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INDUSTRIAL ACCIDENTS AND HYGIENE SERIES

HEALTH SURVEY OF THE PRINTING TRADES 1922 TO 1925

BY

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PREFACE

The International Joint Conference Council of the Commercial and Periodical Branch of the Printing Industry, representing the employers having contracts with the various printing trades-unions through the Printers' League of America and the International Association of Employing Electrotypers, and the employees in the printing trades-unions through the International Typographical Union, the International Printing Pressmen and Assistants' Union of North America, the International Stereotypers and Electrotypers' Union, and the International Brotherhood of Bookbinders, in 1922 took up the matter of undertaking a survey of the health conditions of the printing industry. The International Photo-Engravers' Union, though not a member of the International Joint Conference Council, agreed to cooperate in carrying out such a survey. The local employers' associations, the Typothetæ of Washington, D. C., and the Franklin Association of Chicago actively cooperated to make the survey possible.

At the August 1, 1922, meeting of the International Joint Conference Council an agreement was drafted according to which Dr. Frederick L. Hoffman, consulting statistician of the Prudential Insurance Co., of Newark, N. J., was to assume full authority for planning and carrying out the investigation in cooperation with the various organizations listed above and in cooperation with the Bureau of Labor Statistics of the United States Department of Labor. The findings were to be published, after having been submitted for approval to each of the cooperating unions and associations, as a bulletin of the United States Bureau of Labor Statistics.

The purpose of this survey was to secure, as far as practicable, an impartial up-to-date scientific appraisal of the status of health conditions in the industry, with the object of correcting any conditions which might need correction, in order to promote better health of the people working in any department of the industry.

This survey was not undertaken as a governmental project by the United States Department of Labor but under the auspices of the International Joint Conference Council through the organized groups of employers and employees represented by the various trade associations and unions, employing Doctor Hoffman to be in charge of and to carry on the investigation. The cooperation of the United States Bureau of Labor Statistics was limited to general supervision, to assistance in putting on a special field man, and to the preparation of the material for final publication.

Every effort has been made to secure a comprehensive, impartial statement of the conditions of the industry and to bring such data up to date for such use as may be practicable for promoting better conditions in the industry.

F. A. Silcox,
Secretary Printers' League of America.

January 10, 1927.

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U. S. BUREAU OF LABOR STATISTICS

No. 427 WASHINGTON MARCH, 1927

HEALTH SURVEY OF THE PRINTING TRADES 1922 TO 1925

INTRODUCTION

A health survey concerning some 300,000 workers in a particular branch of industry of nation-wide extent and represented in practically every community, however small, suggests at the outset many unusual difficulties, which preclude thoroughness and completeness in matters of detail. The printing industry is unique in the extent of its geographical distribution and in the great variety of processes and plant conditions, which defy standardization. It would be a practical impossibility to arrive at an inclusive descriptive definition of a printing plant, which would be applicable to the industry as a whole. As a matter of fact, the smaller printing plants are typical of the past rather than of the present, and they represent labor conditions affecting health and welfare quite essentially at variance with those common to large and modern establishments. It is probably safe to say that the large majority of the smaller plants have suffered from the results of rapid business extension during recent years, being hindered by structural plant conditions which do not admit of an effective change without complete renovation and reconstruction. In fact, most of the smaller printing plants were established at a time when no substantial future growth in plant necessities was clearly apparent. As a result, in countless instances, the mechanical equipment of printing plants is arranged in an unsatisfactory order, or more or less opposed to effective and complete methods of lighting, ventilation, and use of floor space. In countless other instances, printing and allied processes are carried on in the same room or under the same roof, space limitations precluding separate arrangements. Thus, hand composition, as well as monotype and linotype composition, is often carried on in crowded spaces, while the major portion of the room is taken up with presses of ever-increasing size. Stereotyping and photo-engraving processes are often carried on under conditions opposed to effective health control, particularly as regards ventilation, but the structural situation is such that it does not admit of material change or improvement. The hope for the future lies rather in the direction of discontinuing old-style small-shop methods for methods typical of the modern establishment on a larger scale. This trend, while possibly in some cases an economic disadvantage, is unquestionably in the right direction as regards better provisions for the health and comfort of the employees.

The term "printing plant," for the present purpose, includes all the essential printing processes and allied methods, or trades, essential to the manufacture and distribution of printed matter. As far as this has been practicable, particular employments have been considered in some

detail, since in the final analysis health-injurious conditions affect specific occupations rather than occupational groups. The investigation has not included an inquiry into wages, and only to a very limited extent has it been necessary to consider the question of hours. The United States Bureau of Labor Statistics has for a number of years published comprehensive data on wages and hours, and similar information has been gathered by the various labor organizations and the United Typothetæ of America. Health and welfare, to a great extent, are conditioned by the wages and hours of work. It admits of no contradiction that when wages are low and hours are long, disease resistance diminishes and sickness and mortality increase more or less proportionately. Conversely, a betterment in health conditions and a lowering of the death rate almost invariably follow higher wages, which provide better nutrition, and shorter hours, which eliminate much harmful fatigue while providing a larger measure of leisure time. Whatever credit may be given to medical science and sanitary advances in promoting the health of the people, there can be no question but that the fundamental elements responsible for the measurable reduction in the general death rate during the last 30 years have been higher wages and shorter hours, aided materially by better and ever-improving shop conditions, and no definite conclusions regarding health and longevity would be justified which ignore the health aspects inseparably interwoven with the improved economic status of persons employed in the various branches of the printing trades.

Before 1921, printing plants generally were on a 48-hour working week, but on May 1, 1921, or the date of expiration of contracts thereafter, the composing rooms of book and job shops on a union basis, changed from a 48 to a 44 hour week, and this was true also for the other mechanical departments in the union shops in certain cities. The length of the working week at the present time is thus 44 to 48 hours a week, as contrasted with conditions 30 years ago, when at least 10 hours a day was the rule and Saturday half holidays had not been thought of. Without reviewing the question historically, it is safe to say that working hours in the past generation averaged not less than 60 a week, if indeed they did not average nearer 12 hours a day for six days a week.

A review of weekly wages in book and job printing since 1914[1] shows that average wage scales in the four key occupations combined taking May 15, 1914, as 100, were represented by 202 on May 15, 1924, and 205 on May 15, 1925. On the same base, the wages on May 15, 1924, were 199 for compositors, 194 for cylinder pressmen, 222 for cylinder feeders, and 200 for bookbinders, and on May 15, 1925, were 202 for compositors, 197 for cylinder pressmen, 225 for cylinder feeders, and 203 for bookbinders.

In actual figures, on May 15, 1914, the average wage scale for cylinder feeders was $14.94; for bookbinders $20.40; for compositors, $21.81; and for cylinder pressmen, $22.65. The scale for each craft rose slowly through the years 1915 to 1917, and more rapidly during 1918 to 1920, reaching the peak in February, 1921. At that time, the average wage scales were as follows: Feeders, $34.49; bookbinders,

[1] United Typothetæ of America. Department of Research. Changes in union wage scales in the book and job printing industry, 1914 to 1924. Chicago, 1924. 23 pp. The figures given for May 15, 1924, in this study are preliminary figures, but the figures here given for 1924 and also for 1925 are later figures supplied by the United Typothetæ of America.

$41.60; compositors, $43.97; and pressmen, $44.66. During the period of depression which followed decreases lowered the average for each of the foregoing craft by amounts of from $2 to $3 per week. In May, 1922, scales were still, in spite of the depression, well above the average of May, 1920. By May, 1923, scales had risen again, and by May 1924, continued increases had carried the average scale for compositors and pressmen well above the May, 1921, average, and that for feeders and bookbinders nearly up to the 1921 level, although for all crafts the scales were still somewhat below the February, 1921, peak. The average scales in May, 1924, were: Feeders, $33.18; bookbinders, $40.81; compositors, $43.34; and pressmen, $44; and in May, 1925, they were: Feeders, $33.66; bookbinders, $41.41; compositors, $44.04, and pressmen, $44.69.

An average of the scales of the four occupations referred to shows an increase from $19.97 per week in 1914 to $41.18 in February, 1921, declining to $38.84 in May, 1922, and rising again to $40.33 by May, 1924.

Wages have risen approximately 100 per cent since 1914. Regardless of a lower cost of living, the actual wages previous to the war were in many instances totally inadequate to maintain the normal American standard of life. The rise in the cost of living in the meantime has, of course, done much to minimize the economic benefits of higher wages, but the wage status of practically every branch of printing labor has during the last 10 years undergone a decided change for the better. All of these facts have an unquestionable bearing upon the present health situation, which is in marked contrast to that found in earlier investigations, representing a time when shop conditions were far less satisfactory; when practically no serious attention was given to sanitation and ventilation; when wages were low and hours were long; when habits of intemperance and gross intoxication were by no means of rare occurrence. It is these fundamental conditions that are primarily responsible for the improvement in health conditions and in the longevity of the workers, as set forth in subsequent sections of this report.

The magnitude of the printing industry is revealed by the various census investigations which extend over a considerable period of time The latest information is contained in the United States Census report on the industry for 1923. The essential branches of the printing industry as regards the nature of the material produced were in 1923 as follows:

TABLE 1.—NUMBER AND PER CENT OF WAGE EARNERS IN THE PRINTING INDUSTRY AND AGGREGATE WAGES, 1923, BY BRANCH OF INDUSTRY

[Data from United States Census of Manufactures, 1923] [1]

Branch of industry	Wage earners		Aggregate wages
	Number	Per cent	
Book and job printing	129,890	44.6	$201,216,502
Music printing	919	.3	1,366,756
Newspaper and periodical	115,646	39.7	196,804,325
Bookbinding and blank-book making	20,728	7.1	25,216,055
Engraving and plate printing	7,529	2.6	10,185,393
Lithographing	16,317	5.7	25,067,427
Total	291,029	100.0	459,856,458

[1] Census figures did not include plants with less than $5,000 annual production, or the Federal printing plant.

According to this table, the 291,029 wage earners in 1923 earned $459,856,458 in wages, or an average of approximately $1,580, which, of course, includes every class or grade of employment in the industry. For all practical purposes, it is probably safe to say that at the time of this investigation there were over 300,000 persons connected with the various branches of the printing trades in this country.

Some additional information regarding the growth of the printing trades may be obtained from an extended study of the returns of labor organizations. The International Typographical Union, under date of August, 1925, reported a membership of 70,372. Comparative data since 1891 for that organization are given in Table 2:

TABLE 2.—MEMBERSHIP OF THE INTERNATIONAL TYPOGRAPHICAL UNION, 1891 TO 1925, BY YEARS

Year	Membership	Year	Membership	Year	Membership
1891	[1] 25,165	1903	42,436	1915	59,571
1892	[1] 28,187	1904	46,165	1916	60,231
1893	[1] 30,454	1905	46,734	1917	61,350
1894	[1] 31,379	1906	44,980	1918	62,661
1895	[1] 29,295	1907	42,357	1919	65,203
1896	28,938	1908	43,740	1920	70,945
1897	28,096	1909	44,921	1921	74,355
1898	28,614	1910	47,848	1922	68,746
1899	30,646	1911	51,095	1923	68,144
1900	32,105	1912	53,807	1924	68,944
1901	34,948	1913	55,614	1925	70,372
1902	[2] 38,364	1914	58,537		

[1] Including pressmen and bookbinders.
[2] Including stereotypers and electrotypers, seven months.
[3] Including photo-engravers, seven months.

The foregoing membership does not include certain Canadian members, the number of which is not clearly indicated.

The International Photo-Engravers' Union has reported its membership for the period 1905 to 1923, which is shown in Table 3:

TABLE 3.—MEMBERSHIP OF THE INTERNATIONAL PHOTO-ENGRAVERS' UNION, 1905 TO 1923, BY YEARS

Year	Membership	Year	Membership	Year	Membership
1905	2,344	1912	4,136	1919	5,229
1906	2,412	1913	4,136	1920	6,149
1907	3,010	1914	4,662	1921	6,480
1908	3,016	1915	4,800	1922	6,405
1909	3,224	1916	5,001	1923	6,488
1910	3,577	1917	5,163		
1911	3,865	1918	4,919		

The membership in the International Stereotypers and Electrotypers' Union is available for a period of 18 years, from 1904 to 1921, as shown in Table 4:

TABLE 4.—MEMBERSHIP OF THE INTERNATIONAL STEREOTYPERS AND ELECTROTYPERS' UNION, 1904 TO 1921, BY YEARS

Year	Membership	Year	Membership	Year	Membership
1904	2,534	1910	3,953	1916	4,941
1905	2,847	1911	4,220	1917	5,210
1906	2,747	1912	4,310	1918	5,282
1907	2,996	1913	4,603	1919	5,819
1908	3,374	1914	4,864	1920	6,072
1909	3,710	1915	4,958	1921	6,138

The membership of the International Printing Pressmen and Assistants' Union at the end of 1924 was 50,000. The membership from 1904 to 1924 is given in Table 5:

TABLE 5.—MEMBERSHIP OF THE INTERNATIONAL PRINTING PRESSMEN AND ASSISTANTS' UNION, 1904 TO 1924, BY YEARS

Year	Membership	Year	Membership	Year	Membership
1904	16,000	1911	19,000	1918	34,000
1905	17,000	1912	19,000	1919	34,000
1906	16,000	1913	19,000	1920	35,000
1907	16,600	1914	19,300	1921	37,000
1908	17,200	1915	22,700	1922	37,000
1909	17,800	1916	29,000	1923	37,000
1910	18,600	1917	33,000	1924	50,000

The membership of the International Brotherhood of Bookbinders is available for the years 1915 to 1923. The membership during this period is shown in Table 6:

TABLE 6.—MEMBERSHIP OF THE INTERNATIONAL BROTHERHOOD OF BOOKBINDERS, 1915 TO 1923, BY YEARS

Year	Membership	Year	Membership	Year	Membership
1915	8,480	1918	14,436	1921	34,349
1916	8,594	1919	16,770	1922	14,164
1917	11,900	1920	21,126	1923	13,047

In connection with the foregoing it may be of interest to call attention to the printing industry in Canada, since the international labor organizations represent the printing trades on both sides of the boundary line. In 1920 the number of printing establishments in Canada was 1,795, employing 21,153 wage earners and representing an invested capital of $76,610,000 and an annual product valued at $103,411,000.

Aside from the foregoing official and semiofficial statistics of the printing trades, indicative of the numerical importance of the industry, statistics of specific employments were obtained in the present survey representing conditions in 1923 for 2,096 establishments in 47 States, the District of Columbia, and parts of Canada, which employ 100,704 wage earners. The essential occupations are given in detail in Table 7.

TABLE 7.—NUMBER AND PER CENT OF WAGE EARNERS IN THE AMERICAN PRINTING TRADES, 1923, BY OCCUPATION[1]

[Data from employers' returns]

Occupation	Wage earners		Occupation	Wage earners	
	Number	Per cent		Number	Per cent
Hand compositors	11,701	11.6	Lithographers	1,375	1.4
Linotype operators	7,719	7.7	Pressmen	11,202	11.1
Monotype keyboard operators	975	1.0	Press feeders and assistants	9,786	9.7
Monotype casters	728	.7	Other machine employees [2]	4,944	4.9
Makers-up and stone hands	3,204	3.2	Bookbinders	7,759	7.7
Proof readers	3,268	3.2	Apprentices	5,340	5.3
Electrotypers	3,054	3.0	Miscellaneous	25,767	25.6
Stereotypers	1,801	1.8			
Photo-engravers	1,868	1.9	Total	100,704	100.0
Plate printers	213	.2			

[1] In considering this table the fact must be kept in mind that the voluntary returns of employers as a matter of pure chance—for there was no selection—represent a much larger proportion of job shops than of news and other printing establishments. Apparently owners of job shops were more interested in the survey than owners of the other printing establishments.

[2] Includes engineers, firemen, carpenters, plumbers, machinists, etc.

This table emphasizes the relative importance of hand composition, which gives employment to 11.6 per cent of all persons employed in the printing trades. Regardless of the rapid increase of machine composition, hand compositors still predominate. Of about equal numerical importance are pressmen and press feeders and assistants. Relatively, electrotypers, stereotypers, and photo-engravers are numerically of less importance.

Since the present investigation is concerned only with health conditions in the printing trades, it does not seem necessary to enlarge further upon the economic aspects of the industry, but the foregoing data may aid in the correct interpretation of the results presented. Also it may serve a useful purpose to add rather interesting mortality data derived from the experience of various labor organizations. Table 8, taken from the Stereotypers and Electrotypers' Union Journal, presents mortality statistics derived from the experience of the mortuary fund of the organization for the period 1904 to 1924. During this period the average age at death increased from 38.40 to 50.75 years. The death rate per 1,000 members did not undergo very material changes. The most suggestive factor is the rapidly increasing average duration of trade life between 1918 and 1924—from 11.43 to 21.70 years.

TABLE 8.—NUMBER OF DEATHS, BENEFITS PAID, AVERAGE AGE AT DEATH, AND DEATH RATES, INTERNATIONAL STEREOTYPERS AND ELECTROTYPERS' UNION, 1904 TO 1924, BY YEARS

Year	Number of deaths	Benefits paid	Average age at death	Number of members	Deaths per 1,000 members	Average years of membership
1904	21	$1,260	38.40	2,534	8.29	----------
1905	30	1,800	38.35	2,847	10.54	----------
1906	32	1,920	39.72	2,747	11.65	----------
1907	30	1,800	40.67	2,996	10.01	----------
1908	28	1,680	39.50	3,374	8.30	----------
1909	37	2,200	42.27	3,710	9.97	----------
1910	46	2,760	41.56	3,953	11.64	----------
1911	48	4,760	42.81	4,220	11.37	----------
1912	44	4,400	42.00	4,310	10.21	----------
1913	37	3,700	44.62	4,603	8.04	----------
1914	64	6,400	43.48	4,864	13.16	----------
1915	47	4,700	44.02	4,958	9.48	----------
1916	67	6,700	48.72	4,941	13.56	----------
1917	58	5,800	50.10	5,210	11.13	----------
1918	80	7,900	40.52	5,282	15.15	11.43
1919	58	5,700	43.93	5,819	9.97	12.48
1920	66	6,400	45.06	6,072	10.70	16.50
1921	57	5,600	48.54	6,138	9.29	18.00
1922	61	6,100	48.91	6,283	9.71	22.30
1923	66	12,900	49.92	6,487	10.17	19.96
1924	79	15,600	50.75	6,789	11.72	21.70
Total	1,055	110,080	----------	----------	----------	----------

The foregoing is amplified by Table 9, which gives the ages at death by single years of life for the period 1904–1923, representing a total of 976 deaths, with an average age at death of 44.6 years.

