.00 | 0.28 | 1.28 |
| Total..... | 7 | 1,473 | 3 | 75 | 78 | 78 | .68 | 16.97 | 17.65 | 17.65 | .54 | .19 | .73 |

STEAM FITTINGS, APPARATUS, AND SUPPLIES

| | | | | | | | | | | | | | | |
|-------------------|----|-------|----|-----|-----|-----|------|-------|-------|-------|------|------|------|------|
| Indiana..... | 1 | 214 | 1 | 43 | 43 | 43 | 0.47 | 58.71 | 58.71 | 58.71 | 0.47 | 0.55 | 0.55 | |
| Minnesota..... | 1 | 20 | 1 | 2 | 2 | 2 | 2.00 | 25.35 | 25.35 | 25.35 | 2.00 | 1.40 | 1.40 | |
| New Jersey..... | 5 | 1,149 | 9 | 170 | 79 | 79 | 2.61 | 20.30 | 22.91 | 22.91 | 4.23 | 1.56 | 4.79 | |
| New York..... | 4 | 1,453 | 21 | 100 | 121 | 121 | 4.80 | 22.86 | 27.66 | 27.66 | 4.06 | 1.85 | 4.38 | |
| Ohio..... | 9 | 699 | 2 | 120 | 122 | 122 | 1.00 | 60.10 | 61.10 | 61.10 | 0.53 | 0.82 | 1.35 | |
| Pennsylvania..... | 24 | 2,669 | 1 | 6 | 7 | 7 | 0.12 | 0.75 | 0.87 | 0.87 | 0.75 | 0.26 | 1.01 | |
| Total..... | 44 | 6,212 | 1 | 38 | 335 | 374 | .05 | 2.04 | 31.52 | 33.61 | .32 | 1.89 | .74 | 2.96 |

STOVES

| | | | | | | | | | | | | | | |
|-------------------|----|-------|---|-----|-----|-----|------|-------|-------|-------|------|------|------|------|
| Indiana..... | 9 | 572 | 1 | 72 | 73 | 73 | 0.58 | 41.96 | 42.54 | 42.54 | 0.17 | 0.54 | 0.71 | |
| Maryland..... | 3 | 399 | 1 | 5 | 5 | 5 | 1.50 | 4.18 | 4.18 | 4.18 | 0.14 | 0.14 | 0.14 | |
| Ohio..... | 8 | 1,753 | 2 | 275 | 277 | 277 | 0.38 | 52.30 | 52.68 | 52.68 | 0.49 | 0.49 | 0.97 | |
| Pennsylvania..... | 9 | 1,264 | 1 | (*) | 1 | 1 | 0.26 | 0.26 | 0.26 | 0.26 | 1.58 | 1.58 | 1.58 | |
| Total..... | 29 | 3,988 | 1 | 3 | 352 | 356 | .08 | .25 | 43.08 | 43.41 | .50 | .24 | .45 | 1.19 |

STRUCTURAL-IRON WORK

| | | | | | | | | | | | | | | |
|-------------------|----|-------|---|-----|-----|-----|------|-------|--------|--------|------|------|-------|-------|
| Illinois..... | 3 | 296 | 1 | 8 | 129 | 38 | 1.13 | 9.02 | 32.69 | 42.84 | 6.76 | 9.56 | 1.11 | 17.45 |
| Indiana..... | 5 | 153 | 1 | 35 | 30 | 30 | 2.17 | 76.07 | 78.24 | 78.24 | 1.30 | 0.52 | 1.82 | |
| Iowa..... | 1 | 66 | 1 | 1 | 1 | 1 | 1.52 | 1.52 | 1.52 | 1.52 | 1.52 | 1.52 | 1.52 | |
| Michigan..... | 2 | 313 | 4 | 117 | 21 | 21 | 4.26 | 18.09 | 22.35 | 22.35 | 7.98 | 1.62 | 8.60 | |
| Minnesota..... | 2 | 354 | 2 | 6 | 6 | 6 | 1.88 | 5.65 | 8.47 | 11.29 | 1.13 | 0.27 | 12.69 | |
| New Jersey..... | 2 | 100 | 1 | 1 | 1 | 1 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | |
| New York..... | 7 | 929 | 1 | 11 | 32 | 44 | 3.65 | 11.48 | 15.79 | 15.79 | 2.15 | 3.78 | 4.45 | 6.38 |
| Ohio..... | 16 | 1,419 | 1 | 5 | 424 | 430 | 2.31 | 99.57 | 100.97 | 100.97 | 1.41 | 1.20 | 1.15 | 3.76 |
| Pennsylvania..... | 20 | 2,681 | 1 | 10 | (*) | 11 | 1.24 | 1.36 | 1.36 | 1.36 | 0.75 | 0.45 | 1.20 | |
| Wisconsin..... | 2 | 212 | 2 | 16 | 18 | 18 | 3.15 | 25.17 | 28.32 | 28.32 | 1.65 | 0.57 | 2.22 | |
| Total..... | 60 | 6,524 | 6 | 42 | 559 | 607 | .31 | 2.15 | 48.49 | 50.95 | 1.84 | 1.95 | .75 | 4.54 |

WOOLEN GOODS

| | | | | | | | | | | | | | | |
|-------------------|----|--------|---|----|-----|----|------|------|------|------|------|------|------|-----|
| New Jersey..... | 4 | 6,910 | 1 | 9 | 133 | 42 | 0.43 | 1.59 | 2.02 | 2.02 | 0.22 | 1.06 | 0.27 | |
| Pennsylvania..... | 21 | 5,772 | 1 | 4 | (*) | 5 | 0.06 | 0.23 | 0.29 | 0.29 | 0.35 | 0.26 | 0.61 | |
| Total..... | 25 | 12,682 | 1 | 13 | 33 | 47 | .03 | .34 | 1.59 | 1.96 | .16 | .24 | .05 | .45 |

* Data for temporary disabilities ending in first week not available.

† Data for temporary disabilities ending in first two weeks not available.

‡ Data for temporary disabilities not available.

AGRICULTURAL IMPLEMENTS AND SUPPLIES

Table 106 records the experience from 1912 to 1924 of a large company engaged in the manufacture of agricultural implements and supplies. The three sections of the industry have different hazards and for this reason are shown separately. General manufacture declined in frequency during the interval covered from 78.34 to 24.49, or 69 per cent; woodworking from 64.41 to 23.77, or 63 per cent; binder twine from 60.87 to 12.84, or 79 per cent.

Accident severity is much more irregular but when the whole period is considered there is a definite downward trend. General manufacture declined in severity from 1.80 to 1.16, or 36 per cent; woodworking from 2.06 to 1.40, or 32 per cent; binder twine from 1.37 to 0.87, or 36 per cent.

The rates shown in this table for 1924 may be compared with those for agricultural implement manufacture in 1925, shown in Table 105, as follows: Frequency 25.09 and severity 2.78.

TABLE 106.—NUMBER OF FULL-YEAR WORKERS, NUMBER OF ACCIDENTS, AND ACCIDENT FREQUENCY AND SEVERITY RATES FOR THE AGRICULTURAL MACHINERY AND SUPPLIES INDUSTRY, 1912 TO 1924, BY YEARS

| Operation and year | Full-year workers | Number of accidents | Frequency rates (per 1,000,000 hours' exposure) | Severity rates (per 1,000 hours' exposure) |
|---|-------------------|---------------------|---|--|
| Agricultural machinery, general manufacture: | | | | |
| 1912..... | 23, 118 | 5, 433 | 78.34 | 1.80 |
| 1913..... | 22, 832 | 4, 894 | 71.45 | 2.64 |
| 1914..... | 13, 955 | 1, 571 | 37.53 | 1.64 |
| 1915..... | 13, 054 | 1, 059 | 25.85 | 1.50 |
| 1916..... | 16, 193 | 1, 821 | 37.65 | 2.38 |
| 1917..... | 19, 487 | 2, 334 | 39.92 | 2.15 |
| 1918..... | 20, 152 | 2, 094 | 34.64 | 2.29 |
| 1919..... | 18, 652 | 1, 683 | 29.81 | 2.07 |
| 1920..... | 23, 136 | 2, 059 | 29.67 | 2.34 |
| 1921..... | 9, 077 | 580 | 21.30 | 1.06 |
| 1922..... | 11, 624 | 704 | 20.54 | 1.98 |
| 1923..... | 15, 171 | 1, 289 | 28.32 | 2.00 |
| 1924..... | 13, 461 | 989 | 24.49 | 1.16 |
| Operation of woodworking machines: | | | | |
| 1912..... | 1, 925 | 372 | 64.41 | 2.06 |
| 1913..... | 1, 858 | 315 | 56.52 | 2.84 |
| 1914..... | 1, 179 | 108 | 30.55 | 1.87 |
| 1915..... | 1, 064 | 82 | 25.70 | 1.56 |
| 1916..... | 1, 191 | 122 | 34.14 | 5.02 |
| 1917..... | 1, 576 | 184 | 38.92 | 1.22 |
| 1918..... | 1, 707 | 197 | 38.47 | 2.09 |
| 1919..... | 1, 571 | 123 | 26.10 | 1.35 |
| 1920..... | 1, 589 | 125 | 26.22 | 1.70 |
| 1921..... | 652 | 38 | 19.44 | 5.11 |
| 1922..... | 698 | 38 | 18.15 | 1.70 |
| 1923..... | 1, 072 | 102 | 33.12 | 2.69 |
| 1924..... | 757 | 54 | 23.77 | 1.40 |
| Manufacture of binder twine: | | | | |
| 1912..... | 2, 875 | 535 | 60.87 | 1.37 |
| 1913..... | 2, 753 | 394 | 47.71 | 2.69 |
| 1914..... | 2, 401 | 296 | 41.09 | 2.66 |
| 1915..... | 2, 305 | 186 | 26.90 | .58 |
| 1916..... | 2, 828 | 205 | 24.16 | 1.80 |
| 1917..... | 2, 114 | 191 | 30.11 | .69 |
| 1918..... | 2, 493 | 153 | 20.45 | 2.39 |
| 1919..... | 1, 844 | 73 | 13.19 | .73 |
| 1920..... | 2, 166 | 121 | 18.62 | .76 |
| 1921..... | 1, 606 | 81 | 16.82 | .45 |
| 1922..... | 1, 483 | 77 | 17.31 | .49 |
| 1923..... | 1, 428 | 93 | 21.71 | .58 |
| 1924..... | 1, 453 | 50 | 12.84 | .87 |

BUILDING CONSTRUCTION

Table 107 presents several interesting phases of hazard in building construction. The rates for Group A illustrate the effect of accident-prevention effort directed primarily toward severe accidents. In this group there was marked improvement in the severity rates while frequency rates were practically at a standstill. The rates for Group B show what can be accomplished by intensive effort applied to the reduction of both frequency and severity of accidents. Data for Groups C1 and C2 illustrate the fluctuating and very high rates which thus far have appeared in every record of experience in fabrication and erection.