TABLE 9.—DEATHS AND AGGREGATE AGES, INTERNATIONAL STEREOTYPERS AND ELECTROTYPERS' UNION, 1904 TO 1923

Age at death	Total deaths	Aggregate age	Age at death	Total deaths	Aggregate age	Age at death	Total deaths	Aggregate age
20 years	1	20	42 years	37	1,554	64 years	15	960
21 years	2	42	43 years	25	1,075	65 years	13	845
22 years	3	66	44 years	32	1,408	66 years	9	594
23 years	5	115	45 years	31	1,395	67 years	6	402
24 years	11	264	46 years	30	1,380	68 years	7	476
25 years	13	325	47 years	25	1,175	69 years	8	552
26 years	18	468	48 years	29	1,392	70 years	7	490
27 years	15	405	49 years	16	784	71 years	4	284
28 years	29	812	50 years	21	1,050	72 years	6	432
29 years	24	696	51 years	18	918	73 years	3	219
30 years	13	390	52 years	17	884	74 years	5	370
31 years	20	620	53 years	14	742	76 years	2	152
32 years	27	864	54 years	20	1,080	79 years	4	316
33 years	26	858	55 years	22	1,210	80 years	1	80
34 years	28	952	56 years	13	728	82 years	2	164
35 years	37	1,295	57 years	15	855	83 years	1	83
36 years	27	972	58 years	16	928	84 years	1	84
37 years	22	814	59 years	12	708	85 years	2	170
38 years	34	1,292	60 years	20	1,200			
39 years	32	1,248	61 years	9	549	Total	976	43,497
40 years	26	1,040	62 years	12	744			
41 years	26	1,066	63 years	7	441	Average age	--------	44.6

In addition to the foregoing the Stereotypers and Electrotypers' Union Journal contains an analysis of the 976 deaths by causes, but unfortunately not in sufficient detail to serve the great variety of purposes to which data of this kind can easily be applied. Table 10 presents this analysis.

TABLE 10.—NUMBER AND PER CENT OF DEATHS, INTERNATIONAL STEREOTYPERS AND ELECTROTYPERS' UNION, 1904 TO 1923, BY CAUSE

Cause of death	Deaths	
	Number	Per cent
Nervous diseases	87	8.9
Genito-urinary diseases	92	9.4
Respiratory diseases	377	38.6
Miscellaneous diseases	345	35.4
Accidents	44	4.5
Suicides	15	1.5
War casualties	16	1.7
Total	976	100.0

The International Photo-Engravers' Union has published a table giving the deaths of its members from 1903 to 1924 by years and the amount disbursed in mortuary benefits. The total number of deaths in this period was 649 and the total amount paid out in mortuary benefits $80,810, or an average claim of $124.51. The details are given in Table 11:

TABLE 11.—NUMBER OF DEATHS AND TOTAL FUNERAL BENEFITS, INTERNATIONAL PHOTO-ENGRAVERS' UNION, 1903 TO 1924, BY YEARS

Year	Number of deaths	Total funeral benefits	Year	Number of deaths	Total funeral benefits	Year	Number of deaths	Total funeral benefits
1903	7	$525	1911	26	$2,125	1919	61	$6,000
1904	7	525	1912	19	1,885	1920	34	5,100
1905	11	825	1913	25	2,500	1921	38	7,500
1906	14	1,050	1914	23	2,300	1922	50	9,900
1907	22	1,650	1915	39	3,900	1923	49	9,800
1908	20	1,500	1916	34	3,350	1924	45	9,000
1909	18	1,350	1917	44	4,400			
1910	25	1,875	1918	38	3,750	Total	649	80,810

The International Typographical Union in 1925 published an exceedingly interesting table giving the average age at death, the membership, and the rate per 1,000 members for the period 1900–1925. Table 12 reproduces this data:

TABLE 12.—NUMBER OF DEATHS, AVERAGE AGE AT DEATH, NUMBER OF MEMBERS, AND DEATH RATES, INTERNATIONAL TYPOGRAPHICAL UNION, 1900 TO 1925, BY YEARS

Year	Number of deaths	Average age at death	Number of members	Deaths per 1,000 members	Year	Number of deaths	Average age at death	Number of members	Deaths per 1,000 members
1900	419	41.25	32,105	13.05	1913	687	49.24	55,614	12.35
1901	406	41.94	34,948	11.62	1914	713	48.70	58,537	12.18
1902	474	42.94	[1] 38,364	12.35	1915	696	50.84	59,571	11.68
1903	476	42.62	42,436	11.21	1916	755	51.73	60,231	12.54
1904	578	45.50	[2] 46,165	12.52	1917	825	51.42	61,350	13.44
1905	567	45.26	46,734	12.13	1918	849	50.82	62,661	13.54
1906	512	44.02	44,980	11.38	1919	1,142	45.12	65,203	17.51
1907	561	46.07	42,357	13.24	1920	783	53.17	70,945	11.00
1908	538	45.05	43,740	12.30	1921	730	54.32	74,355	9.80
1909	509	46.09	44,921	11.33	1922	818	54.40	68,746	11.90
1910	574	46.07	47,848	12.00	1923	804	54.40	68,144	11.80
1911	639	49.12	51,095	12.51	1924	831	54.40	68,944	12.04
1912	655	48.09	53,807	12.50	1925	856	57.68	70,372	12.16

[1] Including stereotypers and electrotypers, seven months. [2] Including photo-engravers, seven months.

The foregoing is amplified by a table giving by single years of life the deaths for 1892–1920, numbering in the aggregate 16,554. The average age at death for the entire period was 46.7 years. The details are given in Table 13:

TABLE 13.—DEATHS AND AGGREGATE AGES, INTERNATIONAL TYPOGRAPHICAL UNION, 1892 TO 1920, BY AGE AT DEATH

Age at death	Total deaths	Aggregate age	Age at death	Total deaths	Aggregate age	Age at death	Total deaths	Aggregate age
16 years	1	16	45 years	406	18.270	73 years	139	10,147
18 years	2	36	46 years	318	14,628	74 years	108	7,992
19 years	8	152	47 years	316	14,852	75 years	137	10,275
20 years	41	820	48 years	362	17,376	76 years	106	8,056
21 years	105	2,205	49 years	324	15,876	77 years	76	5,852
22 years	165	3,630	50 years	378	18,900	78 years	82	6,396
23 years	185	4,255	51 years	294	14,994	79 years	72	5,688
24 years	263	6,312	52 years	315	16,380	80 years	57	4,560
25 years	282	7,050	53 years	281	14,893	81 years	54	4,374
26 years	306	7,956	54 years	339	18,306	82 years	31	2,542
27 years	279	7,533	55 years	326	17,930	83 years	31	2,573
28 years	386	10,808	56 years	264	14,784	84 years	24	2,016
29 years	305	8,845	57 years	279	15,903	85 years	20	1,700
30 years	375	11,250	58 years	269	15,602	86 years	18	1,548
31 years	330	10,230	59 years	293	17,287	87 years	10	870
32 years	361	11,552	60 years	304	18,240	88 years	3	264
33 years	361	11,913	61 years	237	14,457	89 years	10	890
34 years	369	12,546	62 years	238	14,756	90 years	5	450
35 years	409	14,315	63 years	205	12,915	91 years	2	182
36 years	336	12,096	64 years	232	14,848	92 years	2	184
37 years	397	14,689	65 years	229	14,885	93 years	1	93
38 years	444	16,872	66 years	209	13,794	94 years	2	188
39 years	328	12,792	67 years	213	14,271	96 years	1	96
40 years	463	18,520	68 years	170	11,560			
41 years	334	13,694	69 years	147	10,143	Total	16,318	762,299
42 years	392	16,464	70 years	183	12,810	Unknown	236	.....
43 years	360	15,480	71 years	132	9,372			
44 years	323	14,212	72 years	154	11,088	Grand total	16,554	.....

The only strictly scientific study of the mortality of compositors and pressmen for this country is a brief tabulation in the report of the medico-actuarial committee, issued in 1913, on the Effect of Occupation on Mortality.[2]

This investigation covered 24 years' experience and represents to a considerable extent conditions of the past rather than of the present. The investigation considers only those exposed to risk by divisional periods of life, the actual deaths, the expected deaths, and the ratio of the actual to the expected mortality.

The results, as to journeyman compositors and journeyman pressmen, are shown in Table 14. The actual number of deaths under observation, however, is too small for strictly scientific conclusions. There were 68 deaths among journeyman compositors and 70 deaths among journeyman pressmen. The number exposed to risk for 1 year among the former was 11,378 and among the latter 9,987. The ratio of actual to expected deaths was 102 per cent for journeyman compositors and 117 per cent for journeyman pressmen. The details are given in Table 14.

[2] Association of Life Insurance Medical Directors and the Actuarial Society of America. Effect of occupation on mortality. New York, 1914. 219 pp.

TABLE 14.—RATIO OF ACTUAL TO EXPECTED DEATHS, MEDICO-ACTUARIAL COMMITTEE INVESTIGATION

Age	Journeyman compositors				Journeyman pressmen			
	Number exposed to risk	Actual deaths	Expected deaths	Ratio of actual to expected deaths	Number exposed to risk	Actual deaths	Expected deaths	Ratio of actual to expected deaths
				Per cent				*Per cent*
15–29 years	6,428	35	29.64	118	5,674	32	25.99	123
30–39 years	3,706	20	21.23	94	3,012	15	17.02	88
40–49 years	962	7	9.58	73	976	10	9.29	108
50–59 years	261	6	4.95	121	310	11	6.93	159
60 years and over	21		1.04		15	2	.51	392
All ages	11,378	68	66.44	102	9,987	70	59.74	117

While the foregoing data are insufficient for the purpose, the final conclusions are, nevertheless, suggestive of somewhat unsatisfactory health conditions in the past. This is made clear by comparing the results with other occupations briefly as follows: For retail druggists the ratio of actual to expected deaths in the same experience was 108 per cent; for glass blowers, hand, 121 per cent; for metal grinders, 117 per cent; for metal buffers and polishers, 101 per cent; for cigar makers, 108 per cent; for journeyman jewelers, 76 per cent; for journeyman millers, 106 per cent; for journeyman house painters, 111 per cent; and for journeyman stonecutters, 214 per cent.

Broadly speaking, in normal risks the approximate ratio of actual to expected deaths would be 85 per cent, but comparing strictly industrial occupations with each other, conditions in the printing trades show no very suggestive departure from the general average of occupational hazards. More recent data would unquestionably show a decided improvement.

The foregoing may be amplified by some interesting data regarding group insurance, representing the experience of American life insurance companies during the period 1913–1921. In the aggregate this experience represents 68,233 years of life exposed to risk one year, with 504 deaths from all causes. The ratio of actual to expected mortality was 90.8 per cent for the textile industries; 98 per cent for chemical and allied industries; 104.1 per cent for clay, glass, and stone industries; 138.4 per cent for the mining industries; 103 per cent for iron and steel industries; and 113.8 per cent for lead industries, including white lead manufacturing, lead supplies, storage batteries, etc. Thus, when compared with more dangerous industries, printing employments come out reasonably well, but not so well when compared with many other occupations free from obvious health-injurious exposure. For illustration, the ratio of actual to expected mortality was 74.8 per cent for the clothing industry and 80.5 per cent for clerical and professional occupations. For all industries combined the ratio of actual to expected mortality was 87.7 per cent which compares with 90.8 per cent for printing, bookbinding, and publishing.

All of the foregoing, however, are limited to group-insurance experience by industries or groups upon which the employer paid the entire premium. The experience for employments in which the employer and employee jointly paid the premiums seems too limited to justify definite conclusions. But as a matter of record, the results are given for the printing industry representing for the period 1913–1921, 4,993 years of life exposed to risk one year, with 29 deaths, or a ratio of actual to expected mortality of 89.6 per cent, while for all

industries combined the corresponding ratio was 114.1 per cent. Thus, viewed from either point of view, the principal industry yields on the whole a fairly favorable mortality not indicative of particularly hazardous conditions. Of the 504 deaths from all causes in the group-insurance experience in which the employers paid the entire premium, 53 of the deaths were from tuberculosis, 57 from non-tuberculous respiratory diseases, 56 from genito-urinary diseases, 34 from cancer, 8 from diabetes, 19 from influenza, and 104 from disease of the heart and the circulatory system. In addition there were 32 deaths from accidents and 3 suicides. This statement also is not suggestive of particularly unfavorable conditions which would place the printing trades below employment subject to a fairly normal mortality experience.

HEALTH CONDITIONS IN THE PRINTING TRADES

EMPLOYERS' RETURNS

The employers' questionnaire, a copy of which is given in the appendix (see p. 130) was sent to a large number of employing printers throughout the United States and Canada, the names being taken from the Typo Credit Book. Since only a small number of replies were received from Canada they have been included with the data for the United States and are not separately considered. The number of tabulatable replies received was 2,096, representing 47 States, the District of Columbia, and as stated before, certain portions of the Dominion of Canada. The number of employees represented by these reports was 100,704. The returns for the individual plants represented conditions as of the date on which the report was made, which was not identical in all cases, but this fact gives a more representative aspect to the collective aggregates for the year under review. The occupations of the 100,704 employees are given in Table 15, together with the number of employees at work, the number who were reported absent on account of sickness, vacation, or other reasons, and the number of employees in each occupation who were 60 years of age and over.

TABLE 15.—NUMBER OF EMPLOYEES AT WORK, NUMBER ABSENT ON ACCOUNT OF SICKNESS, VACATION AND OTHER CAUSES, PER CENT SICK, AND NUMBER OVER 60 YEARS, 1922-23, BY OCCUPATION

Occupation	Number at work	Number absent on account of—			Total	Per cent sick	Number over 60 years old
		Sickness	Vacation	Other reasons			
Hand compositors	11,359	110	130	102	11,701	0.9	614
Linotype operators	7,468	48	74	129	7,719	.6	128
Monotype keyboard operators	930	8	21	16	975	.8	5
Monotype casters	691	9	22	6	728	1.2	1
Makers-up and stone hands	3,135	19	27	23	3,204	.6	96
Proof readers	3,167	26	52	23	3,268	.8	142
Electrotypers	3,009	17	19	9	3,054	.6	38
Stereotypers	1,777	8	9	7	1,801	.4	37
Photo-engravers	1,851	7	7	3	1,868	.4	12
Plate printers	208	1	2	2	213	.5	2
Lithographers	1,351	11	1	12	1,375	.8	20
Pressmen	11,009	64	78	51	11,202	.6	98
Press feeders and assistants	9,595	68	63	60	9,786	.7	23
Other machine employees	4,875	29	23	17	4,944	.6	48
Bookbinders	7,554	54	67	84	7,759	.7	130
Apprentices	5,282	21	16	21	5,340	.4	1
Miscellaneous	25,071	197	207	292	25,767	.8	612
Total	98,332	697	818	857	100,704	.7	2,007

It may prove a matter of considerable surprise that out of 100,704 printing employees only 697, or 0.7 per cent, should have been absent at the time on account of sickness. But the trustworthiness of this figure is fully supported by other investigations, and particularly by the corresponding returns furnished by labor organizations. (See pp. 15 to 25.)

The current sickness rate of 0.7 per cent is a really extraordinary low incidence of sickness, which must in part at least be attributed to the satisfactory health conditions throughout the country at large during the year under review. According to current reports of the division of vital statistics of the United States Census, tabulating the weekly death records of some 70 American cities, the average death rate at the present time rarely exceeds 13 per 1,000, while it is sometimes as low as 11 per 1,000. While sickness and mortality can not be looked upon as equivalent terms, nevertheless, the death rate, broadly speaking, is a fairly satisfactory indication of the prevailing state of health of the general population and of special aggregates of populations such as workers in the printing trades.

Considered by individual occupations it is shown that the two most important employments are hand compositors and pressmen, represented in each case by more than 10,000 workers. The actual amount of prevailing sickness, as ascertained by the present method, has been so low that it would serve no useful purpose to deal exhaustively with individual groups of occupations, but it is certainly suggestive that among 11,701 hand compositors there should have been only 110 cases of absences on account of sickness, and that among 11,202 pressmen the number of absences on account of sickness should have been only 64. In a general way the indications of health, as represented by this method of inquiry, disclose a condition which must be considered surprisingly satisfactory.

It is also of some significance in this connection that the predominating employment in the printing trades should still be hand composition, considering the enormous progress which has been made in the direction of machine composition. Hand compositors, as shown by Table 7 (p. 6), formed 11.6 per cent of the total number of workers, followed by pressmen with a percentage of 11.1. Leaving out of consideration the miscellaneous or unclassified employees, the third most important occupation in the printing trade is represented by press feeders and assistants, followed by bookbinders, linotype operators, and other machine employees in the order named. The relatively low number and proportion of electrotypers, stereotypers, and photo-engravers may be explained by the fact that no special effort was made at the time to reach individual establishments specializing in this line of work, but later a special questionnaire was sent to the photo-engraving plants throughout the country as well as to photo-engraving labor organizations, the returns of which are summarized on pages 67 and 68.

Information as regards working hours was asked for in the questionnaire, but since this information is available in a much better form through the United States Bureau of Labor Statistics and the United Typothetæ, it has not seemed necessary to tabulate the results. It may be pointed out that of the 2,096 establishments, 1,039 reported one-half a day off weekly, 664 reported no lay-off, 30 reported all day Saturday off, while 39 grant lay-offs under certain conditions. The establishments making no reports numbered 324.

It has been found rather difficult to summarize replies made in response to the request for description of ventilating devices. The information secured seems to indicate that, in a general way, most of the plants under review were properly provided with ventilating devices either in the nature of exhaust or other fans wherever required. In about one-half the cases, however, the method of ventilation was simply by open windows.

The reports received as to three particular forms of prevailing sickness, namely, lead poisoning, tuberculosis, and eye affections, are of special value only as regards lead poisoning. As regards tuberculosis and eye affections it is doubtful if the returns are correct and complete. These forms of sickness, are, however, dealt with in more detail on pages 76 to 79 of the report. It is of considerable interest to note that according to the returns of employers upon health conditions of more than 100,000 workers in the printing trades, only 34 known cases of lead poisoning occurred, while there were 78 cases of tuberculosis and 67 cases of eye affections. The information concerning lead poisoning is apparently entirely trustworthy, being in conformity to results obtained by other methods of inquiry, hereafter referred to. The prevailing rate of lead poisoning among printing employees of all kinds is, therefore, only 34 per 100,000 workers. Although comparative data are not available for previous years the inference seems justified that there has been a material improvement in the liability to lead poisoning in the printing trades during the last few decades.[a]

Inquiry was made as to the number of times a plant had been inspected either by a factory inspector or by some other person representing the State or local health authorities. As regards inspection by a factory inspector, 1,316 plants reported in the affirmative and 361 in the negative, while 419 made no report. The number of plants inspected by the local board of health and other authorities was 929, while 584 had not been inspected, and 583 made no report. Broadly speaking, therefore, the printing plants throughout the country are subject to a reasonable measure of inspection by authorities more or less qualified for the purpose. Quite a number of local health officers throughout the country cooperated in making a special sanitary inspection of printing plants, with particular reference to composing rooms, in a uniform manner upon the basis of a standard blank recommended by the Board of Health of the District of Columbia, the results of which are dealt with in a subsequent section of the report (see pp. 28 to 67).

Some attention was given to the accident factor. While accidents in printing plants are relatively rare and seldom of serious importance, they nevertheless constitute a potential danger, requiring much vigilance in the direction of safeguarding dangerous machinery. Of the 2,096 plants covered, 1,215 reported no accidents during the year, while 546 reported accident occurrences, mostly, however, of a trivial nature. The number of plants making no report was 335.

In most of the States, workmen's compensation laws provided a reasonable measure of pecuniary indemnity in the event of accident occurrence. It has seemed worth while to inquire into the extent to which such plants were protected by compensation insurance. Of the 2,096 establishments, 1,825 reported that they were

[a] See in this connection U. S. Bureau of Labor Statistics Bul. No. 426: Deaths from lead poisoning, by Frederick L. Hoffman. Washington, 1927.

protected by compensation insurance, while 191 reported they were not, and 80 plants made no report. It is thus shown that in a large majority of cases the interests of the employees were protected and safeguarded by the required amount of compensation insurance.

It was also thought advisable to inquire into the question of group insurance, which during recent years has made considerable progress, particularly among printing plants, as a supplementary means of safeguarding the interests of the dependents of deceased printing employees. In practice, this form of insurance has been found decidedly beneficial. It is therefore of some significance that out of 2,096 establishments, 476 should carry group insurance, while 1,248 report in the negative, and 372 make no report.

Finally, inquiry was made as to whether the establishment provided a sickness or accident fund for the benefit of employees, which funds are, of course, mostly on a purely voluntary basis, though in some cases supported by the joint contributions of employers and employees. Out of 2,096 establishments, the number having such a fund or funds was 363, while 1,551 had made no such provisions, and 182 made no report. Of course, such funds, to be of a solvent character, are advisable only in the cases of large establishments, where the number of employees is sufficient to yield a fair average experience.

Summarizing the foregoing, it would appear that conditions affecting the health of employees in American printing plants are much better than had been assumed to be the case. The foregoing replies represent the viewpoint of the employers or the experience under their observation, but subsequent sections of the report, representing other sources of information, will amply sustain the conclusion that health conditions in American printing plants are to-day far in advance of the conditions reported in the past.

The results of a similar questionnaire sent out during 1925, presented in Table 16, when compared with Table 15 clearly emphasize that the returns are thoroughly trustworthy, particularly as regards the proportion of employees absent on account of sickness. The proportion in both returns is precisely the same or 0.7 per cent, varying only in minor matters of detail for the different occupations.

TABLE 16.—NUMBER AND PER CENT OF EMPLOYEES AT WORK, NUMBER ABSENT ON ACCOUNT OF SICKNESS, VACATION, AND OTHER CAUSES, PER CENT SICK, AND NUMBER OVER 60 YEARS, 1925, BY OCCUPATION

Occupation	At work		Number absent on account of—			Total	Per cent sick	Number over 60 years old
	Number	Per cent	Sickness	Vacation	Other reasons			
Hand compositors	3,826	11.9	31	106	35	3,998	0.8	182
Linotype operators	2,660	8.2	11	71	83	2,775	.4	49
Monotype keyboard operators	279	.9	-------	5	1	285	-------	-------
Monotype casters	202	.6	2	3	1	208	1.0	1
Makers-up and stone hands	1,105	3.4	4	20	3	1,132	.4	32
Proof readers	1,046	3.2	5	25	6	1,078	.5	69
Electrotypers	981	3.0	9	10	3	1,003	.9	17
Stereotypers	580	1.6	2	15	3	600	.3	12
Photo-engravers	603	1.9	4	4	2	613	.6	2
Plate printers	88	.3	3	-------	2	93	3.2	5
Lithographers	586	1.8	4	8	1	589	.7	19
Pressmen	3,505	10.8	21	68	16	3,610	.6	47
Press feeders and assistants	3,092	9.6	15	25	25	3,157	.5	12
Other machine employees	1,337	4.1	10	12	7	1,366	.7	20
Bookbinders	2,879	8.9	37	66	24	3,006	1.2	66
Apprentices	1,730	5.3	5	22	2	1,759	.3	-------
Miscellaneous	7,872	24.3	55	166	26	8,119	.7	209
Total	32,367	100.0	218	626	190	33,401	.7	742

The preceding table covers 754 printing plants, employing 33,401 workers, of whom 742 were 60 years of age and over.[b] The information obtained with regard to ventilation, working time, etc., as well as official inspections, conforms so closely to that obtained in the larger investigation that it did not seem necessary to enter into matters of detail. Of particular significance, however, is the information concerning the number of cases of lead poisoning observed during the year, which is given as 11. Based on the number of employees this would give a rate of approximately 33 per 100,000. This corresponds almost exactly to the 34 cases of lead poisoning found among 100,000 printers in the general investigation. Thus, both as regards the rate of sickness and the rate of lead poisoning, these two absolutely independent investigations confirm each other. They emphasize at the same time the great practical value of a continuous investigation. It would be to the interest of the printing trades if the facts in the case were made a matter of annual or biennial tabulation so that the trend of correct health conditions could be thoroughly and impartially established.

LABOR ORGANIZATIONS' RETURNS

The labor organization questionnaire was sent to the secretaries of the locals of all the great international unions, but particularly the International Typographical Union of North America, the International Printing Pressmen and Assistants' Union of North America, the International Photo Engravers' Union of North America, the International Stereotypers and Electrotypers' Union of North America, and the International Brotherhood of Bookbinders.

INTERNATIONAL TYPOGRAPHICAL UNION

Replies were received from 224 locals of the International Typographical Union, representing 34,817 members, on October 1, 1922, or about that date. Since the total membership of the International Typographical Union in 1923 was 68,144, the replies represent 51.1 per cent of the organization. Of the 34,817 members represented by the 224 replies, the number of members out of employment was 1,368 or 3.9 per cent. In the case of a few unions the entire membership was on strike. The number of members on sick pay at the time was 333, or 1 per cent. This may be compared with the sickness rate shown by the reports by the employers—0.7 per cent. The two returns therefore confirm each other sufficiently to be considered representative of the printing trades at large. Of the 34,817 members, 1,141, or 3.3 per cent, were receiving old-age pensions.[3]

Inquiry was made regarding the duration of trade life of the membership by divisional periods—under 5 years, 5 to 10 years, 10 to 15 years and 15 years and over—but as in quite a number of returns this

[b] The age return of employers and labor organizations are not comparable. It is probable that the latter represent many members, age 60 and over, no longer at work but kept on the rolls of the organization, including pensioners.

[3] The mortuary and old-age pension fund of the International Typographical Union has been discussed by the author in an article in the Spectator, of Nov. 29, 1923.

question was left unanswered, the returns can not be considered strictly satisfactory. The available returns are as follows:

	Number	Per cent
Under 5 years	7,632	39.3
5 to 10 years	3,206	16.5
10 to 15 years	3,802	19.6
15 years and over	4,777	24.6
Total	19,417	100.0

It will be seen that of the entire membership reporting 24.6 had been at work for 15 years or over. It is evident, therefore, that the average trade life is relatively high, corresponding to a proportionately high average age attained. This, considered by itself, would yield a relatively high death rate, which, theoretically, might be placed at about 15 per 1,000. In actual experience, however, this rate has not prevailed during recent years in the experience of the International Typographical Union. Reference to this matter, on the basis of the published statistics of the International Typographical Union, as contained in the annual convention reports, is made on pages 81 to 91 of this report.

Inquiry was also made as to the membership 60 years of age and over. About 200 locals replied to this question, giving a total of 1,400 craftsmen who had attained to 60 years or more. To each and every one of these, an individual questionnaire on aged printers was mailed, and quite a fair proportion of replies were received. These are dealt with on pages 69 to 75 of this report.

In reply to the question as to whether the union maintained a sick-benefit fund, 175 answered in the negative and 48 in the affirmative, while 1 union made no reply. The urgency of such sickness protection is, therefore, not apparent. As may safely be assumed that labor organizations subject to an exceptional sickness rate realize the advantage of some form of systematic sickness-insurance provision, when such a provision is absent it is self-evident that the need of pecuniary assistance in sickness is not considered great.

The necessity or advantage of a mortuary-benefit fund is much more generally recognized, and the International Typographical Union provides such benefits for all of its members on a plan well adapted to the needs of the organization. Since the facts regarding the mortuary experience of the union are generally well understood, it did not seem necessary to give extended consideration to the facts on this occasion. Similar conclusions apply to the recognition of the value of a pension fund.

Inquiry was made as regards the number of deaths during the year 1921. It is doubtful whether the replies to this question were made in all cases with the required accuracy. In the aggregate, returns were made of 542 deaths among 34,817 members, equivalent to an approximate death rate of 15 per 1,000.[4] Information in detail was furnished regarding deaths from pulmonary tuberculosis, of which 49 were reported, and deaths from other respiratory diseases, returned as 64. Of particular significance are the returns relating to deaths from lead poisoning during the year 1921. The number of such deaths reported by the 224 unions was 27, equivalent to a rate of 0.8 per 1,000 of the membership exposed to risk. This return is in reason-

[4] See pp. 81 to 91 for vital statistics of the International Typographical Union.

able conformity to the results of the questionnaire addressed to employers. The number of serious accidents during 1921 was 36, equivalent to approximately 1 per 1,000 of the membership.

To the question as to whether "any specific complaints could be made regarding health conditions in the printing plants of the locality reported upon by the local union," 68 of the 224 unions replied in the affirmative. Some of the detailed statements were as follows:

A newspaper plant has refused to remedy evils complained of, claiming compliance to State ordinances sufficient for the purpose.

Ventilation bad in several shops on account of low ceilings and overcrowded conditions.

Objections raised to the melting of metal in plants where linotype and monotype machines are used while the men are at work. This is considered a grave source of annoyance.

Unsanitary toilets, bad light, poor ventilation, metal pots of type, but in the larger establishments the conditions are ideal.

Newspaper maintains insanitary plant. Type-setting machines not piped to carry off gas fumes. Ventilation imperfect.

Plants need ventilation system. Type casters are not arranged to carry off fumes.

The small print shops have poor ventilation and are absolutely unsanitary.

Insufficient heat in winter and always poor ventilation.

Suggest the removal of stereotyping plants from composing rooms.

Most printing offices do not provide for the piping of fumes of linotype machines.

Ventilation in one plant very bad as regards lead fumes from stereotyping pots and linotype machines.

Newspaper located in old dilapidated building owned by railroad company, refusing to make improvements.

Carelessness with regard to leakage of gas.

Ventilation bad on account of machines not being properly piped.

Not enough modern ventilation methods. Composing rooms overcrowded.

There is not enough proper attention given to fumes from melting pots.

Melting of metal in State printing office unsanitary, on account of there being no proper facilities for the carrying off of fumes.

Ventilation and lighting could be much better.

Complaint has been made from time to time regarding smoke in composing rooms in newspaper plants, due to the burning of dross from metal in stereotype rooms on the same floor.

Sanitary conditions in four shops could not possibly be worse.

Two plants below street level have insufficient light.

Should urge better attention to ventilation of composing rooms.

Smoke and fumes from stereotype rooms of newspaper plants allowed to escape into the composing rooms.

Workrooms should be kept cleaner and ventilated more often.

The shops should be kept in a more sanitary condition and there should be more natural light and sunshine, in place of so much artificial illumination.

In two newspaper offices no hoods are provided on machines for the carrying off of fumes. The composing rooms of both papers being upstairs, smoke from the stereotyping machines is quite annoying. One paper has a suction plant, but the other has no ventilating device, whatever.

Metal fumes from stereotyping rooms annoying and there is sweeping of rooms during working hours.

Linotyping machines should have hoods.

Union had to insist on newspaper plant making provision for eliminating fumes from machines.

Should have better system of ventilation.

No adequate system for carrying off lead and gas fumes from the linotyping and monotyping machines in the plant of one of the local newspapers.

Spitting on the floor and lack of ventilation.

Highly unsatisfactory in majority of plants.

Would suggest piping linotype machines, to prevent the gases from escaping into workrooms.

Skylights on morning paper would improve matters considerably.

Ventilating conditions could be considerably improved in many plants.

At two of the local newspapers the metal and gas fumes from ten linotyping and monotyping machines escape into the work rooms. The men are also considerably exposed to draughts.

Lack of provision to carry off fumes from gas-heated metal pots.

Old type casting machines should have exhaust pipes with blowers to carry off deadly fumes.

Poor ventilation and open metal pots are common.

Metal pots are not properly piped.

Printing plants located in basement demanding consideration. There is lack of suitable ventilation and poor methods of lighting.

There is need of considerable additional daylight illumination.

Small plants located in basement should be looked into.

One plant crowded and unsanitary. Stereotyping room near composing room. Structural arrangements unsatisfactory.

Four shops located in basement with unsatisfactory conditions.

Newspaper plant has very unsatisfactory toilet and washroom accommodations.

Linotype melting pots of one plant are not piped for ventilation.

Two plants are very unhealthy.

One shop without outside windows.

Ventilation poor. Much of this caused by the lay-out of the building.

In contrast to the foregoing, many replies were to the effect that conditions are excellent or improving. The replies represent every State and most of the Provinces of Canada.

Additional returns were made in 1925 for 228 locals of the International Typographical Union, which reported a membership of 34,263. For 217 locals, with 31,904 members, reporting on this point, the number out of employment is given as 686 or 2.1 per cent. The number of persons on the sick list was 194; the number receiving old-age pensions was 1,265, or 3.8 per cent of 218 locals, with 33,414 members, reporting on this point. The returns made as regards the duration of trade life in different locals may be summarized in the following statement: The proportion of members less than 5 years in the trade was 8.5 per cent; of those 5 to 10 years, 12.5 per cent; of those 10 to 15 years, 17.5 per cent; and of those 15 years and longer, 60.3 per cent. For 196 locals with 14,823 members reporting on this point, the number of aged printers or persons 60 years and over was reported as 1,742 or 11.8 per cent.

The total number of deaths during the year, in a membership of 34,088, was 424, equivalent to a rate of 12.5 per 1,000. Among 23,597 members reported upon on this point there occurred 30 deaths from tuberculosis, equivalent to a rate of 1.3 per 1,000. For 209 locals, representing 21,210 members, information was furnished with reference to lead poisoning, showing 19 cases or a rate of 0.9 per 1,000. There were 18 serious accidents among a membership of 17,771, representing 210 locals furnishing data on this point, equivalent to a rate of 1 per 1,000.

The few comments made with reference to complaints as to sanitary conditions were limited chiefly to poor ventilation, defective fume control, and inadequate illumination.

INTERNATIONAL PRINTING PRESSMEN AND ASSISTANTS' UNION

Replies were received from 65 locals of the International Printing Pressmen and Assistants' Union, representing 14,748 members, as of October 1, 1922, or about that date. Since the total membership of this international union for 1923 was 37,000 the replies represent 39.9 per cent of the organization. Of the 14,748 members reported on, the number of members out of employment was 657 or 4.5 per cent. The number of men on sick pay at the time reports were made was only 63, or 0.4 per cent. None of the members were receiving old-age pensions, at least not through the local unions.

Inquiry was made as regards the duration of trade life of the membership by divisional periods of life, and return was made for 8,604 members as follows:

	Number	Per cent
Under 5 years	1,060	12.3
5 to 10 years	2,503	29.1
10 to 15 years	3,128	36.4
15 years and over	1,913	22.2
Total	8,604	100.0

It will be seen that of the membership reported, 22.2 per cent had been at work for 15 years or more.

Inquiry was made as to the membership 60 years of age and over, and the returns indicate only 199 aged pressmen, a surprisingly low figure, which may possibly be changed by more extended returns. Inquiry was also made as regards the number of deaths during the year 1921 but it is doubtful whether replies to this question in some cases were made with the required accuracy, as returns were made of 87 deaths, which indicate a mortality figure too low to be accepted as conclusive.[5] The number of deaths from pulmonary tuberculosis was 36, or 41.4 per cent of the mortality from all causes. This also is a statement of doubtful accuracy and is given merely as a matter of record. Deaths from other respiratory diseases numbered 19. Of significance is the number of deaths from lead poisoning, which was returned as 5, or 0.3 per 1,000 of the membership concerned. The number of serious accidents was 31, which in a membership of 14,748 can not be considered a serious indication of occupational hazards.

Some of the detailed statements to the question as to whether "any specific complaints could be made regarding health conditions in the printing plants of the localities reported upon by the local union," are as follows:

Ventilation in some plants could be improved.

A few plants had poor ventilation.

One plant needs thorough cleaning, being located in a dark basement.

[Reference is made to Mexican print shops all in the southwest as follows:] The majority of these shops work anywhere from 10 to 16 hours a day and in a great many cases the proprietors live in back of the shop. The Mexican shops work seven days a week and employ any kind of help they see fit which in most cases mean that they have boys from the ages of 7 to 16 years working for them. A special investigation of local conditions is urgently called for.

[5] See pp. 91 to 96 for vital statistics of Printing Pressmen and Assistants' Union.

Some two years ago one plant was complained of to the local health officer but nothing had been done about it.

Conditions in newspaper plant ideal.

Five or six of the plants are poorly housed.

Plans for improvement are under consideration.

Usually poor ventilation and inadequate heating.

Ventilation poor in some plants.

Conditions poor in cellars; were not kept clean or properly ventilated.

Plants here are in very good condition.

A noticeable increase of infections as the result of ink poisonings has been observed.

All of our plants are up to the standard in every respect.

Complaint limited to poor ventilation.

The worst of "poor light," bad for eyes which reacts on the nervous system.

Plants in this locality above the average.

Health conditions in a number of plants could be improved upon.

Four plants in this locality with normal condition.

One basement shop is in a very unhealthy condition.

Two plants in this town are not very sanitary.

Conditions are generally fair.

Conditions unsatisfactory since stereotyping rooms are on the same floor as pressmen's.

We have automatic machinery in which the men are compelled to climb stairs with a load of probably 100 to 200 pounds on their shoulders and have no rails to protect them in case they lose their balance and causes a number of accidents.

Poor ventilation in some of the shops. The ventilation and toilet accommodations are very poor in some of the shops.

Additional information is available for 14 locals with a membership of 1,782 as of March, 1925. The proportion out of employment numbered 128, of which only 4 were on the sick list. As to duration of trade life the proportion in the divisional periods was as follows: Less than 5 years in the trade, 6.5 per cent; 5 to 10 years, 46.6 per cent; 10 to 15 years, 16 per cent; 15 years and over, 31.9 per cent. The proportion of aged members of the printing pressmen and assistants' union, 60 years and over, for 10 organizations of 1,005 members was 61, or 6.1 per cent. The mortality from all causes was reported for all 14 locals, there being 10 deaths from all causes in 1924, equivalent to a rate of 5.6 per 1,000 members. There were 3 deaths from pulmonary tuberculosis, equivalent to a rate of 3.8 per 1,000 members of the locals reporting on this point. There were no cases of lead poisoning, but 2 serious accidents equivalent to a rate of 0.8 per 1,000 members of the locals reporting on this point. There were a few complaints in regard to conditions, particularly as to press rooms in basements.

INTERNATIONAL PHOTO-ENGRAVERS' UNION

Returns were received from 27 locals of the International Photo-Engravers' Union representing a membership of 4,872. The number out of employment was 163, or 3.3 per cent. The number of members on sick pay at the time the reports were made was 105, or 2.2 per cent. Only 6 of the members, or 0.1 per cent, were at the time receiving old-age pensions.

Inquiry was made regarding the trade life of the membership by divisional periods, and in most cases the information was furnished. The available returns show the following as to duration of trade life:

	Number	Per cent
Under 5 years	713	15.8
5 to 10 years	1,115	24.8
10 to 15 years	1,414	31.4
15 years and over	1,258	28.0
Total	4,500	100.0

It will be seen that of the entire membership 28 per cent had been at work for 15 years or more. As with the members of the International Typographical Union the average age attained is probably proportionately high, a fact which must not be overlooked in considering the prevailing general death rate for this organization.

All of the 27 locals answered the inquiry as to the membership 60 years of age and over, 6 reporting 54 aged members or 1.1 per cent of the total membership, which is considerably less than for other branches of the printing trade.