TABLE 107.—NUMBER OF FULL-YEAR WORKERS, NUMBER OF ACCIDENTS, AND ACCIDENT FREQUENCY AND SEVERITY RATES IN BUILDING CONSTRUCTION, 1919 TO 1925, BY YEARS

| Year | Hours of exposure (thousands) | Full-year workers | Number of accidents | Frequency rates (per 1,000,000 hours' exposure) | Severity rates (per 1,000 hours' exposure) |
|---|-------------------------------|-------------------|---------------------|---|--|
| Group A (general contractors): | | | | | |
| 1919 | 4,140 | 1,380 | 216 | 52.2 | 6.1 |
| 1920 | 7,635 | 2,545 | 300 | 39.3 | 10.1 |
| 1921 | 3,695 | 1,232 | 184 | 49.8 | 3.4 |
| 1922 ¹ | 17,527 | 5,842 | 1,268 | 72.4 | 3.8 |
| 1923 ² | 22,633 | 7,544 | 1,226 | 54.2 | 4.8 |
| 1924 ³ | 19,009 | 6,337 | 1,118 | 58.8 | 4.6 |
| Group B (general contractors):⁴ | | | | | |
| 1919 | 14,788 | 4,929 | 247 | 16.7 | 3.1 |
| 1920 | 11,302 | 3,787 | 177 | 15.6 | 1.2 |
| Group C1 (fabricators and erectors): | | | | | |
| 1922 ¹ | 3,949 | 1,316 | 564 | 142.8 | 5.4 |
| 1923 ² | 533 | 178 | 122 | 228.9 | 65.6 |
| Group C2 (fabricators and erectors):³ | | | | | |
| 1923 | 2,043 | 681 | 213 | 104.0 | 8.3 |
| 1924 | 2,546 | 849 | 251 | 97.0 | 22.6 |
| 1925 | 2,592 | 864 | 196 | 76.0 | 10.0 |

¹ National Safety News, July 1923, p. 48.

² Idem, July, 1924, p. 42.

³ Idem, July, 1925, p. 40.

⁴ Idem, August, 1921, p. 23.

⁵ Idem, May, 1926, p. 10.

Construction will always present serious difficulties from a safety standpoint which are not encountered in industries which have a local habitation. The apparatus is necessarily so constructed that it can be transported from place to place. This mobility involves some hazards not pertaining to apparatus which can be installed permanently. The men who carry on the construction processes are a more fluctuating group than those concerned in manufacturing. Both contractor and owner are apt to be anxious to push the job with all practicable speed. All these things conspire to render difficult the task of securing a reasonable degree of safety.

EXPLOSIVES, DYES, AND CHEMICALS

The first part of Table 108 records the experience to and including the year 1920 of one large company engaged in the manufacture of explosives, dyes, and chemicals. The second part covers the experience of several companies which are members of the chemical section of the National Safety Council. The table is not extended enough in some particulars to warrant conclusions, but the general impression

is of a very decided declining tendency both in frequency and severity. For example, between the industrially active years of 1910 and 1920 frequency dropped from 30.57 to 16.80, or 45 per cent, while severity changed from 14.43 to 3.67, or 75 per cent.

TABLE 108.—NUMBER OF FULL-YEAR WORKERS, NUMBER OF ACCIDENTS, AND ACCIDENT FREQUENCY AND SEVERITY RATES IN THE MANUFACTURE OF EXPLOSIVES, DYES, AND CHEMICALS, 1908 TO 1924, BY YEARS¹

| Year | Hours of exposure (thousands) | Full-year workers | Frequency rates (per 1,000,000 hours' exposure) | | |
|------|-------------------------------|-------------------|---|--------------------|-------|
| | | | Fatal accidents | Nonfatal accidents | Total |
| 1908 | 9,963 | 3,321 | 3.50 | | |
| 1909 | 12,129 | 4,043 | 2.06 | | |
| 1910 | 14,070 | 4,690 | 2.20 | | |
| 1911 | 14,184 | 4,728 | 1.20 | | |
| 1912 | 13,719 | 4,573 | .80 | | |
| 1913 | 12,673 | 4,291 | 1.71 | | |
| 1914 | 12,399 | 4,133 | .57 | | |
| 1915 | 160,398 | 53,466 | .59 | 25.87 | 26.46 |
| 1916 | 112,581 | 37,527 | 1.07 | 36.05 | 37.12 |
| 1917 | 119,202 | 39,734 | .43 | 35.33 | 35.76 |
| 1918 | 195,405 | 65,135 | .46 | 25.69 | 26.15 |
| 1919 | 51,624 | 17,208 | .41 | 18.22 | 18.63 |
| 1920 | 48,396 | 16,132 | .50 | 16.30 | 16.80 |

| Year | Hours of exposure (thousands) | Full-year workers | Number of accidents | Frequency rates (per 1,000,000 hours' exposure) | Severity rates (per 1,000 hours' exposure) |
|------------------------|-------------------------------|-------------------|---------------------|---|--|
| 1910 | 14,070 | 4,690 | 430 | 30.57 | 14.43 |
| 1920 | 48,396 | 16,132 | 813 | 16.80 | 3.67 |
| Explosives | | | | | |
| 1924 ² | 4,330 | 1,443 | 22 | 5.08 | 2.80 |
| Dye manufacture | | | | | |
| 1924 ² | 5,450 | 1,817 | 96 | 17.61 | 6.14 |
| Chemicals | | | | | |
| 1923 ² | 18,044 | 6,015 | 422 | 24.55 | 4.73 |
| 1924 ² | 48,450 | 16,150 | 1,187 | 26.13 | 3.07 |

¹ National Safety News, Feb. 21, 1921, p. 4.

² Idem, June, 1925, p. 31.

LIGHT AND POWER

No additional information has been secured regarding accidents in the light and power industry since the publication of Bulletin No. 339. The experience then reported shows the possibilities of vigorous safety effort so clearly that it seems desirable to reproduce the table.

TABLE 109.—NUMBER OF FULL-YEAR WORKERS, NUMBER OF ACCIDENTS, AND ACCIDENT FREQUENCY AND SEVERITY RATES IN A LIGHT AND POWER COMPANY, 1918 TO 1922, BY YEARS

| Year | Hours of exposure (thousands) | Equivalent full-year workers | Number of accidents | Number of deaths | Frequency rates (per 1,000,000 hours' exposure) | Severity rates (per 1,000 hours' exposure) |
|-----------------------------|-------------------------------|------------------------------|---------------------|------------------|---|--|
| Group A:¹ | | | | | | |
| 1918..... | 2,059 | 686 | 74 | 3 | 35.9 | 9.05 |
| 1919..... | 2,059 | 686 | 69 | 2 | 33.5 | 6.23 |
| 1920..... | 2,100 | 700 | 123 | 7 | 58.6 | 20.90 |
| 1921..... | 1,931 | 643 | 47 | 5 | 24.3 | 15.93 |
| 1922..... | 2,317 | 772 | 31 | 2 | 13.3 | 5.40 |
| Group B: 1921..... | 10,800 | 5,600 | 387 | 5 | 22.8 | 2.09 |

¹ National Safety News, February, 1923, p. 33.

MANUFACTURE OF CAMERAS

Table 110 contrasts the accident occurrence in two 6-month periods for the manufacture of cameras. These rates are naturally low, since there is in the production of cameras a large number of light and relatively nonhazardous operations. The table illustrates what can be accomplished even in such circumstances by determined effort. Accident frequency declined 30 per cent and accident severity 47 per cent.

TABLE 110.—NUMBER OF FULL-YEAR WORKERS, NUMBER OF ACCIDENTS, AND ACCIDENT FREQUENCY AND SEVERITY RATES IN THE MANUFACTURE OF CAMERAS, JANUARY TO JUNE, 1919 AND 1920¹

| Period | Hours of exposure (thousands) | Equivalent full-year workers | Number of accidents | Frequency rates (per 1,000,000 hours' exposure) | Severity rates (per 1,000 hours' exposure) |
|----------------------------|-------------------------------|------------------------------|---------------------|---|--|
| January to June, 1919..... | 2,994 | 998 | 44 | 13.2 | 0.30 |
| January to June, 1920..... | 3,063 | 1,021 | 30 | 9.2 | .16 |

¹ National Safety News, Aug. 30, 1920, p. 7.

Table 111 shows a remarkably regular decline in frequency in the industry during the period 1910 to 1922. The drop is from 36.6 to 5.6, or 85 per cent.

TABLE 111.—ACCIDENT FREQUENCY RATES IN THE MANUFACTURE OF CAMERAS, 1910 TO 1922, BY YEARS

| Year | Frequency rates (per 1,000,000 hours' exposure) | Year | Frequency rates (per 1,000,000 hours' exposure) | Year | Frequency rates (per 1,000,000 hours' exposure) |
|-----------|---|-----------|---|-----------|---|
| 1910..... | 36.6 | 1915..... | 7.3 | 1920..... | 8.1 |
| 1911..... | 23.9 | 1916..... | 6.8 | 1921..... | 6.3 |
| 1912..... | 20.4 | 1917..... | 7.2 | 1922..... | 5.6 |
| 1913..... | 18.4 | 1918..... | 8.0 | | |
| 1914..... | 9.1 | 1919..... | 9.2 | | |

PORTLAND CEMENT

Table 112 is drawn from the publications of the Portland Cement Association. This organization was among the first to compile statistics on a satisfactory basis and their annual studies are models of statistical presentation.

The table shows a very steady decline in both frequency and severity. Frequency declines from 43.50 in 1918 to 26.08 in 1925 (40 per cent) and severity goes from 6.05 to 5.00 (17 per cent) in the same period.

TABLE 112.—NUMBER OF FULL-YEAR WORKERS, NUMBER OF ACCIDENTS, AND ACCIDENT FREQUENCY AND SEVERITY RATES IN THE MANUFACTURE OF PORTLAND CEMENT, 1918 TO 1925, BY YEARS¹

| Year | Hours of exposure (thousands) | Full-year workers | Number of accidents | Number of deaths | Frequency rates (per 1,000,000 hours' exposure) | Severity rates (per 1,000 hours' exposure) |
|-----------|-------------------------------|-------------------|---------------------|------------------|---|--|
| 1918..... | 55,215 | 18,405 | 2,401 | 38 | 43.50 | 6.05 |
| 1919..... | 48,743 | 16,248 | 2,225 | 39 | 45.05 | 7.15 |
| 1920..... | 89,580 | 19,862 | 2,750 | 53 | 46.16 | 7.60 |
| 1921..... | 62,247 | 20,749 | 2,727 | 44 | 43.81 | 6.18 |
| 1922..... | 63,527 | 21,176 | 2,597 | 52 | 41.00 | 6.50 |
| 1923..... | 76,611 | 23,547 | 3,180 | 43 | 41.62 | 6.48 |
| 1924..... | 87,767 | 29,256 | 3,088 | 60 | 35.30 | 5.87 |
| 1925..... | 97,415 | 32,472 | 2,541 | 61 | 26.08 | 5.00 |

¹ Portland Cement Association: Study of accidents, 1918; Accident Prevention Bulletin, September-October, 1920; July-August, 1921; May-June, 1922; May-June, 1923; March-April, 1924; July-August, 1925; and May-June, 1926.

PAPER MILLS

The figures in Table 113 show the experience of the concerns that are members of the paper section of the National Safety Council. In the interval from 1920 to 1924 frequency declines from 46.34 to 41.58, or 10 per cent, and severity from 2.60 to 2.07, or 20 per cent.