Inquiry was made regarding the number of deaths during the year 1921, but it is somewhat doubtful whether the replies to this question were made in all cases with required accuracy and completeness. In the aggregate returns were made of 51 deaths from all causes among 4,872 members, equivalent to an approximate death rate of 10.5 per 1,000. There were 7 deaths from pulmonary tuberculosis and 9 deaths from nontuberculous respiratory diseases. There were no deaths from lead poisoning and no serious accidents.

The replies to the question as to any specific complaints regarding health conditions in the printing trades of the locality reported upon by the local union, were as follows:

None whatever.

Poor ventilation.

Lack of ventilation and crowding of the different departments.

Conditions generally satisfactory.

Acid fumes are most objectionable in most plants.

Some engraving plants need more light and ventilation.

No complaint; health conditions splendid.

Dark rooms poorly ventilated, etching machines do not carry off fumes of nitric acid; bright arc lights injurious to eyes.

Most shops have good sanitary conditions. Some still lacking suction flues in dark rooms.

Not enough ventilation in one or two shops.

Additional information as of 1925 was furnished for 20 locals, representing a membership of 3,596. The proportion out of employment was 2.1 per cent while four persons were on the sick list. As to duration of trade life the proportion in the divisional periods was as follows: Less than 5 years in the trade, 11.9 per cent; 5 to 10 years, 23 per cent; 10 to 15 years, 36.5 per cent; 15 years and over, 29.8 per cent. For 18 locals with 3,409 members, the number of photo-engravers 60 years and over was 137. The number of deaths from all causes in 1924 for 19 locals with a membership of 3,589 was reported as 30, equivalent to a rate of 8.4 per 1,000. There were 6 deaths from pulmonary tuberculosis, equivalent to a rate of 1.7 per 1,000. There were 2 deaths from lead poisoning, equivalent to a rate of 0.5 per 1,000. There were a few complaints as regards sanitary conditions, chiefly with reference to inadequate ventilation, defective illumination, and inadequate sanitary facilities.

INTERNATIONAL STEREOTYPERS AND ELECTROTYPERS' UNION

Returns were received from 32 locals of the International Stereotypers and Electrotypers' Union representing a membership of 1,438 on October 1, 1922, or about that date, which is considered reasonably representative. The number of members out of employment was only 16 or 1.1 per cent. The number of members on sick pay at the time the reports were made was only 4 or 0.3 per cent. This may be compared with the sickness rate for the International Typographical Union, given as 1 per cent.

Of the 1,438 members only 4, or 0.3 per cent, were receiving old-age pensions. Most of the unions answered the question regarding the duration of trade life, the available returns being as follows:

	Number	Per cent
Under 5 years	157	13.9
5 to 10	201	17.8
10 to 15	273	24.2
15 years and over	498	44.1
Total	1,129	100.0

Of the entire membership reporting, 44.1 per cent have thus been at work for 15 years or more. It is evident, therefore, that the average trade life is relatively high, approximately corresponding to a proportionately high average age attained.

Inquiry was made also as to the membership 60 years of age and over. Thirty-two locals reported a total of 43 members who had attained age 60 years or over. To each of these locals a separate questionnaire was sent and a number of returns were received, which are considered in another section of this report (see pp. 98 to 100). All the unions belong to the mortuary fund of the international association, which, in a few instances, is supplemented by local sickness societies. The number of death returns is of somewhat doubtful accuracy, but as a matter of record it may be said that among the 1,438 members there were reported 11 deaths during the year under observation, equivalent to a rate of 7.6 per 1,000.[6]

As regards deaths from pulmonary tuberculosis only two were reported. There were two deaths from respiratory diseases. Of particular significance are the returns relating to lead poisoning, during the year 1921. The number of such deaths reported by the 32 unions was 5, equivalent to a rate of 3.5 per 1,000 of the membership exposed to risk. The number of serious accidents during the year was 3, equivalent to approximately 2.1 per 1,000 of the membership reported upon.

Some of the detailed statements regarding whether any specific complaints could be made regarding health conditions in the plants of the locality reported upon by the local union were as follows:

Some plants very bad, others very good.

Stereotyping rooms in cellars should be prohibited. All workrooms should be thoroughly ventilated and the burning of metals should be forbidden.

While sanitary conditions in this business have much improved during the past few years, owing to the installation of blower systems for the removal of noxious fumes from melting metal, etc., the washing and dressing conditions are about as they were when I first entered the business 20 years ago.

[6] See pp. 98 to 103 for vital statistics of International Stereotypers and Electrotypers' Union.

A large proportion of the men must strip practically to the skin in order to keep clothing presentable enough to appear in public; no clean dressing rooms are available and in all shops in —— the men wash up in the sinks that are used in handling vitriol or other acids and chemicals used in the electrotyping processes, a condition, we understand, which is not tolerated in most cities.

Complaint is made against conditions in 3 shops but no details are given.

Metal pots should have covers to carry fumes out of the room.

Conditions unusually good on account of plant locations. There is plenty of light and air and most plants use power fans for keeping air pure.

One plant is poorly lighted and badly ventilated.

Plenty of room for improvement.

Elimination of smoke and fumes while melting would be desirable. Complaint has been made of a newspaper plant in this regard, but conditions have been modified lately.

Stereotypers in this locality are a healthy lot.

All members agree that dross pots or refiners should not be allowed to be burned in a room where men are compelled to work.

Additional returns were furnished in 1925 by 60 locals representing a membership of 2,782. The proportion out of employment was 3.2 per cent, while only 18 were on sick pay. As to duration of trade life, the proportion in the divisional periods was as follows: 16.2 per cent for less than 5 years in the trade, 18.8 per cent for 5 to 10 years, 23.0 per cent for 10 to 15 years, and 42.0 per cent for 15 years and over.

The mortality from all causes during the year 1924 in 58 locals, with 2,747 members, was 19, equivalent to 6.9 per 1,000. There were only 2 deaths from pulmonary tuberculosis, equivalent to a rate of 0.7 per 1,000. In 56 locals, reporting 2,357 members, there were 6 cases of lead poisoning, a rate of 2.5 per 1,000. The few complaints made as regards sanitary conditions were chiefly on account of poor ventilation. In two cases there was a complaint of fume trouble from the vats and in one case complaint of the want of bathing facilities.

INTERNATIONAL BROTHERHOOD OF BOOKBINDERS

Returns were received from 27 locals of the International Brotherhood of Bookbinders, representing 2,379 members, on October 1, 1922. The number of members out of employment was 173, or 7.3 per cent. None were reported absent on account of sickness at the time the report was made. The number receiving old-age pensions was only four.

Inquiry was made regarding the duration of trade life of the membership by divisional periods of life with the following results:

	Number	Per cent
Under 5 years	496	21.2
5 to 10 years	588	25.1
10 to 15 years	671	28.7
15 years and over	585	25.0
Total	2,340	100.0

The number of bookbinders 60 years of age and over was 67, or 2.8 per cent. The number of deaths from all causes during 1921 was 15, or 6.3 per 1,000 members. Of these deaths 2 were from tuberculosis and 3 from nonrespiratory diseases, there being none from lead poisoning or from serious accidents.

Particular comments regarding plant conditions were made in a few letters as follows:

Everything is satisfactory.

There have been two deaths from tuberculosis since I knew of this union: One lad that served his apprenticeship here. He grew too fast and did not get outside enough. His brother, a pressman, is at the pressmen's home now. The last report was that he was getting better. Another, an Englishman, never seemed very robust. Went overseas, came back here, then went east, I think, into your State. We heard later that he had died. Both were paper rulers.

Conditions satisfactory except as to insanitary toilet facilities and no sanitary drinking cups. The ventilation also is poor.

The city has grown so fast that it is difficult to give trustworthy information. Local conditions are changing rapidly. We had a splendid sick-benefit system which worked admirably, but the membership did not keep it up, so it was disbanded. Our death benefit is paid by the international union. In this climate colds are far more frequent than in more favored parts of the country, but our people do not seem to suffer to any greater extent from respiratory diseases than the general public. Our serious accidents are negligible. The one great general complaint that could be made regarding conditions is the one of ventilation, especially in winter. Most of the bindery girls wear thin clothing indoors and can stand considerable heat. The men working on the bench and on the cutting machines have their bodies in continual heat. If windows are opened a little for air, the girls usually complain, and often some of the men, thus I have often seen men freely perspiring, almost alongside girls, who sat down, complaining of the coldness of the room. This muscular activity, however, tends to keep the men more healthy, but when they quit work and go outside to stand in the cold waiting for the street cars they quickly chill off and frequently contract a cold which proper ventilation indoors would have obviated.

In summer there is little to complain of from this source, but the fumes from gas stoves, glue pots, printers' ink, etc., give a typical odor to such places. In the winter they get this along with the shut-in, dried-up, vitiated atmosphere of artificial heat and the always present dust-laden air (paper dust).

The only suggestion for improvement likely to be adopted that I could make would be to place thermometers at various points in the workrooms, keeping a uniform temperature of 70 degrees in the winter months. This would do away with the frequent arguments as to whether it was hot or cold in the shop.

When there is a dispute as to whether it is early or late the best answer is a look at a correct timepiece; the same applies to heat. It can be measured; ascertain the best degree and maintain it.

An insurance agent gave me a little enlightenment on the trade. He said that a typesetter of my age would have to pay a higher premium than I would because the compositors' statistics proved a higher mortality rate than myself, a paper cutter, operating a very dangerous machine with considerably more muscular energy than a typesetter used.

One phase of local conditions is the tendency for some firms to overburden their floors with excess weight. Several of them are housed in very old buildings or ramshackle constructions. I quit one place because the floors used to sway and vibrate to a dangerous extent. If not remodeled, this place will probably collapse, and I don't want to be killed in that manner, and, as a one-time sailor and Navy man, I claim at least the average courage.

Taken all together, I think our working conditions are a trifle better than those of many other trades due to organized effort on the part of the workers.

I find it difficult to answer your questions.

The most striking fact is the frequency of pulmonary tuberculosis symptoms in young men and a large percentage of underweight men engaged in our trades. It seems to me of importance that clean toilets should be supplied every day and that the work place should be whitewashed once a year. I also favor a contributory system of old-age pensions, either through the Federal or State Government. I also believe that it would be an advantage to have State-owned hospitals or sanitariums supported by compulsory system. By this means cancer and pulmonary tuberculosis might be dealt with in a better way.

No serious objections except that the work place should be kept a little cleaner and better ventilated.

All the work places here are in fairly good condition and no serious complaints can be made.

Inadequate factory inspection and the crowding in small places of machinery and workers. All poor ventilation.

Shops here are in fairly good condition.

The dust from concrete floors is probably a health menace.

Better system of ventilation should be insisted upon.

Additional information is available as of 1925 for 46 locals, with a membership of 5,256. The proportion out of employment was 5.5 per cent, and the number on sick pay was only 3. As to duration of trade life, the proportion in the divisional periods was 22.5 per cent for less than 5 years; 25.7 per cent for 5 to 10 years; 28.3 per cent for 10 to 15 years, and 23.5 per cent for 15 years and over.

For 44 locals, representing a membership of 5,227, information was furnished as regards the number of deaths from all causes for the year 1924. There were 52 deaths, equivalent to a rate of 9.9 per 1,000 members. There were only 4 deaths from pulmonary tuberculosis, equivalent to a rate of 0.88 per 1,000 members. There were no cases of lead poisoning, but there were 12 serious accidents, equivalent to a rate of 2.61 per 1,000 members reported upon.

There were few complaints as regards deficient illumination, structural defects, particularly as regards basement locations, and inadequate sanitary facilities for women.

SUMMARY

Summarizing the foregoing, it appears that the sickness rate in 1922 of the International Typographical Union was 1 per cent; of the International Stereotypers and Electrotypers' Union, 0.3 per cent; of the International Photo-Engravers' Union, 2.2 per cent; of the International Brotherhood of Bookbinders, none; and of the International Printing Pressmen and Assistants' Union, 0.4 per cent.

The preceding percentages indicate merely the proportion of men who were absent on account of sickness at the time the questionnaire was filled in. While it might have been more desirable if the returns could all have been made of a precisely uniform date, the results have the advantage that they harmonize seasonal effects which might otherwise have become too apparent.

The sickness rate is so low that it may be challenged on the ground of accuracy, but the corresponding returns made by so many local unions prove that serious errors are not likely to have occurred. They are furthermore confirmed by the low sickness rate from different unions and employers. The sickness rate reported by employers was 0.7 per cent. Hence the conclusion would seem fully justified that the present health conditions among printing employees may safely be considered in every way satisfactory.

Like considerations apply to the relatively low incidence of lead poisoning. In the International Typographical Union, the proportion of such cases was 0.8 per 1,000 of the membership exposed to risk. For electrotypers and stereotypers the proportion was higher, 3.5 per 1,000. There were no deaths from lead poisoning among photo-engravers, nor among bookbinders, Among printing pressmen and assistants, the rate of lead poisoning was 0.3 per 1,000. Hence the conclusion that the lead-poisoning risk in all branches of the printing trades is now one of decidedly minor significance.

PRINTING-PLANT INSPECTIONS

The printing-plant inspections made in connection with the health survey of the printing trades have already been presented in detail in Bulletin No. 392 of the U. S. Bureau of Labor Statistics. It would therefore serve no useful purpose to enlarge upon the results of this part of the survey. That study covered 536 printing plants, of which 339 were located in the eastern group of States, 147 in the southern group, and 50 in the western group (it was not found feasible to extend the field investigations beyond Denver, Colo.). The character of the work performed in the establishments investigated is illustrated by Table 17:

TABLE 17.—NUMBER OF ESTABLISHMENTS IN EACH GEOGRAPHICAL GROUP OF STATES DOING SPECIFIED KIND OF WORK

Kind of work	Eastern group	Southern group	Western group	Total
Composition, hand	238	122	40	400
Composition, machine	164	79	30	273
Photo-engraving	97	33	12	142
Stereotyping	58	32	13	103
Electrotyping	47	12	3	62
Presswork	254	127	44	425
Binding, book	61	30	12	103
Binding, miscellaneous	178	73	39	290

Different types of work are, of course, performed in different establishments. It is shown for illustration that hand composition was carried on in 400 of the 536 plants, while machine composition was carried on in 273. Presswork was carried on in 425, or the large majority of the plants, while photo-engraving was carried on in 142, stereotyping in 103, and electrotyping in 62. Bookbinding was carried on in 103 and miscellaneous binding in 290 others.

The report gives a detailed description of operations, which will be found extremely useful for a thorough understanding of printing-plant process and conditions. The observations include ink grinding, which was not considered in the present investigation. Of the 536 plants inspected 221 were located in buildings adapted for the purpose. One of the serious problems of many printing plants is that they are frequently located in premises not suitably adapted for the purpose. The general appearance of plant conditions at the time of inspection was good in 129 plants, fair in 253, and bad in 154. Of course such findings may be criticized on the ground that they represent merely a personal impression, but no method could be adopted which would eliminate the personal element, since most of the objections that could be raised to plant conditions are a matter of opinion. Like considerations apply to the question as to adequacy of working space. According to the report referred to working space was ample in 377 plants and crowded in 159. This would conform to personal investigations made by the author of this survey, which in many instances showed a very crowded condition due to the rapid expansion among printing plants during recent years without adequate provision for increased working space.

The motive power was individual in 411 plants, collective in 19, and of a mixed character in 106. Much of the motive power is electric, but in many of the plants it is from steam or gas engines. As

regards safeguards or protective devices against accident occurrences, these were reported as good in 308 plants, fair in 169, and bad in 59. The plants reporting bad conditions, a relatively small portion, are in all probability small establishments not under adequate supervision from factory inspection departments.

Natural lighting conditions were good in 216 plants, fair in 213, and bad in 99. Lighting conditions in most printing plants could, it is believed, be materially improved. Illuminating engineering has only of recent years attained to the proportions of an exact science, and a vast amount of illumination in most industrial plants at the present time is far from being properly adapted to the purpose. Natural lighting conditions in all cases require to be amplified by artificial lighting, but, unfortunately, too often opportunities for natural lighting are neglected as the result of occupancy of premises ill adapted to the purpose. The artificial lighting conditions were good in 150 plants, fair in 287, and bad in 99.

The natural ventilation was good in 157 plants, fair in 142, and bad in 62. Ventilation, like illumination, has only of recent years attracted adequate scientific attention. Efficient ventilation devices, not prohibitive as regards cost of operation or methods of installation, are as yet met with in only a fraction of printing establishments. All plenum artificial ventilation was practiced in 30 plants, in 24 of which ventilation was good and in 6 fair. All exhaust artificial ventilation was practiced in 20 plants, in 11 of which the ventilation was good, in 7 fair, and in 2 poor. Part plenum artificial ventilation was practiced in 30 plants, in 14 of which the ventilation was good, in 15 fair, and in 1 bad. Part exhaust artificial ventilation was practiced in the majority of plants with artificial ventilation, 95, in 26 of which the ventilation was good, in 57 fair, and in 12 bad.

The ventilation of plants is of course separate and distinct from, although closely interwoven with, the ventilation of equipment. There were 2,314 typecasting machines using gas and 1,262 using electricity. Ventilation of equipment in composing rooms was good in 113 plants, fair in 77, and bad in 83; in photo-engraving rooms good in 42 plants, fair in 68, and bad in 32; in stereotyping rooms good in 41 plants, fair in 32, and bad in 30; in electrotyping rooms good in 10 plants, fair in 33, and bad in 19. The ventilation of other equipment was good in 22 plants, fair in 55, and bad in 70. "Other equipment," it may be said, represents so large a variety of operations and conditions that individual ventilation is necessarily more difficult. In a general way, the results of the investigation regarding ventilation of equipment are decidedly suggestive. They indicate in most cases a relatively large proportion of badly working ventilating devices on equipment which should admit of remedial measure without prohibitive expense.

As to cleanliness, the plants inspected reveal the following conditions: Floors—good in 219 plants, fair in 187, and bad in 130; windows—good in 328 plants, fair in 80, and bad in 128; equipment—good in 353 plants, fair in 120, and bad in 63; type cases—good in 271 plants and bad in 130. The latter, it may be pointed out, is one of the most obvious indications of censurable neglect, for unclean type cases are the source of much needless lead poisoning, as well as, possibly, of tuberculosis. Toilets were in good condition in 357

plants and in bad condition in 176 plants. This also is evidence of inexcusable neglect for which the employer is primarily responsible.

Sanitary facilities and medical attention, etc., were as follows: Dressing rooms were provided in 220 plants for both sexes, and in 45 for women only. No dressing rooms were provided in the remainder. Individual lockers, which are considered a sanitary essential, were provided in 295 plants and collective lockers in 28. Hot water was provided in only 329 of the 536 plants investigated. Shower baths were provided in only 115 plants. Separate lunch rooms were provided in only 26 plants and restaurant facilities in only 35. It must, of course, be considered that many of the printing plants are small and that no necessity exists for separate lunch rooms, shower baths, etc. Hospital facilities were provided by 58 plants, rest rooms for females by 49, and first-aid kits were found in 326 of the 536 plants inspected.

The investigation included 81,314 workers employed in the 536 establishments inspected. Of this number 1,363 or 1.7 per cent were 60 years of age and over. The proportion of women employed in the different plants inspected was 21.4 per cent. The number of cases of lead poisoning known to have occurred during the year under review was 14, or at the rate of 0.2 per 1,000 employees. This figure is possibly a more trustworthy figure than that reported by different labor organizations in their mortality returns, and conforms to the rate reported by employers given in the first section of the present investigation as 0.3 per 1,000. There were 29 cases of tuberculosis and 15 cases of other occupational diseases, aside from 139 accidents.