TABLE 113.—NUMBER OF FULL-YEAR WORKERS, NUMBER OF ACCIDENTS, AND ACCIDENT FREQUENCY AND SEVERITY RATES, IN PAPER MILLS, 1920 TO 1924, BY YEARS¹

| Year | Hours of exposure (thousands) | Full-year workers | Number of accidents | Frequency rates (per 1,000,000 hours' exposure) | Severity rates (per 1,000 hours' exposure) |
|-----------|-------------------------------|-------------------|---------------------|---|--|
| 1920..... | 79,574 | 26,525 | 3,684 | 46.34 | 2.60 |
| 1921..... | 81,196 | 27,065 | 3,380 | 41.68 | 2.83 |
| 1922..... | 106,830 | 35,610 | 5,106 | 47.77 | 2.36 |
| 1923..... | 115,902 | 38,634 | 5,042 | 43.50 | 2.73 |
| 1924..... | 100,300 | 33,433 | 4,171 | 41.58 | 2.07 |

¹ National Safety News, June, 1925, p. 30.

PETROLEUM REFINING

The data on petroleum refining are not as yet extensive enough to permit the formulation of a judgment, but apparently the plants covered by Table 114 have not thus far made any noteworthy progress.

TABLE 114.—NUMBER OF FULL-YEAR WORKERS, NUMBER OF ACCIDENTS, AND ACCIDENT FREQUENCY AND SEVERITY RATES IN PETROLEUM REFINING, 1921 TO 1923, BY YEARS

| Year | Hours of exposure (thousands) | Full-year workers | Number of accidents | Frequency rates (per 1,000,000 hours' exposure) | Severity rates (per 1,000 hours' exposure) |
|------------------------------------|-------------------------------|-------------------|---------------------|---|--|
| 1921 ¹ | 27, 010 | 9, 003 | 841 | 31. 15 | 1. 86 |
| 1922 ² | 72, 815 | 24, 272 | 2, 617 | 35. 94 | 1. 86 |
| 1923 (6 months) ³ | 39, 228 | 13, 076 | 1, 292 | 32. 93 | 1. 91 |

¹ National Safety News July, 1922, p. 31.² Idem, May, 1923, p. 24.³ Idem, October, 1923, p. 46.**RUBBER**

The rubber section of the National Safety Council has maintained a very carefully worked out statistical presentation of their experiences for the past five years. The rates are somewhat irregular, with no definite trend.

Besides the accident rates the section has prepared an excellent analysis of accident causes.

TABLE 115.—NUMBER OF FULL-YEAR WORKERS, NUMBER OF ACCIDENTS, AND ACCIDENT FREQUENCY AND SEVERITY RATES IN RUBBER INDUSTRY, 1921 TO 1925,¹ BY YEARS

| Year | Hours of exposure (thousands) | Full-year workers | Number of accidents | Frequency rates (per 1,000,000 hours' exposure) | Severity rates (per 1,000 hours' exposure) |
|-----------|-------------------------------|-------------------|---------------------|---|--|
| 1921..... | 83, 101 | 27, 700 | 2, 190 | 26. 42 | 0. 94 |
| 1922..... | 123, 152 | 41, 081 | 4, 431 | 36. 97 | 1. 57 |
| 1923..... | 134, 272 | 44, 787 | 4, 132 | 31. 15 | 1. 32 |
| 1924..... | 126, 594 | 41, 865 | 3, 449 | 27. 46 | 1. 00 |
| 1925..... | 173, 438 | 57, 813 | 6, 241 | 35. 98 | 1. 11 |

¹ National Safety News, March, 1923, p. 15; August 1923, p. 39; November, 1923, p. 40; and February, 1920, p. 20.**WOODWORKING**

The rates in Table 116 are too irregular to justify any conclusions regarding accident trend in the woodworking industry. It is evident that the hazards of woodworking plants are quite serious. Study elsewhere indicates that saws of various types are an important factor and that the condition of the saw itself is often responsible for the occurrence of accidents.

TABLE 116.—NUMBER OF FULL-YEAR WORKERS, NUMBER OF ACCIDENTS, AND ACCIDENT FREQUENCY AND SEVERITY RATES IN WOODWORKING, 1920 TO 1924,¹ BY YEARS

| Year | Hours of exposure (thousands) | Full-year workers | Number of accidents | Frequency rates (per 1,000,000 hours' exposure) | Severity rates (per 1,000 hours' exposure) |
|-----------|-------------------------------|-------------------|---------------------|---|--|
| 1920..... | 14, 367 | 4, 780 | 616 | 42. 09 | 4. 38 |
| 1921..... | 52, 122 | 17, 374 | 2, 851 | 54. 70 | 1. 47 |
| 1922..... | 86, 769 | 29, 590 | 5, 657 | 63. 72 | 2. 70 |
| 1923..... | 58, 822 | 19, 607 | 2, 486 | 42. 26 | 3. 36 |
| 1924..... | 56, 228 | 18, 743 | 2, 787 | 49. 56 | 3. 08 |

¹ National Safety News, June, 1925, p. 42.

TEXTILES

The records of the textile section of the National Safety Council have not been maintained long enough to warrant any very positive conclusion beyond the confirmation of the idea that the textile industry is relatively of rather low hazard. When, however, accident frequency in such mills is greater than that in some of the best steel mills, it is obvious that there is opportunity for improvement. The intrinsic hazard of the steel and iron concerns is obviously much greater than that in textile establishments, and accident prevention effort if undertaken with anything like the energy shown in the steel mills should markedly influence the rates.