The foregoing data are decidedly instructive, but for full consideration the report published in Bulletin No. 392 should be consulted. They confirm the point of view that while health conditions in matters of detail are often far from what they should be, in a general way they are better now than in former years, although exact comparative data are wanting. They do not reveal definite evidence that would justify serious apprehensions, but are indicative of many directions in which a material improvement is easily obtainable.

SANITARY INSPECTION OF COMPOSING ROOMS

The sanitary conditions of composing rooms necessarily have a most important bearing upon health conditions of the employees therein. It requires no extended familiarity with the facts, however, to emphasize the great practical difficulty of finding conditions sufficiently standardized to admit methods of statistical inquiry suitable for qualified analysis. Printing plants fail greatly in the arrangement of mechanical equipment and in countless matters of detail, which can not possibly be reduced to a single basis of exact comparison. The responsibility for conformity to accepted sanitary standards rests, as a rule, upon the local boards of health, although in some States this duty has been transferred to the industrial commission or the labor department.

In this phase of the investigation, the following plan of procedure was decided upon: Letters were sent to the health officers of quite a large number of cities, requesting that they cooperate in the survey by undertaking special sanitary investigations of a number of repre-

sentative printing plants in their respective communities upon the basis of the schedule used in the inspection of composing rooms by the board of health of the District of Columbia and approved by the local typographical union. The questionnaire used covers a large number of items, some of which do not admit of being tabulated for statistical purposes, nor can the replies be very well summarized, largely on account of the wide variance in different localities, and this has not been done here except for strictly comparable items. It seemed best to present the facts for each locality separately.

In the aggregate this part of the health survey represents 24 cities, for which 303 reports were made. No particular rule was followed, it being left entirely to the judgment, time, and ability of the local health officers to determine the type of plant to be investigated and the number of persons to be reported upon. For certain cities the number of reports is exceptionally small, while for others they are sufficiently representative.

The most important cities reporting upon local conditions are Baltimore with 36 reports, Washington with 33 reports, Richmond with 30 reports, San Francisco with 26 reports, New York with 25 reports, Chicago with 20 reports, Cleveland with 15 reports, Philadelphia with 12 reports, and Milwaukee with 12 reports. The remainder of the cities, sending in 10 reports or less were Birmingham, Buffalo, Cincinnati, Denver, Fall River, Fort Wayne, Hartford, Houston, Indianapolis, Los Angeles, Minneapolis, Oakland, Omaha, Rochester, and Montreal. The 303 establishments investigated represent 14,886 workers, of which 2,231, or 15 per cent, were women.[c] This number would seem sufficient for present purposes. Only those who are thoroughly familiar with the practical difficulties of such investigations can appreciate the generosity of the local health officers in having these investigations made. They involved, in many cases, a considerable amount of time, which was freely given in the effort to show the true state of present-day health conditions in composing rooms in the printing trades.

There are two fundamental elements of such investigations which may be dealt with briefly on general principles. The average amount of floor space per employee and the amount of air space in cubic feet bear unquestionably upon the general health of the worker, although in practically all cases modified by local conditions, especially artificial ventilation. The factor of floor space, of course, in a measure determines the air space, but it also affects profoundly the accident hazard, which is greater in overcrowded establishments than in plants which have a sufficient amount of floor space available for the machinery used. As a matter of fact, however, the precise ascertainment of floor space and air space and their relation to individual employees is a difficult matter. Structural conditions, machinery, etc., may determine the resulting averages. Hence there are a few variations the nature of which cannot be determined on the basis of individual descriptive accounts. Large modern plants, it goes without saying, have as a rule a larger proportion of floor and air space than the smaller plants, which are representative of conditions common in the past.

In the first place, of course, the air space per employee is determined by the air space available at the plant. This in the nature of the

[c] Of the 14,886 employees, 5,224, or 35.1 per cent, were hand compositors.

case varies widely; for instance, the average air space of the plants investigated in Minneapolis was 78,331 cubic feet and in Los Angeles, 79,465 cubic feet, while it was only 21,804 cubic feet in Fall River, 28,346 cubic feet in Richmond, and 39,471 cubic feet in Baltimore.

The average air space per employee was as high as 4,682 cubic feet for Birmingham, based upon 6 plants, and 4,308 cubic feet for Indianapolis, based on 10 plants, but it was as low as 680 cubic feet for New York City based on 25 plants, and 684 cubic feet for Rochester, based on a single plant.

The average floor space per employee was as high as 404 square feet in Milwaukee and as low as 40 square feet in New York, but the Milwaukee figures are based upon only 12 plants which can hardly be considered representative for that city.

From the foregoing it is apparent that no safe conclusions can be drawn from the data given, other than in the most general way, conditions in printing plants varying entirely too much to permit of a typical average for the country at large or even for the localities considered in the present investigation. It may be safely asserted, however, that the amount of floor space and air space per employee is as low in New York City as anywhere in the country.

Of the 24 cities investigated 13 gave an average floor space of from 100 to 199 square feet per employee, while 12 gave an average amount of air space per employee of from 1,000 to 1,999 cubic feet. Ten cities reported an average plant floor space of 50,000 square feet or less, while 6 reported an average of from 50,000 square feet to 74,999 square feet and 8 reported 75,000 square feet or more.

BALTIMORE, MD.

For Baltimore, Md., the local health officer furnished 36 reports. Of this number of establishments, 33 were of brick construction and 3 of concrete or other materials.

The installations regarding fire protection were as follows:

	Plants having	Plants not having
Automatic sprinklers	6	30
Fire hose	10	26
Extinguishers	32	4

In 32 cases the plant was reported to be in a clean and generally satisfactory condition and in 4 as not being so.

The total air space of the 36 plants was 1,420,977 cubic feet, giving an average air space of 39,471 cubic feet to a plant.

The plenum system of artificial ventilation was used in 1 plant and the exhaust system in 9 plants. In only 1 of the plants were odors observed at the time of inspection.

The natural lighting conditions were considered adequate for 33 plants and inadequate for 3, but the question as to whether artificial lighting made up for the deficiency in natural lighting was answered in the affirmative in all of the 36 cases. The methods of artificial lighting in use were tungsten and nitrogen.

The heating was by hot water in 1 plant, by hot air in another plant, by direct steam in 22 plants, and by miscellaneous methods in 12 plants. Heating facilities were considered satisfactory in all of the 36 plants. Thermometers were used in 6 plants and automatic heat regulators in 1 plant. The removal of surplus heat from

machinery was practiced in 11 plants. Not all the plants in question have machines in operation.

The machinery equipment of the different plants was as follows:

TABLE 18.—NUMBER OF MACHINES AND CONDITION AS TO ELIMINATION OF HEAT AND GASES, BY KIND OF MACHINES

Kind of machines	Number of plants having	Number of machines			Number of machines not piped
		Condition as to elimination of heat and gases		Total	
		Satisfactory	Unsatisfactory		
Linotype machines	14	20	66	86	78
Monotype machines	8	11	12	23	12
Casters	8	10	10	20	10
Remelting furnaces	18	18	3	21	3
Total		59	91	150	103

With reference to specific mechanical conditions the reports were as follows:

There were remelting furnaces in composing rooms in 5 plants. Linotype pots could be closed in 13 plants but could not be in 1 plant. They were found closed at the time of inspection in 5 plants. Scrap lead was found on the floor in 15 plants. The bottoms of cases were flush with the floor in 23 plants and not flush with the floor in 13 plants. Sanitary leg bases for cases were provided in 15 of the plants. The space under the cases was reported clean in 31 plants and not clean in 5. Type was cleaned in 21 plants by benzine, in 5 by gasoline, in 2 by alcohol, and in 8 by methods not reported.

Bubble fountains for drinking purposes were not provided in any of the plants, but ice coolers were provided in 26. The common drinking cup was in use in 23 plants but individual drinking cups were provided in 20.

Washing of the hands was compulsory in 28 plants. Sanitary rules were not posted in any of the plants, nor were medical examinations required nor medical supervision over sanitary conditions exercised.

BIRMINGHAM, ALA.

For Birmingham, Ala., six reports were secured, all of which have reference to plants of brick construction. The information regarding fire protection was as follows:

	Plants having	Plants not having
Automatic sprinkler	1	5
Fire hose	0	6
Fire extinguishers	2	4
Fire-alarm system	1	5
Fire escapes	5	1

In all of the 6 cases, the plant inspected was reported as in a clean and generally satisfactory condition. The total air space of the 6 plants was 538,500 cubic feet, giving an average of 89,750 cubic feet to a plant.

Artificial ventilation was not practiced in any of the plants inspected, and odors were observed in only 1 plant. Natural light was considered adequate in the 6 plants, though the following methods of artificial lighting were reported as used in the different plants: Gas (mantle), electric arc and tungsten, 1 plant; gas (open flame) and electric arc, 1 plant; electric arc, 1 plant; tungsten and nitrogen, 1 plant; tungsten, 1 plant; not reported, 1 plant. All replies to the question as to whether artificial lighting made up for any deficiency in natural lighting were in the affirmative.

Heating was by hot air in 1 of the plants, by stoves in 2 of the plants, by direct steam in 1 plant, by combined direct and indirect steam in 1 plant, and for 1 plant no information was available. Heating facilities were considered adequate in all the plants, while facilities for carrying off surplus heat from machinery were considered adequate in 4 of the plants. Thermometers or other heat-recording devices were used in only 1 plant, while automatic heat regulators were not in use in any of the plants.

The 6 plants in question had 21 machines of various types, each of which was considered as in a satisfactory condition as to carrying off heat and gases, being piped for the elimination of gases and fumes. The number and kind of machines in the plants were as follows:

	Number of plants having	Number of machines
Linotype machines	5	6
Monotype machines	3	5
Casters	3	5
Remelting furnaces	5	5

With reference to specific mechanical conditions the replies were as follows:

In 4 of the 5 plants having a remelting furnace the furnace was in the composing room. In 5 plants the linotype pots could be closed, while in 1 plant they were closed at the time of inspection. The pots were heated by gas in 5 of the plants.

Scrap lead was found on the floor in 1 of the plants. The bottoms of the composing cases were flush with the floor in 1 plant and not flush in 1 plant, information for the others not being secured. Type was cleaned with benzine in 4 plants and with potash in 1 plant, and both methods were used in another plant. The space underneath the cases was clean in all 6 plants.

With reference to the water supply for general purposes, the 6 plants were provided with 17 spigots, or an average of 2.83 spigots to a plant. Only one plant reported having a shower bath, while 4 plants reported dressing rooms for males and 5 reported dressing rooms for females. None of the plants investigated had lockers and none provided lunch rooms. As regards drinking water, common drinking cups have been done away with in all of the plants, while 5 plants provide individual drinking cups.

Washing of the hands was compulsory in 1 of the plants. Sanitary rules were not posted and medical examinations were not required in any of the plants reporting. There was no professional supervision over sanitary conditions in any of these plants.

The number of employees at the time of investigation, by sex and class of work, was as follows:

TABLE 19.—NUMBER OF EMPLOYEES IN THE COMPOSING ROOMS OF SIX PRINTING PLANTS IN BIRMINGHAM, ALA., BY SEX AND CLASS OF WORK

Sex	Hand composition	Machine composition	Other work	Total
Males	34	10	48	92
Females	3	1	19	23
Total	37	11	67	115

On the basis of information furnished, the floor space per employee was 352 square feet and the air space per employee was 4,682 cubic feet. The sanitary accommodations were apparently considered sufficient and satisfactory. None of the 6 plants reported tuberculous employees at the time of the inspection.

BUFFALO, N. Y.

For Buffalo, N. Y., 4 reports were secured. The buildings were all of brick or stone construction. The installations regarding fire protection were as follows:

	Plants having	Plants not having
Automatic sprinkler	3	1
Fire hose	1	3
Extinguishers	4	0
Fire-alarm system	0	4
Fire escapes	1	3

Three of the plants were found in a clean and generally satisfatory condition, while 1 was not. The total air space was 225,690 cubic feet, giving an average of 56,423 cubic feet to a plant. Artificial methods of ventilation were practiced in 1 plant, using the exhaust system with 2 fans. Odors were found present in 2 of the plants, and 1 was inadequately ventilated.

In 1 plant the natural lighting was inadequate. The methods of artificial lighting in use in different plants were as follows: Tungsten, 2 plants; tungsten and nitrogen, 2 plants. Artificial lighting made up for any deficiency in natural lighting in 3 out of the 4 plants. Heating was by direct steam in 3 plants and by hot water in 1 plant. The heating facilities were adequate in all plants. The facilities for carrying off surplus heat were also adequate in all plants. Thermometers were used in 3 plants, while automatic heat regulators were found in 1 plant.

The machinery equipment of the different plants, which was all piped and satisfactory as to the elimination of heat and gases, was as follows:

	Number of plants having	Number of machines
Linotype machines	2	15
Monotype machines	3	7
Casters	3	12
Remelting furnaces	4	4

Remelting furnaces were found in the composing room of 1 of the plants. Linotype pots could be closed in 2 plants, and were found closed at the time of inspection in 1 plant. Scrap lead was found on the floor in 3 plants. Linotype pots were heated by gas in 2 plants and also by electricity in 1 plant. Bottoms of the composing cases were flush with the floor in 2 plants, and not flush with the floor in 2 others, sanitary leg bases being used in these 2. The space was clean beneath the cases in all of the plants. The type was cleaned by benzine in 3 plants and by unknown methods in 1 plant.

The total number of spigots was 20, an average of 5 spigots to a plant. Dressing rooms were provided for male employees in 1 plant and for females in 2 others. Lockers were provided in 2 plants and lunch rooms in 1 plant. Drinking water was from bubble fountains in 1 plant, and ice coolers were provided in 2. Common drinking cups were used in 2 plants, and individual drinking cups were provided in 3. In none of the plants was the washing of hands and face compulsory; neither were sanitary rules posted in any of the plants nor medical examinations required. No professional supervision of sanitary conditions was carried on in any of the plants.

The number of employees according to sex and class of work was as follows:

TABLE 20.—NUMBER OF EMPLOYEES IN THE COMPOSING ROOMS OF 4 PRINTING PLANTS IN BUFFALO, N. Y., BY SEX AND CLASS OF WORK

Sex	Hand composition	Machine composition	Other work	Total
Males	61	31	23	115
Females	4	3	12	19
Total	65	34	35	134

The average floor space per employee was 112 square feet and the average air space 1,684 cubic feet.

There were no tuberculous employees in any of the plants.

CHICAGO, ILL.

For Chicago, Ill., 20 reports were secured. All of the buildings were of brick or stone construction. The installations regarding fire protection were as follows:

	Plants having	Plants not having
Automatic sprinkler	14	6
Fire hose	9	11
Extinguishers	18	2
Fire-alarm system	10	10
Fire escapes	20	0

All the 20 plants were reported to be in a clean and generally satisfactory condition.

The total air space was 1,738,396 cubic feet, with an average of 86,920 cubic feet to a plant.

Artificial ventilation was practiced in 7 plants. The plenum system was used in 7 plants and the exhaust system in 7 plants. Odors were found present in 18 plants at the time of inspection, but the ventilation was considered adequate in all plants.

The following methods of artificial lighting were in use in different plants: Tungsten, 3 plants; tungsten and nitrogen, 10 plants; other, 1 plant. As regards whether the artificial light made up for any deficiency of natural lighting, the reports were in the affirmative in all cases.

Heating was by direct steam in all the plants and without exception considered adequate. The facilities for carrying off surplus heat were considered adequate in 13 plants and inadequate in 2, while 5 had no machinery. Thermometers were used in 10 plants and automatic heat regulating devices in 5.

The machinery equipment of the different plants was as follows:

TABLE 21.—NUMBER OF MACHINES AND CONDITION AS TO ELIMINATION OF HEAT AND GASES, BY KIND OF MACHINES

Kind of machines	Number of plants having	Number of machines			Number of machines not piped
		Condition as to elimination of heat and gases		Total	
		Satisfactory	Unsatisfactory		
Linotype machines	13	61	3	64	4
Monotype machines	10	51		51	
Casters	9	45		45	
Remelting furnaces	11	12		12	
Total		169	3	172	4

With reference to specific mechanical conditions the reports were as follows:

Three plants reported that remelting furnaces were in the composing rooms and 8 that they were not. In 10 plants linotype pots could be closed and in 3 they could not. In three plants linotype pots were found closed at the time of inspection, while in 10 plants the pots were not found closed. Scrap lead was found on the floor in 9 plants. Pots were heated by gas in 9 plants and by electricity in 4.

The bottoms of the cases were found flush with the floor in 16 plants and not flush in 3 plants, while for 1 plant no report was made. Sanitary leg bases for composing cases were provided in 3 plants and not provided in 15, while no report was made for 2. The space beneath the cases was found clean in 19 plants, while for 1 plant no report was made. Type was cleaned by benzine in 14 plants, gasoline in 1 plant, and parkaline in 2 plants, while the method was not stated for 3 plants.

Spigots to the extent of 141 were used in different plants, giving an average of 7.05 spigots to a plant. Bubble fountains were provided in 13 plants and ice coolers in 10. Common drinking cups were found in 5 plants, and individual drinking cups were observed in 6 plants. Shower baths were provided in 2 plants.

Separate dressing rooms were provided for male employees in 4 plants and for female employees in 3. Lockers were provided in 9 plants, while no lunch rooms were provided in any of the plants. The compulsory washing of hands was observed in 1 plant and likewise the compulsory washing of the face. Sanitary rules were

not posted and medical examinations were not required in any of the plants, but professional supervision of some kind over sanitary conditions was exercised in 17 plants.

The number of employees, according to sex and kind of work, was as follows:

TABLE 22.—NUMBER OF EMPLOYEES IN THE COMPOSING ROOMS OF 20 PRINTING PLANTS IN CHICAGO, ILL., BY SEX AND CLASS OF WORK

Sex	Hand composition	Machine composition	Other work	Total
Males	487	162	178	827
Females	4	8	75	87
Total	491	170	253	914

The average floor space to each employee was 163 square feet and the average air space per employee 1,902 cubic feet. There were no cases of tuberculosis among the employees at the time of inspection.

CINCINNATI, OHIO

For Cincinnati, Ohio, 8 reports were secured, all of which represent plants of brick or stone construction. The installations regarding fire protection were found to be as follows:

	Plants having	Plants not having
Automatic sprinklers	7	1
Fire hose	4	4
Extinguishers	6	2
Fire-alarm system	8	0
Fire escapes	6	2

All the plants were reported to be in a clean and generally satisfactory condition.

The total air space in all the plants was 445,530 cubic feet, or an average of 55,691 cubic feet to a plant. The plenum system was used in 2 plants, having 5 fans, and the exhaust system in 1 plant, having 1 fan. Odors were found present in 3 plants, Eight plants were adequately ventilated, but the natural lighting conditions were inadequate in one plant.

The methods of artificial lighting used in the different plants were as follows: Tungsten, 6 plants; nitrogen, 1 plant; tungsten and nitrogen, 1 plant. All plants reported that artificial lighting made up for any deficiency in natural lighting.

Heating was by direct steam in 6 plants and by steam and hot water in 2. The heating facilities were adequate in all the plants and the facilities for carrying off heat were adequate in 6 plants. Thermometers were used in 2 plants, but automatic heat regulators were not used in any.

The machinery equipment of the different plants was as follows:

TABLE 23.—NUMBER OF MACHINES AND CONDITIONS AS TO ELIMINATION OF HEAT AND GASES, BY KIND OF MACHINES

Kind of machines	Number of plants having	Number of machines			Number of machines not piped
		Condition as to elimination of heat and gases		Total	
		Satisfactory	Unsatisfactory		
Linotype machine	7	19	6	25	11
Monotype machine	5	23	2	25	
Casters	3	15		15	
Remelting furnaces	8	6	2	8	1
Total		63	10	73	12

With reference to specific mechanical conditions, reports were as follows: Remelting furnaces were found in composing rooms in 3 plants. Linotype pots could be closed in 4 plants while they could not be closed in 3 plants; they were found closed at the time of inspection in 4 plants and open in 3. Scrap lead was found on the floor in 6 plants. Linotype pots were heated by gas in 4 plants and by electricity in 3.

The bottoms of the cases were flush with the floor in 5 plants, while sanitary leg bases were provided in 3. The space beneath the cases was reported clean in 7 plants. Type was cleaned by benzine in all the plants.

The total number of spigots in different plants was 59, giving an average of 7.38 spigots to a plant. Shower baths were provided in only 1 plant. Dressing rooms for males were provided in 5 plants and for females in 3. Lockers were provided in 5 plants and lunch rooms in 2. Drinking water was from bubble fountains in 7 plants. Ice coolers were provided in 2 plants. Common drinking cups were not found in any plant and individual drinking cups were provided in 2 plants. The washing of hands and face was not compulsory in any of the plants. Sanitary rules were found posted in 1 plant; medical examination was not required in any plant; and professional supervision over sanitary conditions was exercised in 1 plant.

The number of employees according to sex and kind of work was as follows:

TABLE 24.—NUMBER OF EMPLOYEES IN THE COMPOSING ROOMS OF 8 PRINTING PLANTS IN CINCINNATI, OHIO, BY SEX AND CLASS OF WORK

Sex	Hand composition	Machine composition	Other work	Total
Males	99	56	24	179
Females		6	1	7
Total	99	62	25	186

The average floor space per employee was 191 square feet and the average air space 2,395 cubic feet.

There were no tuberculous employees at the time of inspection.

CLEVELAND, OHIO

For Cleveland, Ohio, the local health officers furnished 15 reports. Of this number of establishments, 2 were of frame construction and 13 of brick. The installations regarding fire protection were as follows:

	Plants having	Plants not having
Automatic sprinklers	6	9
Fire hose	6	9
Fire-alarm system	7	8
Fire escapes	12	3

All the plants were reported to be in a clean and generally satisfactory condition.

The total air space for all the plants was 911,772 cubic feet, or an average of 60,785 cubic feet to a plant.

Artificial ventilation was practiced in 6 plants. The plenum system was used in 2 plants, having 8 fans, and the exhaust system in 4 plants, having 5 fans. Odors were observed in 8 plants and not found present in 7. The ventilation was adequate in all plants.

The natural lighting conditions were adequate in 9 plants and inadequate in 6. The methods of artificial lighting in use in different plants were as follows: Tungsten, 10 plants; tungsten and nitrogen, 3 plants; mercury tubes, 1 plant; tungsten and electric arc, 1 plant. Artificial lighting was sufficient to make up for any deficiency in natural lighting in all plants.

Heating was by direct steam in 11 plants and by indirect steam in 4.

Heating facilities were sufficient in all plants but the facilities for carrying off heat were adequate in only 11 plants. Thermometers were used in 4 plants and automatic heat regulators in 2 plants. The machinery equipment of the different plants was as follows:

TABLE 25.—NUMBER OF MACHINES AND CONDITION AS TO ELIMINATION OF HEAT AND GASES, BY KIND OF MACHINES

Kind of machines	Number of plants having	Number of machines			Number of machines not piped
		Condition as to elimination of heat and gases		Total	
		Satisfactory	Unsatisfactory		
Linotype machines	7	16	1	17	2
Monotype machines	9	20	6	26	4
Casters	5	10	1	11	----------
Remelting furnaces	10	10	1	11	----------
Total	----------	56	9	65	6

With reference to specific mechanical conditions the reports were as follows: In only 1 plant were the remelting furnaces in the composing room. Linotype pots could be closed in 4 plants and could not be closed in 3. Linotype pots were closed at the time of inspection in 3 plants and open in 4. Scrap lead was found on the floor in 6 plants at the time of inspection. The bottoms of cases

were flush with the floor in 13 plants and not flush in 2. Sanitary leg bases were observed in only 2 plants. The space beneath the cases was clean at the time of inspection in 3 plants, no information being furnished as to the remainder of the plants.

Type was cleaned with benzine in 10 plants, with potash in 1 plant, with gasoline in 2 plants, with benzine and lye in 1 plant, and by other methods in 1 plant.

The number of spigots in different plants was 181, giving an average of 12 spigots to a plant. There were no shower baths in any of the plants. Dressing rooms were provided for males in 3 plants and for females in 11. Lockers were provided in 8 plants and lunch rooms in 1.

Drinking water was from bubble fountains in 7 plants, and ice coolers were provided in 10 plants. Common drinking cups were used in 6 plants and individual drinking cups were provided in 10 plants. Washing of the hands was compulsory in 12 plants and sanitary rules were posted in 1 plant. Medical examinations were not required in any of the plants but professional inspection of sanitary conditions was made in 1 plant.

The number of employees according to sex and kind of work was as follows:

TABLE 26.—NUMBER OF EMPLOYEES IN THE COMPOSING ROOMS OF 15 PRINTING PLANTS IN CLEVELAND, OHIO, BY SEX AND CLASS OF WORK

Sex	Hand composition	Machine composition	Other work	Total
Males	165	35	574	774
Females	7	12	253	272
Total	172	47	827	1,046

The average floor space per employee was 59 square feet, and the average air space 871 cubic feet. There were no tuberculous employees in the plants at the time of inspection.

DENVER, COLO.

For Denver only 3 reports were furnished, representing structures of brick or stone construction. The methods of fire protection for the different plants were as follows:

	Plants having	Plants not having
Automatic sprinkler	0	3
Fire hose	2	1
Extinguishers	0	3
Fire-alarm system	0	3
Fire escapes	1	2

All the plants were found to be in a clean and generally satisfactory condition. The total air space was 150,036 cubic feet, or an average of 50,012 cubic feet to a plant. Artificial ventilation was practiced in 1 plant and not practiced in 2 plants. The exhaust system was used in 1 plant, having 3 fans. Odors were not present in any of the plants and all were adequately ventilated, but in 2 the method of natural lighting was inadequate. For artificial lighting purposes

tungsten lamps were used in the 3 plants. In all of the plants artificial methods of lighting made up for any deficiency in natural lighting.

Heating was by direct steam in all cases, and the heating facilities were adequate in all. Facilities for carrying off surplus heat were inadequate in 1 plant. Thermometers and automatic heat regulators were not used in any plant. The machinery equipment of the different plants was as follows:

TABLE 27.—NUMBER OF MACHINES AND CONDITION AS TO ELIMINATION OF HEAT AND GASES, BY KIND OF MACHINES

Kind of machines	Number of plants having	Number of machines			Number of machines not piped
		Condition as to elimination of heat and gases		Total	
		Satisfactory	Unsatisfactory		
Linotype machines	3	24	31	55	31
Monotype machines	2	4	4	8	4
Casters	2	5	----------	5	----------
Remelting furnaces	2	3	----------	3	1
Total	----------	36	35	71	36

Remelting furnaces were found in the composing room in 1 of the plants. Linotype pots could be closed in 2 plants and were so found closed at the time of inspection, while they were open in 1 plant. Scrap lead was found on the floor of all the plants. All the linotype pots were heated by gas. All the bottoms of cases were flush with the floor. The space beneath the cases was reported clean in all the plants. The type was cleaned by gasoline in 1, by oakite in 1, and by potash and benzine in another. The total number of spigots in all the plants was given as 20, averaging 6.67 spigots to a plant. Dressing rooms for either males or females were not provided in any of the plants. Lockers were provided in all; no lunch rooms were provided. Drinking water was from bubble fountains in all of the plants. In none of the plants was the washing of the hands compulsory. Sanitary rules were not posted in any of the plants, nor were medical examinations required, while no professional sanitary inspections were provided.

The number of employees according to sex and class of work was as follows:

TABLE 28.—NUMBER OF EMPLOYEES IN THE COMPOSING ROOMS OF 3 PRINTING PLANTS IN DENVER, COLO., BY SEX AND CLASS OF WORK

Sex	Hand composition	Machine composition	Other work	Total
Males	70	78	23	171
Females	----------	3	9	12
Total	70	81	32	183

The average floor space per employee was 67 square feet, and the average air space was 820 cubic feet.

There were 5 tuberculous printers in 1 plant employing a total of 100 persons.

FALL RIVER, MASS.

There were 8 reports for Fall River, representing 3 plants of brick construction and 5 of concrete, steel, etc. The installations regarding fire protection were as follows:

	Plants having	Plants not having
Automatic sprinklers	1	7
Fire hose	2	6
Extinguishers	3	5
Fire-alarm system	1	7
Fire escapes	2	6

All the plants were reported to be in a clean and generally satisfactory condition.

The total air space was 174,433 cubic feet, or an average of 21,804 cubic feet to a plant. Artificial ventilation was practiced in 2 of the plants, 1 employing the plenum system with 1 fan and 1 the exhaust system with 2 fans. No odors were observed in any of the plants. All plants were adequately lighted and in only 1 plant was the natural light inadequate. Artificial lighting was provided by the following methods: Tungsten, 6 plants; gas lamp, 1 plant; electric arc and tungsten, 1 plant; and made up for any deficiency in natural lighting in the plants.

Heating facilities were inadequate in only 1 plant, and facilities for carrying off surplus heat were adequate in 3 plants. Automatic heat regulators were not used in any of the plants.

The machinery equipment of the different plants was as follows:

TABLE 29.—NUMBER OF MACHINES AND CONDITION AS TO ELIMINATION OF HEAT AND GASES, BY KIND OF MACHINES

Kind of machines	Number of plants having	Number of machines			Number of machines not piped
		Condition as to elimination of heat and gases		Total	
		Satisfactory	Unsatisfactory		
Linotype machines	7	34		34	24
Monotype machines	2	2		2	2
Casters	3	4		4	
Remelting furnaces	2	2		2	
Total		42		42	26

With reference to specific mechanical conditions, reports were as follows:

Remelting furnaces were in the composing room in only 1 plant. Linotype pots could be closed in 7 plants, and were found closed at the time of inspection. Scrap lead was found on the floor of all the plants. Linotype pots were heated by gas in 7 of the plants. Composing cases were flush with the floor in 3 of the plants and not so in 5. Sanitary leg bases were not used in any of the plants and the

space beneath the cases was clean in 3 and not clean in 2. Type was cleaned by benzine in 7 plants, the method not being specified for 1 plant.

The total number of spigots was 10, giving an average of 1.25 spigots to a plant. There were no shower baths in any of the plants. Dressing rooms were provided for males in 1 plant and for females in another. Lockers were provided in 1 plant, but there were no lunch rooms in any of the plants. The water supply for drinking purposes was through bubble fountains in 1 plant, and ice coolers were provided in 3 plants. The common drinking cup was found in 6 plants and individual drinking cups were provided in 5. Washing of the face and hands was not required in any of the plants, nor were sanitary rules posted nor medical examinations required in any of the plants. Professional sanitary inspection was required in 7 of the plants.

The number of employees according to sex and class of work was as follows:

TABLE 30.—NUMBER OF EMPLOYEES IN THE COMPOSING ROOMS OF 8 PRINTING PLANTS OF FALL RIVER, MASS., BY SEX AND CLASS OF WORK

Sex	Hand composition	Machine composition	Other work	Total
Males	28	41	10	79
Females		10	4	14
Total	28	51	14	93

The average floor space per employee was 103 square feet, while the average air space was 1,876 cubic feet.

There were no tuberculous printers in any of the plants.

FORT WAYNE, IND.

For Fort Wayne 8 reports were secured, representing brick structures exclusively. The installations regarding fire protection were as follows:

	Plants having	Plants not having
Automatic sprinklers	4	4
Fire hose	1	7
Extinguishers	6	2
Fire-alarm system	5	3
Fire escapes	5	3

All plants were in a clean and generally satisfactory condition. The total air space was 359,808 cubic feet, giving an average air space of 44,976 cubic feet to a plant. Three of the plants had artificial ventilation, 2 having the exhaust system with 5 fans and 1 the plenum system with 2 fans. Odors were found present in 4 of the plants.

Ventilation was adequate in all of the plants. In one of the plants the natural light was inadequate. For artificial lighting purposes tungsten lamps were used in all of the plants. Artificial lighting was found sufficient to make up for any deficiency in natural lighting.

Heating was by direct steam in 7 plants and by indirect steam in 1 plant. The heating facilities were adequate in all but 1 of the

plants. Without exception the facilities for carrying off surplus heat were adequate. Thermometers were used in 4 plants but automatic heat regulators were not used in any of the plants.

The machinery equipment of the different plants was as follows:

TABLE 31.—NUMBER OF MACHINES AND CONDITION AS TO ELIMINATION OF HEAT AND GASES, BY KIND OF MACHINES

Kind of machines	Number of plants having	Number of machines			Number of machines not piped
		Condition as to elimination of heat and gases		Total	
		Satisfactory	Unsatisfactory		
Linotype machines	7	35	1	36	2
Monotype machines	4	12		12	
Casters	4	5	1	6	4
Remelting furnaces	7	7		7	1
Total		59	2	61	7

With reference to specific mechanical conditions reports were as follows:

Remelting furnaces were found in composing rooms in 1 of the plants. Linotype pots could be closed in only 5 of the 7 plants having linotype installations, pots being found closed at the time of inspection in 3 of the plants. Scrap lead was found on the floor in 1 plant. Linotype pots were heated by gas in 7 of the plants. Composing cases were flush with the floor in all plants, and sanitary leg bases were used in none. The space beneath the cases was reported clean at the time of inspection in all of the plants. The cleaning of the type was done by benzine in all plants.

The total number of spigots in different plants was 32, giving an average of 4 spigots to a plant. There were no shower baths. No reports as to dressing rooms were made. Lockers were found in 2 of the plants but lunch rooms in none. The water supply for drinking purposes was from bubble fountains in 4 plants. Ice coolers were provided in 4 plants. Common drinking cups were used in 3 plants and individual drinking cups were provided in 3 others. Washing of the hands was compulsory in all of the plants, but the washing of the face was compulsory in only 3. There were no sanitary rules posted anywhere, medical examinations were not required, nor was there any professional supervision over sanitary conditions.

The number of employees according to sex and class of work was as follows:

TABLE 32.—NUMBER OF EMPLOYEES IN THE COMPOSING ROOMS OF 8 PRINTING PLANTS IN FORT WAYNE, IND., BY SEX AND CLASS OF WORK

Sex	Hand composition	Machine composition	Other work	Total
Males	77	62	162	301
Females		4	68	72
Total	77	66	230	373

The floor space per employee was 65 square feet, the air space being 965 cubic feet.

There were no tuberculous employees in any of the plants.

HARTFORD, CONN.

For Hartford 6 reports were furnished, all representing structures of brick or concrete construction. The fire protection of the different plants was as follows:

	Plants having	Plants not having
Automatic sprinklers	5	1
Fire hose	4	2
Extinguishers	4	2
Fire-alarm system	1	5
Fire escapes	3	3

All the plants inspected were found to be in a clean and generally satisfactory condition. The total air space was 398,140 cubic feet, giving an average of 66,357 cubic feet to a plant. Artificial ventilation was practiced in 3 plants and not practiced in 3 others. The exhaust system was used in 3 plants, each having 1 fan. Odors were found present in 1 plant. All of the 6 plants inspected were found adequately ventilated and the natural lighting was adequate.

The methods of artificial lighting in use in different plants were as follows: Tungsten 3 plants; carbon filament and tungsten, 1 plant; electric arc, carbon filament, tungsten and nitrogen, 1 plant; electric arc and tungsten, 1 plant. In all of the plants the artificial methods of lighting made up for any deficiency in natural lighting.

Heating was by direct steam in 5 plants, information not being given for 1 plant. Heating facilities were adequate in all cases, as were also facilities for carrying off surplus heat in all the plants having machines. Thermometers were used in 2 plants, and artificial heat regulating devices in 1 plant.

The machinery equipment of the different plants was as follows:

TABLE 33.—NUMBER OF MACHINES AND CONDITION AS TO ELIMINATION OF HEAT AND GASES, BY KIND OF MACHINES

Kind of machines	Number of plants having	Number of machines			Number of machines not piped
		Condition as to elimination of heat and gases		Total	
		Satisfactory	Unsatisfactory		
Linotype machines	3	36	6	42	6
Monotype machines	3	15	3	18	3
Casters	3	9	1	10	1
Remelting furnaces	4	4	----------	4	----------
Total	----------	64	10	74	10

Remelting furnaces were found in the composing room in 1 of the plants. Linotype pots could be closed in 3 plants, but none of the pots were found closed at the time of inspection. Scrap lead was found on the floor in 3 plants. Linotype pots were heated by gas in 3 plants. Composing cases were flush with the floor in 4 plants and

sanitary leg bases were used in 5. The space beneath the cases at the time of inspection was reported clean in all the plants. The type was cleaned by benzine in all plants.

The total number of spigots was 47, giving an average of 7.67 spigots to a plant. One plant had a shower bath, 1 provided a dressing room for males, and 4 provided dressing rooms for females. Lockers were provided in 4 plants and not provided in 2. Drinking water was from bubble fountains in 4 plants. Ice coolers were provided in all plants. Common drinking cups were not observed in any plant, while individual drinking cups were found in 3 plants. The washing of the hands and also of the face was compulsory in only 1 plant. No sanitary rules were found posted in any of the plants, but medical examinations were required in 1 and professional supervision over sanitary conditions was exercised in 2 others.

The number of employees according to sex and class of work was as follows:

TABLE 34.—NUMBER OF EMPLOYEES IN THE COMPOSING ROOMS OF 6 PRINTING PLANTS IN HARTFORD, CONN., BY SEX AND CLASS OF WORK

Sex	Hand composition	Machine composition	Other work	Total
Males	112	74	32	218
Females		7	27	34
Total	112	81	59	252

The floor space per employee was 132 square feet, and the air space 1,580 cubic feet.

There were no tuberculous employees in any of the plants.

HOUSTON, TEX.

For Houston, Tex., 10 reports were furnished, all representing plants of brick or stone construction. The facilities for fire protection were as follows:

	Plants having	Plants not having
Automatic sprinklers	0	10
Fire hose	3	7
Extinguishers	10	0
Fire-alarm system	1	9
Escapes	5	5

All of the plants were found to be in a clean and generally satisfactory condition. The total air space per plant was 41,104 cubic feet. Artificial ventilation was practiced in 6 plants, 5 using the plenum system, with 21 fans, and 1 the exhaust system, with 1 fan. Odors were found present in none of the plants, all having been adequately ventilated. In 4 plants the conditions as to natural lighting were found inadequate.

The methods of artificial lighting in use in the different plants were as follows: Tungsten, 8 plants; nitrogen, 1 plant; tungsten and nitrogen, 1 plant. Lighting facilities were adequate in 9 plants, while facilities for carrying off surplus heat were adequate in 6.