TABLE 117.—NUMBER OF FULL-YEAR WORKERS, NUMBER OF ACCIDENTS, AND ACCIDENT FREQUENCY AND SEVERITY RATES IN TEXTILES, 1923 AND 1924

| Year | Hours of exposure (thousands) | Full-year workers | Number of accidents | Frequency rates (per 1,000,000 hours' exposed) | Severity rates (per 1,000 hours' exposed) |
|-------------------------|-------------------------------|-------------------|---------------------|--|---|
| 1923 ¹ | 46,343 | 15,448 | 604 | 13.03 | 0.67 |
| 1924 ² | 53,196 | 17,732 | 601 | 11.29 | .89 |

¹ National Safety News, October, 1924.

² Idem August, 1925, p. 39.

DEPARTMENTS OF THE FEDERAL GOVERNMENT

Table 118 shows the accident frequency rates in the various departments of the Federal Government. This presentation is from a tabulation prepared by the United States Employees' Compensation Commission. It concerns only civilian employees.

It is rather surprising to find that for the civilian employees of some departments the degree of hazard is comparable in some cases with that encountered in the iron and steel industry as a whole, and in other cases the rates are as high as those for the better plants of the iron and steel industry.

It is also noticeable that with the exception of the Government Printing Office and the Department of the Navy there is observable during this five-year period no tendency to declining rates. On the contrary, with the exceptions noted, the rates tend to rise.

The changes (increases except where otherwise noted) are as follows: All services, from 13.13 to 15.37, or 17 per cent; Department of Agriculture, from 13.85 to 26.21, or 89 per cent; Department of Commerce, from 8.69 to 9.82, or 13 per cent; Government Printing Office, from 8.27 to 2.71, or 67 per cent (decrease); Department of the Interior, from 19.68 to 31.39, or 60 per cent; Department of Labor, from 11.99 to 12.40, or 3 per cent; Department of the Navy from 19.48 to 15.74, or 19 per cent (decrease); Post Office Department, from 7.50 to 9.91, or 32 per cent; Department of the Treasury, from 6.91 to 8.05, or 17 per cent; Department of War, from 46.68 to 60.64, or 30 per cent; other services, from 6.95 to 14.94, or 115 per cent.

TABLE 118.—NUMBER OF ACCIDENTS AND ACCIDENT FREQUENCY RATES IN THE GOVERNMENT SERVICE, 1921 TO 1925, BY DEPARTMENTS AND YEARS

[Based on number of employees shown by the Civil Service Commission's yearly reports and on number of accidents reported to the United States Employees' Compensation Commission]

| Year | Number of employees | Number of accidents | | | Frequency rates (per 1,000,000 hours' exposure) | | |
|-----------------------------------|---------------------|---------------------|---------------|---------------|---|--------------------|--------------|
| | | Fatal | Nonfatal | Total | Fatal accidents | Nonfatal accidents | Total |
| All Government Services | | | | | | | |
| 1921..... | 560,673 | 362 | 18,042 | 18,404 | 0.25 | 12.88 | 13.13 |
| 1922..... | 535,185 | 353 | 17,905 | 18,258 | .26 | 13.38 | 13.64 |
| 1923..... | 535,781 | 279 | 17,713 | 17,992 | .20 | 13.22 | 13.43 |
| 1924..... | 546,961 | 278 | 20,269 | 20,538 | .20 | 14.82 | 15.02 |
| 1925..... | 538,290 | 314 | 20,374 | 20,688 | .23 | 15.14 | 15.37 |
| Total..... | 2,716,910 | 1,586 | 94,294 | 95,830 | .23 | 13.88 | 14.11 |
| Department of Agriculture | | | | | | | |
| 1921..... | 18,722 | 10 | 638 | 648 | 0.22 | 13.63 | 13.85 |
| 1922..... | 19,773 | 11 | 919 | 930 | .22 | 18.59 | 18.82 |
| 1923..... | 20,078 | 17 | 971 | 988 | .34 | 19.34 | 19.68 |
| 1924..... | 20,385 | 25 | 1,287 | 1,312 | .49 | 25.25 | 25.74 |
| 1925..... | 20,066 | 26 | 1,291 | 1,317 | .52 | 25.69 | 26.21 |
| Total..... | 99,056 | 89 | 5,106 | 5,195 | .36 | 20.62 | 20.98 |
| Department of Commerce | | | | | | | |
| 1921..... | 11,748 | 9 | 246 | 255 | 0.31 | 8.38 | 8.69 |
| 1922..... | 11,267 | 15 | 272 | 287 | .53 | 9.06 | 10.19 |
| 1923..... | 11,199 | 11 | 332 | 343 | .49 | 11.96 | 12.25 |
| 1924..... | 12,119 | 8 | 319 | 327 | .26 | 10.52 | 10.79 |
| 1925..... | 14,631 | 11 | 348 | 359 | .30 | 9.52 | 9.92 |
| Total..... | 60,964 | 54 | 1,517 | 1,571 | .35 | 9.95 | 10.31 |
| Government Printing Office | | | | | | | |
| 1921..... | 4,403 | 2 | 89 | 91 | 0.18 | 8.09 | 8.27 |
| 1922..... | 4,024 | 1 | 63 | 64 | .10 | 6.26 | 6.36 |
| 1923..... | 3,989 | ----- | 42 | 42 | ----- | 4.21 | 4.21 |
| 1924..... | 4,269 | ----- | 44 | 44 | ----- | 4.13 | 4.13 |
| 1925..... | 3,994 | ----- | 27 | 27 | ----- | 2.71 | 2.71 |
| Total..... | 20,669 | 3 | 265 | 268 | .06 | 5.12 | 5.16 |
| Department of the Interior | | | | | | | |
| 1921..... | 19,735 | 14 | 937 | 971 | 0.29 | 19.39 | 19.68 |
| 1922..... | 17,834 | 18 | 1,041 | 1,059 | .41 | 23.35 | 23.75 |
| 1923..... | 17,062 | 16 | 1,415 | 1,431 | .37 | 33.12 | 33.49 |
| 1924..... | 16,679 | 19 | 1,676 | 1,695 | .46 | 40.20 | 40.64 |
| 1925..... | 13,125 | 11 | 1,019 | 1,030 | .34 | 31.06 | 31.39 |
| Total..... | 84,465 | 78 | 6,108 | 6,186 | .37 | 28.93 | 29.29 |
| Department of Labor | | | | | | | |
| 1921..... | 3,768 | 1 | 112 | 113 | 0.11 | 11.89 | 11.99 |
| 1922..... | 3,744 | 2 | 100 | 102 | .22 | 10.66 | 10.90 |
| 1923..... | 3,821 | ----- | 112 | 112 | ----- | 11.72 | 11.72 |
| 1924..... | 3,876 | 1 | 111 | 112 | .11 | 11.46 | 11.56 |
| 1925..... | 3,614 | 5 | 107 | 112 | .55 | 11.84 | 12.40 |
| Total..... | 18,823 | 9 | 542 | 551 | .19 | 11.52 | 11.71 |