Heating was by direct steam in 3 of the plants, by coal stoves in 4, by gas radiators in 1, and by miscellaneous methods in 2. Thermometers were used in 2 plants, and automatic heat regulators in 2.

The machinery equipment of the different plants was as follows:

TABLE 35.—NUMBER OF MACHINES AND CONDITION AS TO ELIMINATION OF HEAT AND GASES, BY KIND OF MACHINES

Kind of machines	Number of plants having	Number of machines			Number of machines not piped
		Condition as to elimination of heat and gases		Total	
		Satisfactory	Unsatisfactory		
Linotype machines	8	51	----------	51	7
Monotype machines	2	4	----------	4	----------
Casters	1	2	----------	2	----------
Remelting furnaces	6	6	----------	6	----------
Total	----------	63	----------	63	7

Concerning details of the machinery equipment it was found that remelting furnaces were in composing rooms in 1 plant and linotype machine pots could be closed in 8 plants. The pots were found closed in 3 of the plants and not closed in 5. Scrap lead was found on the floor in 7 plants. Pots were heated by gas in 5 plants, and by electricity in 2 plants, and for 1 plant the method was not specified.

Composing cases were flush with the floor in 4 plants and not flush in 4 others, 2 having no cases. Sanitary leg bases were used in 4 of the plants. The space beneath the cases was reported clean in 8 plants. Type was cleaned by benzine in 7 plants, by potash and benzine compounds in 1 plant, and by benzine and typewash in 1, the method in the other plant not being specified.

The total number of spigots in the different plants was 30, giving an average of 3 spigots to a plant. Shower baths were found in 6 plants. Dressing rooms for male employees were provided in 9 plants and for female employees in 6. Lockers were provided in 5 plants and not provided in 5 others. Lunch rooms were not provided in any of the plants. The water supply for drinking purposes was by bubble fountains in 4 plants. Ice coolers were provided in 8 plants. The common drinking cup was used in 7 plants, while individual drinking cups were provided in 5. Washing of the hands was compulsory in 6 plants, while washing of the face was compulsory in only 1 plant. Sanitary rules were posted in 6 plants, but medical examination was not required nor professional supervision over sanitary conditions exercised in any of the plants.

The number of employees according to sex and class of work was as follows:

TABLE 36.—NUMBER OF EMPLOYEES IN THE COMPOSING ROOMS OF 10 PRINTING PLANTS IN HOUSTON, TEX., BY SEX AND CLASS OF WORK

Sex	Hand composition	Machine composition	Others	Total
Males	70	89	82	231
Females	1	----------	27	28
Total	71	89	109	259

The floor space per employee was 106 square feet and the air space 1,587 cubic feet.

There were no tuberculous employees in any of the plants.

INDIANAPOLIS, IND.

For Indianapolis 10 reports were secured, 9 representing structures of brick and 1 of frame. The facilities for fire protection in the different plants were as follows:

	Plants having	Plants not having
Automatic sprinklers	0	10
Fire hose	2	8
Extinguishers	4	6
Fire-alarm system	0	10
Fire escapes	4	6

All of the plants were in a clean and generally satisfactory condition. The total air space was 348,988 cubic feet, giving an average of 34,898 cubic feet to a plant. Artificial ventilation was practiced in 2 of the plants, the plenum system being used in 1 plant, with 1 fan. Odors were found present in 8 of the plants, but the ventilation was considered adequate in all. Natural lighting was inadequate in 2 of the plants. The methods of artificial lighting used in the different plants were as follows: Tungsten, 8 plants; tungsten and nitrogen, 2 plants. In all of the plants artificial lighting methods made up for any deficiencies in natural lighting.

Heating was by direct steam in 8 of the plants, by hot air in 1, and by hot water and direct steam in another. The facilities for carrying off surplus heat were adequate in 6 plants, 4 having no machinery. Thermometers were used in 3 of the plants, but automatic heat regulating devices were not used in any.

The machinery equipment of the different plants, all of which was piped and satisfactory as to the elimination of heat and gases, was as follows:

	Number of plants having	Number of machines
Linotype machines	5	7
Monotype machines	1	2
Casters	2	3
Remelting furnaces	5	5

Remelting furnaces were found in the composing room in 1 of the plants. Linotype pots could be closed in all of the plants having linotype machines, being found closed in 3 at the time of inspection. In 3 plants scrap lead was found on the floor. Pots were heated by gas in 3 plants and by electricity in 2. Composing cases were flush with the floor in 4 plants, and in 6 plants the cases had sanitary leg bases. The space beneath the cases was found clean in 8 plants, while for 2 plants the information was not furnished. Type was cleaned by lye in 1 plant, by benzine in 8, and by gasoline in 1.

The total number of spigots in the different plants was 22, giving an average of 2.2 spigots to a plant. There were no shower baths in any of the plants. Dressing rooms were provided for males in 3 plants and for females in 1 plant. Lockers were provided in 1 of the plants and not provided in 9. Lunch rooms were provided in 1 plant.

Bubble fountains were not found in any of the plants. Ice coolers were provided in 5 plants. Common drinking cups were used in 8 plants and individual drinking cups were provided in 6. The washing of the hands was compulsory in 3 plants, and washing of the face was compulsory in 3 plants. Sanitary rules were posted in 2 of the plants; medical examinations were not required in any; and professional supervision over sanitary conditions was exercised in 2 plants.

The number of employees according to sex and class of work was as follows:

TABLE 37.—NUMBER OF EMPLOYEES IN THE COMPOSING ROOMS OF 10 PRINTING PLANTS IN INDIANAPOLIS, IND., BY SEX AND CLASS OF WORK

Sex	Hand composition	Machine composition	Other work	Total
Males	38	11	27	76
Females	3		2	5
Total	41	11	29	81

The floor space per employee was 368 square feet, and the air space 4,308 cubic feet. There were no tuberculous employees in any of the plants at the time of inspection.

LOS ANGELES, CALIF.

For Los Angeles, Calif., reports were furnished for 5 plants, but for only 1 as regards the nature of the structure, that being constructed of brick. The installations regarding fire protection were as follows:

	Plants having	Plants not having
Automatic sprinklers	1	4
Fire hose	2	3
Extinguishers	4	1
Fire-alarm system	3	2
Fire escapes	1	4

In 3 cases the plant was reported to be in a clean and generally satisfactory condition and in 2 cases not so. The total air space of all the plants was 397,323 cubic feet, giving an average of 79,465 cubic feet to a plant.

Artificial ventilation was practiced in 2 of the plants, the exhaust system being used, with 2 fans. Natural ventilation was used exclusively in 3 plants. Odors were present in 2 of the plants. Only one of the 5 plants was inadequately ventilated and in 3 the natural light was inadequate.

The methods of artificial lighting in use in the different plants were as follows: Tungsten, 4 plants; electric arc, 1 plant. In all of the plants artificial lighting made up for any deficiency in natural lighting.

Heating was by direct steam in 1 plant, by stove in 1, and by hot water in 1, and the methods were not given for 2 plants. Heating facilities were inadequate in 1 plant and for 1 the information was not given. Facilities for carrying off surplus heat were adequate in

all of the plants having machines. Thermometers were used in 1 plant and automatic heat regulators in another.

The mechanical equipment of the different plants was as follows:

TABLE 38.—NUMBER OF MACHINES AND CONDITION AS TO ELIMINATION OF HEAT AND GASES, BY KIND OF MACHINES

Kind of machines	Number of plants having	Number of machines			Number of machines not piped
		Condition as to elimination of heat and gases		Total	
		Satisfactory	Unsatisfactory		
Linotype machines	4	89	3	92	3
Monotype machines	3	6		6	
Casters	2	4		4	
Remelting furnaces	3	3		3	
Total		102	3	105	3

Remelting furnaces were found in composing rooms of plants having such furnaces or equipment. Linotype pots could be closed in all the plants having linotype machines, but they were found closed at the time of inspection in only 1 plant. Scrap lead was found on the floor of all the plants having linotype machines. Linotype pots were heated by gas in 2 of the plants, and by both gas and electricity in 2 others. Bottoms of composing cases were flush with the floor in 4 of the plants. The space beneath the cases was clean in 3 of the plants and not clean in 2. Type was cleaned by gasoline and kerosene in 1 plant, benzine in 2 plants, and gasoline in 1 plant, and the method was not stated for the other.

There were 28 spigots in all the plants, an average of 5.6 spigots to a plant. Dressing rooms were provided for males in 2 plants and for females in 4, while lockers were provided in 3, and lunch rooms were provided in 1.

Drinking water was from bubble fountains in 5 plants. Ice coolers were provided in 3 plants. Common drinking cups were found in 3 plants and individual cups were provided in 1 plant. Washing of the hands and face was not required in any of the plants. Sanitary rules were posted in 1 plant but medical examinations and professional inspection of sanitary conditions were absent in all of the plants.

The number of employees according to sex and class of work was as follows:

TABLE 39.—NUMBER OF EMPLOYEES IN THE COMPOSING ROOMS OF FIVE PRINTING PLANTS IN LOS ANGELES, CALIF., BY SEX AND CLASS OF WORK

Sex	Hand composition	Machine composition	Other work	Total
Males	93	120	115	328
Females		8	46	54
Total	93	128	161	382

The average floor space to each employee was 100 square feet, and the average air space 1,040 cubic feet.

There were no tuberculous employees in any of the plants.

MILWAUKEE, WIS.

For Milwaukee reports were furnished for 12 plants, all being of brick or stone construction. The installations regarding fire protection were as follows:

	Plants having	Plants not having
Automatic sprinklers	5	7
Fire hose	0	12
Extinguishers	10	2
Fire-alarm system	6	6
Fire escapes	11	1

All but one of the plants were found to be in a clean and generally satisfactory condition. The total air space was 578,544 cubic feet, an average of 48,212 cubic feet to a plant. Artificial methods of ventilation were used in 7 plants, having the exhaust system, with 12 fans. Odors were found present in 2 of the plants; 11 plants were found adequately ventilated.

In 2 plants the natural light was adequate and in 10 inadequate. The methods of artificial lighting in use in the different plants were as follows: Nitrogen, 5 plants; tungsten, 4 plants; gas mantle and tungsten, 1 plant; gas mantle, tungsten and nitrogen, 1 plant; gas (open flame and mantle), tungsten and nitrogen, 1 plant. Artificial lighting made up for any deficiencies in natural lighting in 11 of the plants, and for 1 of the plants no information was given.

Heating in all the plants was by direct steam. Facilities for heating were adequate in all of the plants. The facilities for carrying off surplus heat was inadequate in 6 plants. Thermometers were used in 1 plant and automatic heat regulators in none.

The machinery equipment of the different plants was as follows:

TABLE 40.—NUMBER OF MACHINES AND CONDITION AS TO ELIMINATION OF HEAT AND GASES, BY KIND OF MACHINES

Kind of machines	Number of plants having	Number of machines			Number of machines not piped
		Condition as to elimination of heat and gases		Total	
		Satisfactory	Unsatisfactory		
Linotype	11	35	74	109	74
Monotype	5	7	8	15	8
Casters	4	3	11	14	11
Remelting furnaces	12	11	1	12	----------
Total	----------	56	94	150	93

Remelting furnaces were found in the composing room in 5 of the plants. The linotype pots could be closed in all 11 plants having linotype machines. The pots were found closed at the time of in-

spection in 5 of the plants and not closed in 6. Scrap lead was found on the floor in 11 of the plants, but absent in 1. Linotype pots were heated by gas in 5 of the plants, by electricity in 3, and by both methods in 3 others. Composing cases were flush with the floor in 11 of the plants, and not flush in 1. Sanitary leg bases were used in 10 of the plants and not used in 2. The space beneath the cases was clean in 10 of the plants, and not clean in 2. Type was cleaned by benzine in 10 of the plants, by lye and benzine in 1, and by lye and gasoline in 1.

The total number of spigots in all of the plants was 64, giving an average of 5.33 to a plant. Dressing rooms were provided for male and female employees in 5 of the plants, while lockers were provided in 7, but there were no lunch rooms in any of the plants.

Drinking water was from bubble fountains in 10 plants. Ice coolers were provided in 3 plants. Common drinking cups were not found in any plants and individual drinking cups were provided in 5 plants. Washing of the face and hands was insisted upon in only 1 of the plants. Sanitary rules were posted in 2 plants, but medical examination and professional inspection over sanitary conditions were not required in any.

The number of employees according to sex and class of work was as follows:

TABLE 41.—NUMBER OF EMPLOYEES IN THE COMPOSING ROOMS OF 12 PRINTING PLANTS IN MILWAUKEE, WIS., BY SEX AND CLASS OF WORK

Sex	Hand composition	Machine composition	Other work	Total
Males	184	142	81	407
Females	3	7	18	28
Total	187	149	99	435

The average floor space per employee was 404 square feet, the average air space being 1,330 cubic feet.

There were no tuberculous employees in any of the plants.

MINNEAPOLIS, MINN.

For Minneapolis, Minn., only 2 reports were furnished, both representing plants of brick construction. The installations regarding fire protection were as follows:

	Plants having	Plants not having
Automatic sprinklers	1	1
Fire hose	0	2
Extinguishers	1	1
Fire-alarm system	0	2
Fire escapes	1	1

In both cases the plants were reported to be in a clean and generally satisfactory condition. The total air space of both the plants was 156,661 cubic feet, giving an average of 78,331 cubic feet to a plant. Artificial ventilation was practiced in none of the plants. Odors were present in 1 plant. Both plants were adequately ventilated. Natural

lighting was inadequate in 1 of the plants, and the artificial method of lighting was by tungsten and nitrogen lamps. Artificial lighting made up for any deficiency in natural lighting in both of the plants. Facilities for heating were adequate in both plants. The facilities for carrying off surplus heat were inadequate in the plant having machinery installation. Thermometers were used in 1 plant, while automatic heat regulators were used in the other.

The machinery equipment of the plants, which was piped and satisfactory as to elimination of heat and gases, was as follows:

	Number of plants having	Number of machines
Linotype machines	1	5
Monotype machines	0	0
Casters	0	0
Remelting furnaces	1	1

Remelting furnaces were in the composing room in 1 of the plants. The linotype pots in the 1 plant where there were linotype machines could be closed, but were not found closed at the time of inspection. Scrap lead was found on the floor in one of the plants. The linotype pots were heated by gas. The bottoms of composing cases were flush with the floor in both of the plants. The space beneath the cases was clean in both plants. The type was cleaned by benzine in both.

There were 7 spigots in the 2 plants, giving an average of 3.5 spigots to a plant. No dressing rooms were provided for either male or female employees in either of the plants, nor were lockers or lunch rooms provided. Neither of the plants had bubble fountains for furnishing drinking water. Ice coolers were provided in both. Common drinking cups were found in 1 plant, while individual drinking cups were provided in both. Washing of the hands was required in 1 of the plants but the washing of the face was compulsory in neither. No sanitary rules were found posted in either of the plants, nor was medical examination required, nor professional supervision over sanitary conditions exercised in either of the plants.

The number of employees according to sex and class of work was as follows:

TABLE 42.—NUMBER OF EMPLOYEES IN THE COMPOSING ROOMS OF 2 PRINTING PLANTS IN MINNEAPOLIS, MINN., BY SEX AND CLASS OF WORK

Sex	Hand composition	Machine composition	Other work	Total
Males	23	10	40	73
Females		1	15	16
Total	23	11	55	89

The average air space per employee was 1,760 cubic feet and the average floor space 187 square feet.

There were no tuberculous employees in either of the plants.

NEW YORK CITY

For New York City 25 reports have been furnished. All of the buildings were of brick construction. The installations regarding fire protection were as follows:

	Plants having	Plants not having
Automatic sprinklers	18	7
Fire hose	22	3
Extinguishers	24	1
Fire-alarm system	19	6
Fire escapes	24	1

In 20 cases the plant was reported to be in a clean and generally satisfactory condition and in 5 cases only fair.

The total air space was 4,461,348 cubic feet, with an average air space to a plant of 178,453 cubic feet.

Artificial ventilation was used in 9 plants. The plenum system was used in 4 plants, the exhaust system in 6 plants and other types in 3. Odors were found present in 22 of the plants and not present in 3. The ventilation was considered adequate in 21 plants and inadequate in 4.

The natural lighting conditions were considered adequate in 18 plants and inadequate in 7. The methods of artificial lighting in use in different plants were as follows: Tungsten, 18 plants; nitrogen, 1 plant; tungsten and nitrogen, 6 plants. The replies to the question as to whether the artificial lighting made up for the deficiency in natural lighting were in the affirmative in 24 cases and in the negative in 1.

Heating was by direct steam in 10 plants, by indirect steam in 14, and by both methods in 1. The facilities for heating were considered inadequate in only 1 plant, while the facilities for carrying off surplus heat from machines were unsatisfactory in only 1 plant. Thermometers were used in 4 plants, and automatic heat regulators were used in 1.

The machinery equipment of the different plants was as follows:

TABLE 43.—NUMBER OF MACHINES AND CONDITION AS TO ELIMINATION OF HEAT AND GASES, BY KIND OF MACHINES

Kind of machines	Number of plants having	Number of machines			Number of machines not piped
		Condition as to elimination of heat and gases		Total	
		Satisfactory	Unsatisfactory		
Linotype machines	20	324	86	410	202
Monotype machines	12	42	23	65	23
Casters	20	53	5	58	2
Remelting furnaces	23	21	2	23	
Total		440	116	556	227

With reference to specific mechanical conditions reports were as follows:

In 5 plants the remelting furnaces were in the composing rooms. Three plants reported that linotype pots could not be closed. In the case of 4 plants, linotype pots were found closed at the time of inspection, but for 5 plants no report was made. Linotype pots were heated by gas in 15 plants, by electricity in 4 plants and by both gas and electricity in 1 plant. Scrap lead was found on the floor in 13 plants. The bottoms of the cases were found flush with the floor in 17 plants and not flush in 8. Sanitary leg bases for composing cases were provided in 8 plants and not provided in 17. The space underneath the cases was reported to be clean in 20 plants and not clean in 5. Type was cleaned by benzine in 16 plants, potash in 4, gasoline in 2, and unknown or miscellaneous compounds in 3.

The average number of spigots to a plant was 27, and the total number of shower baths provided was 22, or an average of 0.88 to a plant. Dressing rooms were provided for male employees in 25 plants and for females in 10. Lockers were provided in 19 plants and lunch rooms in 5.

Bubble fountains provided drinking water in 12 plants, while ice coolers were provided in 22. Common drinking cups were used in 9 plants and individual cups provided in 24. Washing of hands and face was not compulsory in any of the plants. Sanitary rules were posted in 6 plants, while medical examinations were not provided in any. Professional inspection of plants for sanitary purposes was provided in 14 plants.

The number of employees, according to sex and class of work was as follows:

TABLE 44.—NUMBER OF EMPLOYEES IN THE COMPOSING ROOMS OF 25 PRINTING PLANTS IN NEW YORK CITY, BY SEX AND CLASS OF WORK

Sex	Hand composition	Machine composition	Other work	Total
Males	2,416	1,656	1,568	5,640
Females	252	47	472	771
Total	2,668	1,703	2,040	6,411

The average floor space per employee was 40.44 square feet. The average air space was 680 cubic feet per employee.

There were no known tuberculous employees at the time of inspection.