TABLE 118.—NUMBER OF ACCIDENTS AND ACCIDENT FREQUENCY RATES IN THE GOVERNMENT SERVICE, 1921 TO 1925, BY DEPARTMENTS AND YEARS—Continued

| Year | Number of employees | Number of accidents | | | Frequency rates (per 1,000,000 hours' exposure) | | |
|--------------------------------------|---------------------|---------------------|----------|--------|---|--------------------|-------|
| | | Fatal | Nonfatal | Total | Fatal accidents | Nonfatal accidents | Total |
| Department of the Navy | | | | | | | |
| 1921..... | 60,653 | 36 | 2,918 | 2,954 | 0.24 | 19.25 | 19.49 |
| 1922..... | 42,515 | 27 | 1,516 | 1,543 | .25 | 14.27 | 14.52 |
| 1923..... | 46,537 | 30 | 1,423 | 1,453 | .30 | 14.04 | 14.33 |
| 1924..... | 42,886 | 28 | 1,882 | 1,910 | .26 | 17.64 | 17.90 |
| 1925..... | 42,342 | 24 | 1,662 | 1,686 | .23 | 15.52 | 15.74 |
| Total..... | 229,253 | 145 | 9,401 | 9,546 | .25 | 16.40 | 16.66 |
| Post Office Department | | | | | | | |
| 1921..... | 281,658 | 62 | 5,218 | 5,280 | 0.08 | 7.42 | 7.50 |
| 1922..... | 284,207 | 64 | 6,196 | 6,260 | .10 | 8.72 | 8.81 |
| 1923..... | 294,226 | 50 | 6,559 | 6,609 | .07 | 8.92 | 8.99 |
| 1924..... | 361,000 | 42 | 7,365 | 7,437 | .06 | 9.93 | 9.99 |
| 1925..... | 304,692 | 47 | 7,488 | 7,535 | .06 | 9.85 | 9.91 |
| Total..... | 1,465,183 | 265 | 32,856 | 33,121 | .07 | 8.96 | 9.04 |
| Department of the Treasury | | | | | | | |
| 1921..... | 68,648 | 30 | 1,157 | 1,187 | 0.18 | 6.74 | 6.91 |
| 1922..... | 56,392 | 44 | 1,263 | 1,247 | .31 | 8.53 | 8.84 |
| 1923..... | 53,694 | 17 | 938 | 965 | .13 | 7.99 | 7.13 |
| 1924..... | 53,121 | 16 | 1,013 | 1,029 | .12 | 7.63 | 7.75 |
| 1925..... | 52,607 | 22 | 1,067 | 1,050 | .17 | 7.98 | 8.05 |
| Total..... | 284,372 | 129 | 5,348 | 5,477 | .18 | 7.52 | 7.70 |
| Department of War | | | | | | | |
| 1921..... | 53,558 | 124 | 6,125 | 6,249 | 0.92 | 45.74 | 46.66 |
| 1922..... | 46,840 | 104 | 5,648 | 5,752 | .89 | 48.23 | 49.12 |
| 1923..... | 44,842 | 96 | 4,913 | 5,009 | .85 | 43.82 | 44.68 |
| 1924..... | 45,906 | 102 | 5,295 | 5,397 | .89 | 46.14 | 47.03 |
| 1925..... | 38,975 | 115 | 5,793 | 5,908 | 1.18 | 59.45 | 60.64 |
| Total..... | 230,116 | 541 | 27,774 | 28,315 | .94 | 48.28 | 49.22 |
| All other Government Services | | | | | | | |
| 1921..... | 37,785 | 74 | 582 | 656 | 0.78 | 6.16 | 6.95 |
| 1922..... | 46,589 | 67 | 947 | 1,014 | .55 | 7.80 | 8.34 |
| 1923..... | 46,373 | 42 | 1,008 | 1,050 | .36 | 8.70 | 9.06 |
| 1924..... | 46,940 | 37 | 1,236 | 1,275 | .31 | 10.55 | 10.86 |
| 1925..... | 44,322 | 53 | 1,602 | 1,655 | .48 | 14.46 | 14.94 |
| Total..... | 224,009 | 273 | 5,377 | 5,659 | .49 | 9.69 | 10.69 |

INDUSTRIAL ACCIDENT EXPERIENCE OF AMERICAN INDUSTRY IN 1925

The National Safety Council in a report on industrial accident experience for 1925¹⁰ has, for the first time, attempted to compute accident rates for American industry as a whole. The computations are based on the statistical tabulations compiled by the industrial sections of the council, with the exception of the cement and the mining industries for which statistics furnished by the Portland Cement Association and the United States Bureau of Mines, respectively, have been used.

The reports, which cover 1,231 establishments or locations, show an average frequency rate of 30.60 per million hours worked and an average severity rate amounting to 2.02 days lost per thousand hours worked. Since the majority of the companies for which data were secured are more or less actively engaged in accident prevention, it can be assumed, however, that the rates for the United States as a whole are somewhat higher. It is impossible to make a fair comparison between the various industrial groups, because of varying occupational risks, but it is of interest to note that in the textile section 35,251 employees worked 77,924,601 hours with only one accidental death.

The detailed record sheets of the council show that accident frequency and severity rates have been reduced through the organized safety work in different industries. This reduction is considered to be due to a considerable extent to the fact that employees have been impressed with the importance of reporting minor injuries promptly, the installation of adequate first-aid facilities, and the cooperation of industrial physicians. The report stresses the importance of a uniform method of keeping plant records and also of making yearly reports in order that the statistics may more accurately represent the accident experience of each industry.

The following table shows the accident experience of companies in 13 principal industries throughout the country for the year 1925:

TABLE 119.—INDUSTRIAL ACCIDENT EXPERIENCE IN AMERICAN INDUSTRY IN 1925*

| Industry | Number of establishments or locations | Total number of employees | Total hours worked | Number of cases of— | | | |
|--------------------------|---------------------------------------|---------------------------|--------------------|---------------------|----------------------|-----------------------|---------|
| | | | | Death | Perma-ent disability | Tem-porary disability | Total |
| Automotive..... | 196 | 304, 639 | 762, 565, 341 | 22 | 560 | 17, 279 | 17, 861 |
| Cement..... | 120 | (^b) | 97, 414, 794 | 61 | 77 | 2, 403 | 2, 541 |
| Chemical..... | 65 | 50, 128 | 124, 148, 274 | 38 | 36 | 2, 473 | 2, 597 |
| Construction..... | 36 | 12, 777 | 25, 462, 441 | 24 | 18 | 1, 736 | 1, 778 |
| Metals..... | 280 | 250, 511 | 661, 189, 970 | 86 | 545 | 18, 915 | 21, 492 |
| Mining..... | 210 | (^b) | 68, 518, 787 | 68 | 62 | 6, 721 | 6, 851 |
| Packers and tanners..... | 17 | 14, 642 | 35, 485, 110 | 1 | 41 | 1, 393 | 1, 425 |
| Paper and pulp..... | 99 | 41, 813 | 104, 623, 437 | 21 | 57 | 3, 943 | 4, 021 |
| Petroleum..... | 18 | (^b) | 214, 054, 563 | 49 | 206 | 5, 600 | 5, 855 |
| Quarry..... | 36 | 5, 598 | 15, 322, 643 | 13 | 23 | 708 | 744 |
| Rubber..... | 22 | 85, 730 | 173, 438, 000 | 10 | 70 | 4, 974 | 5, 054 |
| Textile..... | 32 | 35, 251 | 77, 924, 601 | 1 | 31 | 1, 029 | 1, 061 |
| Woodworking..... | 100 | 26, 939 | 69, 836, 067 | 11 | 128 | 2, 948 | 3, 087 |
| Total..... | 1, 231 | 4 828, 028 | 2, 429, 984, 048 | 405 | 1, 904 | 70, 112 | 74, 367 |

* See page 96 for similar table derived from State data.

^b Not available.

^c This total is reported to be correct; figures for details were not given in every case.

^d Not including 3 industries.

¹⁰ National Safety News, Chicago, October, 1926.

TABLE 119.—INDUSTRIAL ACCIDENT EXPERIENCE IN AMERICAN INDUSTRY
IN 1925—Continued

| Industry | Number of days lost on account of— | | | | Frequency rates (per 1,000,000 hours' exposure) | Severity rates (per 1,000 hours' exposure) |
|--------------------------|------------------------------------|--------------------------------|--------------------------------|-------------|--|---|
| | Death | Perma- nent disa- bility | Tempo- rary disa- bility | Total | | |
| Automotive..... | 132,000 | 245,262 | 405,730 | • 810,610 | 23.42 | 1.06 |
| Cement..... | 366,000 | (^b) | (^b) | 487,189 | 23.08 | 5.00 |
| Chemical..... | 228,000 | 70,632 | 38,379 | 337,011 | 20.91 | 2.71 |
| Construction..... | 144,000 | 20,491 | 28,210 | 192,701 | 69.54 | 7.57 |
| Metals..... | 518,000 | 398,773 | 269,738 | • 1,202,287 | 32.50 | 1.82 |
| Mining..... | 408,000 | 72,675 | 102,193 | 582,868 | 99.99 | 8.51 |
| Packers and tanners..... | 6,000 | 23,139 | 15,796 | 44,935 | 40.15 | 1.27 |
| Paper and pulp..... | 126,000 | 39,862 | 59,166 | 225,028 | 38.43 | 2.15 |
| Petroleum..... | 294,000 | 112,401 | 91,957 | 498,358 | 27.35 | 2.33 |
| Quarry..... | 78,000 | 27,317 | 11,775 | 117,092 | 48.56 | 7.64 |
| Rubber..... | 60,000 | 63,700 | 68,468 | 192,168 | 29.15 | 1.11 |
| Textile..... | 6,000 | 16,420 | 12,778 | 35,198 | 13.61 | .45 |
| Woodworking..... | 66,000 | 67,374 | 58,901 | 192,275 | 44.20 | 2.75 |
| Total..... | 2,430,000 | 1,158,046 | 1,163,121 | • 4,917,850 | 30.60 | 2.02 |

^b Not available.

• This total is reported to be correct; figures for details were not given in every case.