OAKLAND, CALIF.

For Oakland, Calif., 10 reports were furnished. As regards structure, 2 were of frame, 6 of brick, and 2 of other material. The installations regarding fire protection were as follows:

	Plants having	Plants not having
Sprinkling system	0	10
Fire hose	3	7
Extinguishers	6	4
Fire-alarm system	4	6
Fire escapes	4	6

In 8 cases the plant was reported as in a clean and generally satisfactory condition and 2 as not being so.

The total air space of the 10 plants was 1,040,880 cubic feet, giving an average air space of 104,088 cubic feet to a plant.

Artificial ventilation was practiced in 2 of the plants, 1 using the plenum system and 1 the exhaust system. Odors were not present in any of the plants. The ventilation in all 10 plants was reported as adequate.

The natural lighting conditions were considered inadequate in 1 plant. The methods of artificial lighting in use in different plants were as follows: Tungsten, 4 plants; nitrogen, 1 plant; tungsten and nitrogen combined, 5 plants.

The heating was by direct steam in 1 plant, by hot water in another, and by other methods in 8 plants. Heating facilities were considered inadequate in 1 of the plants, while the facilities for carrying off surplus heat from machinery were considered adequate in all. Thermometers were used in 2 plants and automatic heat-regulation devices in 2.

There were 55 machines of various types, all of which were considered in a satisfactory condition as to the elimination of heat and gases, only 1 not being piped. The number and kinds of machines were as follows:

	Number of plants having	Number of machines
Linotype machines	5	44
Monotype machines	1	2
Casters	3	4
Remelting furnace	4	5

With reference to specific mechanical conditions reports were as follows:

In 1 plant the remelting furnace was in the composing room. In 5 plants the linotype pots could be closed, but in 3 they were not found closed at the time of inspection. The heating was by gas in the case of 5 plants and also by electricity in the case of 2. Scrap lead was found on the floor in 3 plants. The cases were flush with the floor in only 2 plants. In 6 plants the cases were provided with sanitary leg bases. The space underneath the cases was clean in 9 plants and not clean in 1 plant. Type was cleaned by gasoline in 7 plants, by benzine in 2 plants, and by lye in 1 plant.

The number of spigots in wash rooms was 23, or an average of 2.3 to a plant. Shower baths were provided in 2 plants. Dressing rooms were provided for male employees by 2 plants and for female employees by 2 others. Lockers were provided in 3 plants and lunch rooms in 2.

Drinking water was from bubble fountains in 3 plants, and ice coolers were provided in 4. Common drinking cups were in use in 4 plants, while individual drinking cups were provided in 5. The washing of hands was compulsory in 2 plants, but sanitary rules were not posted in any of the plants. Medical examinations were not required in any of the plants, but professional inspection of sanitary conditions was provided in 1 plant.

The number of employees according to sex and class of work was as follows:

TABLE 45.—NUMBER OF EMPLOYEES IN THE COMPOSING ROOMS OF 10 PRINTING PLANTS IN OAKLAND, CALIF., BY SEX AND CLASS OF WORK

Sex	Hand composition	Machine composition	Other work	Total
Males	60	55	317	432
Females		3	109	112
Total	60	58	426	544

The floor space per employee was 108 square feet. The average air space per employee was 1,913 cubic feet.

There were no tuberculous employees reported in any of the plants inspected.

OMAHA, NEBR.

For Omaha, Nebr., only 3 reports were secured, all of which represented plants of brick construction. The installations regarding fire protection were as follows:

	Plants having	Plants not having
Automatic sprinklers	1	2
Fire hose	1	2
Extinguishers	0	3
Fire-alarm system	1	2
Fire escapes	2	1

All the plants were in a clean and satisfactory condition at the time of inspection. The total air space was 179,390 cubic feet, giving an average of 59,797 cubic feet to a plant.

Artificial ventilation was practiced in 1 plant. Odors were present in none of the plants, and all were adequately ventilated and lighted. Artificial light used was of a mixed type, including gas, electricity, and tungsten lamps, and in all of the plants was found adequate to make up for any deficiency in natural lighting.

Direct steam was used for heating purposes in all plants and the facilities for heating were adequate in all plants. The facilities for carrying off surplus heat were adequate in all plants and thermometers were used in 2 plants but automatic heat regulators were not used in any.

The machinery equipment of the different plants, all of which was piped and satisfactory as to the elimination of heat and gases, was as follows:

	Number of plants having	Number of machines
Linotype machines	3	17
Monotype machines	0	0
Casters [1]	1	2
Remelting furnaces	3	4

[1] 1 plant had a small heating pot on Elrod machine.

With reference to specific mechanical conditions replies were as follows:

Linotype pots could be closed in all plants and were found closed at the time of inspection. Remelting furnaces in composing rooms were not observed, but scrap lead was found on the floor in 2 plants. Linotype pots were heated by gas. None of the cases were flush with the floor and sanitary leg bases were used in only 1 plant. The space under the cases was clean in all 3 plants. The type was cleaned by benzine in 1 plant and by gasoline in 2 plants.

The total number of spigots was 14, giving an average of 4.67 spigots to a plant. Shower baths were provided in 1 plant, dressing rooms for males in 1 plant and for females in 3 plants. Lockers were provided in 1 plant, but lunch rooms were not provided in any of the plants. Drinking water was from bubble fountains in 2 plants. Ice coolers were provided in 2 plants. Common drinking cups were found in 1 plant and individual drinking cups were provided in 1. The washing of the hands and face was compulsory in all 3 plants. Sanitary rules were posted in 1 plant. Medical examinations were not required in any plants, but professional supervision over sanitary conditions was exercised in all 3 plants.

The number of employees, according to sex and class of work was as follows:

TABLE 46.—NUMBER OF EMPLOYEES IN THE COMPOSING ROOMS OF 3 PRINTING PLANTS IN OMAHA, NEBR., BY SEX AND CLASS OF WORK

Sex	Hand composition	Machine composition	Other work	Total
Males	6	77	27	110
Females	2	4	16	22
Total	8	81	43	132

The average air space per employee was 1,359 cubic feet, and the average floor space 123 square feet.

Tuberculous employees were observed in none of the plants at the time of inspection.

PHILADELPHIA, PA.

The health officer of Philadelphia, Pa., furnished 12 reports, all the plants being of brick or concrete construction. The installations regarding fire protection were as follows:

	Plants having	Plants not having
Automatic sprinklers	8	4
Fire hose	6	6
Extinguishers	12	0
Fire-alarm system	11	1
Fire escapes	11	1

All the plants were found to be in a clean and generally satisfactory condition. The total air space was 1,261,100 cubic feet, giving an average of 105,092 cubic feet to a plant.

Artificial ventilation was practiced in 1 plant, using the plenum system with 6 fans. Odors were found present in 9 plants. Venti-

lation and natural light were adequate in all 12 plants. Artificial lighting was of a mixed type, including electric, arc, tungsten and nitrogen. In all of the plants artificial lighting made up for any deficiency in natural lighting.

Heating was by direct steam in 10 plants and by stoves in 2 plants. The facilities for heating and for carrying off surplus heat were adequate in 11 plants. Thermometers were used only in 2 plants, and automatic heat regulators were not used in any.

The machinery equipment of different plants was as follows:

TABLE 47.—NUMBER OF MACHINES AND CONDITION AS TO ELIMINATION OF HEAT AND GASES, BY KIND OF MACHINES

Kind of machines	Number of plants having	Number of machines			Number of machines not piped
		Condition as to elimination of heat and gases		Total	
		Satisfactory	Unsatisfactory		
Linotype machines	5	25	4	29	29
Monotype machines	5	13	----------	13	12
Casters	6	19	----------	19	7
Remelting furnaces	6	9	----------	9	----------
Total	----------	66	4	70	58

Regarding specific mechanical conditions reports were as follows: Linotype pots could be closed in 3 plants and were found closed at the time of inspection in 2. Remelting furnaces were found in composing rooms in 5 plants and scrap lead was found on the floor in 4. Linotype pots were heated by gas in 4 plants and by electricity in 1 plant.

The bottoms of the cases were flush with the floor in 6 plants and sanitary leg bases were used in 7. The space beneath the cases was reported clean in 11 plants and otherwise in 1 plant. The type was cleaned with benzine in all 12 plants.

The total number of spigots in the different plants was 103, giving 8.58 spigots to a plant. Shower baths were not found in any plants, but dressing rooms for males were found in 1 plant and for females in 3 plants. Lockers were provided in 3 plants and not provided in 9. No lunch rooms were provided in any of the plants.

No bubble fountains were found in any of the plants, but ice coolers were provided in 10. No common drinking cups were found but individual drinking cups were provided in all. Washing of the hands was compulsory in all the plants but in none was washing of the face required. Sanitary rules were not posted nor medical examinations required in any of the plants, and professional supervision over sanitary conditions was exercised in only 1 plant.

The number of employees according to sex and class of work was as follows:

TABLE 48.—NUMBER OF EMPLOYEES IN THE COMPOSING ROOMS OF 12 PRINTING PLANTS OF PHILADELPHIA, PA., BY SEX AND CLASS OF WORK

Sex	Hand composition	Machine composition	Other work	Total
Males	310	44	185	539
Females	1	6	76	83
Total	311	50	261	622

The average floor space per employee was 134 square feet and the average air space 2,027 cubic feet.

No tuberculous employees were found in the plants at the time of inspection.

RICHMOND, VA.

The health officer of Richmond, Va., furnished reports on 30 plants. Of these 2 were of frame construction and 28 of brick. The installations regarding fire protection were as follows:

	Plants having	Plants not having
Automatic sprinklers	6	24
Fire hose	2	28
Extinguishers	14	16
Fire-alarm system	6	24
Fire escapes	14	16

Twenty-eight plants were reported to be in a clean and generally satisfactory condition and 2 plants were not so considered. The total air space was 850,374 cubic feet, giving an average of 28,346 cubic feet to a plant. Artificial ventilation was practiced in 3 plants, using the exhaust system, with 3 fans. Odors were present in 10 plants, and not present in 20. The rooms were adequately ventilated in 20 plants, and inadequately ventilated in 10. The natural light was adequate in 12 and inadequate in 18. For artificial lighting purposes tungsten Mazda lamps were used in all of the plants. Artificial lighting made up for any deficiency in natural lighting in 19 of the plants, while it was inadequate in 1 plant, no report being made for 10 plants.

Heating was by direct steam in 12 plants, by stoves in 13 plants, by hot air in 3 plants, and by other methods in 1 plant. Heating facilities were adequate in 29 plants and inadequate in 1 plant. Facilities for carrying off surplus heat were adequate in only 5 plants and inadequate in 12, while 13 used no machines. Thermometers were used in 2 plants, and automatic heat regulators were not used in any.

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The machinery equipment of different plants was as follows:

TABLE 49.—NUMBER OF MACHINES AND CONDITION AS TO ELIMINATION OF HEAT AND GASES, BY KIND OF MACHINES

Kind of machines	Number of plants having	Number of machines			Number of machines not piped
		Condition as to elimination of heat and gases		Total	
		Satisfactory	Unsatisfactory		
Linotype machines	15	20	30	50	30
Monotype machines	8	12	4	16	4
Casters	3	3	2	5	2
Remelting furnaces	12	14		14	
Total		49	36	85	36

With reference to specific mechanical conditions, reports were as follows:

Remelting furnaces were in composing rooms in 5 plants and not present in 7. Linotype pots could be closed in 13 plants and could not be closed in 2. They were found closed at the time of inspection in 5 plants and open in 10. Scrap lead was found on the floor in 14 plants and not so found in 3. Linotype pots were heated by gas in 13 plants, by electricity in 1 plant, and by both methods in 1 plant.

Bottoms of cases were flush with the floor in 19 plants and not flush in 10, while 1 plant had no cases. Sanitary leg bases were used in 10 plants and not used in 19, no report being made for 1 plant. The space beneath the cases was clean in 22, and not clean in 7, no report being made for 1 plant.

Type was cleaned by benzine in 9 plants, gasoline in 10 plants, potash in 1 plant, potash and gasoline in 4 plants, potash and benzine in 5 plants, and potash and kerosene in 1 plant.

The total number of spigots was 72, giving an average of 2.4 spigots to a plant. Only 1 plant reported a shower bath. The number of dressing rooms for males was 9 and for females 13. Lockers were provided in 4 plants and not provided in 26. Lunch rooms were not provided in any of the plants.

Bubble fountains were used in 2 plants. Ice coolers were provided in 26 plants. The common drinking cup was found in 11 plants, while individual drinking cups were provided in 21. Washing of the face was not compulsory in any plant, and washing of the hands was required in only 1 plant. Sanitary rules were posted in 1 plant; medical examinations were not required nor professional inspection of sanitary conditions carried on in any of the plants.

The number of employees according to sex and class of work was as follows:

TABLE 50.—NUMBER OF EMPLOYEES IN THE COMPOSING ROOMS OF 30 PRINTING PLANTS OF RICHMOND, VA., BY SEX AND CLASS OF WORK

Sex	Hand composition	Machine composition	Other work	Total
Males	100	72	191	363
Females		4	110	114
Total	100	76	301	477

The average floor space per employee was 142 square feet and the average air space 1,783 cubic feet.

There were no tuberculous employees in the plants at the time of inspection.

ROCHESTER, N. Y.

For Rochester, N. Y., only 1 report was secured, representing a building of brick construction. The installations regarding fire protection were as follows: Automatic sprinklers, fire extinguishers, fire-alarm system, and fire escapes.

The plant was in a clean and generally satisfactory condition, having a total air space of 39,648 cubic feet. The ventilation was by natural methods and adequate, no odors being found present. The natural lighting was adequate. For artificial lighting purposes tungsten and nitrogen lamps were used.

Heating was by direct steam and the heating facilities were adequate. Facilities for carrying off surplus heat were adequate. No thermometers nor automatic heat regulators were used.

The machinery equipment of the plant, which was piped and satisfactory as to the elimination of heat and gases, was as follows:

	Number of plants having	Number of machines
Linotype machines	1	19
Monotype machines	0	0
Casters	1	3
Remelting furnaces	1	1

No remelting furnaces were found in the composing room, and linotype pots were found closed at the time of inspection. There was no scrap lead on the floor. Linotype pots were heated by gas. The bottom of cases were flush with the floor in all instances. The space beneath the cases was found clean. Type was cleaned by benzine.

The total number of spigots in the plant was four. Dressing rooms, lockers, and lunch room were provided for both male and female employees. Drinking water was from bubble fountains and ice coolers were provided. There were no common drinking cups and individual drinking cups were not provided. Washing of hands and face was not required in the plant. No sanitary rules were posted and no medical examinations were required, but professional supervision over sanitary conditions was carried on.

The number of employees according to sex and class of work was as follows:

TABLE 51.—NUMBER OF EMPLOYEES IN THE COMPOSING ROOM OF A PRINTING PLANT IN ROCHESTER, N. Y., BY SEX AND CLASS OF WORK

Sex	Hand composition	Machine composition	Other work	Total
Males	32	23		55
Females		3		3
Total	32	26		58

The average floor space per employee was 57 square feet, and the average air space 684 cubic feet.

There were no tuberculous employees in the plant.

SAN FRANCISCO, CALIF.

For San Francisco, Calif., 26 reports have been provided. The structure of the buildings was of frame in 2 cases, of brick in 9, and of concrete in 15. The installations regarding fire protection were as follows:

	Plants having	Plants not having
Automatic sprinklers	5	21
Fire hose	4	22
Extinguishers	17	9
Fire-alarm system	6	20
Fire escapes	8	18

All the plants were reported to be in a clean and generally satisfactory condition.

The total air space of the 26 plants was 3,393,700 cubic feet or an average of 130,527 cubic feet to a plant.

The plenum system of artificial ventilation was not used in any plant but the exhaust system was used in 4 plants. No plants were found to have odors at the time of inspection.

The natural lighting conditions were reported to be adequate in 2 of the plants and inadequate in 2. The methods of artificial lighting in use in different plants were as follows: Electric arc, 4 plants; tungsten, 24 plants; nitrogen, 11 plants. Artificial lighting sufficient to make up for any deficiencies in natural lighting in the plants inspected was reported.

The heating was by hot air in 4 plants, by hot water in 1 plant, by direct steam in 2 plants, and by other methods in 19 plants. Heating facilities were considered adequate in all the plants and the carrying off of surplus heat was considered satisfactory in 20 plants and unsatisfactory in 6. Thermometers were not used in any of the plants nor were there automatic heat-regulating devices.

The machinery equipment of the different plants was as follows:

TABLE 52.—NUMBER OF MACHINES AND CONDITION AS TO ELIMINATION OF HEAT AND GASES, BY KIND OF MACHINES

Kind of machines	Number of plants having	Number of machines			Number of machines not piped
		Condition as to elimination of heat and gases		Total	
		Satisfactory	Unsatisfactory		
Linotype machines	12	15	9	24	9
Monotype machines	3		8	8	8
Casters	1		2	2	2
Remelting furnaces	4	4		4	
Total		19	19	38	19

With reference to specific mechanical conditions the reports were as follows:

As regards the presence of remelting furnaces in composing rooms the answer was in the negative in all cases making reply to this question. As to whether linotype pots could be closed, 11 plants answered in the affirmative and 1 in the negative. In 5 plants the pots were not closed at the time of inspection. Scrap lead was found on the floor in 10 plants. Sanitary leg bases were furnished in 15 plants and not in 11. Type was cleaned by benzine in 20 plants, by benzine and potash in 4, and by other methods in 2.

The number of spigots in wash rooms in 25 plants reporting upon the question was 68, or an average or 2.72 spigots per plant. Shower baths were not provided in any of the plants. Dressing rooms were provided for males in 9 plants and for females in 12. Lockers were provided in 5 plants and lunch rooms in 1 plant.

The drinking water was from bubble fountains in 9 plants, and ice coolers were provided in 5. Common drinking cups were found in use in 5 plants, while individual drinking cups were provided in 12. The washing of hands was compulsory in 3 plants, but no sanitary rules were posted in any of the plants. Medical examinations were not required in any of the plants, nor was there professional supervision over sanitary conditions of any kind.

The number of employees according to sex and class of work was as follows:

TABLE 53.—NUMBER OF EMPLOYEES IN THE COMPOSING ROOMS OF 26 PRINTING PLANTS IN SAN FRANCISCO, CALIF., BY SEX AND CLASS OF WORK

Sex	Hand composition	Machine composition	Other work	Total
Males	134	61	306	501
Females	2		137	139
Total	136	61	443	640

The average air space per employee was 5,303 cubic feet, and the average floor space 304 square feet.

There were no tuberculous employees in any of the establishments inspected.

WASHINGTON, D. C.

For Washington, D. C., 33 reports were secured. The buildings in nearly all cases were of brick construction, only one being of frame and one of stone. The installations regarding fire protection were as follows:

	Plants having	Plants not having
Automatic sprinklers	4	29
Fire hose	1	32
Fire extinguishers	16	17
Fire-alarm systems	4	29
Fire escapes	7	26

In 29 cases the plant was reported as in a clean and generally satisfactory condition and in 4 as not.

The total air space of the 33 plants was 478,626 cubic feet giving the average air space of a plant as 14,504 cubic feet.

Artificial ventilation was practiced in 3 of the plants and odors were observed in 7. For 1 plant the ventilation was reported as not adequate.

The natural lighting conditions were considered adequate in 30 of the plants and inadequate in 2, but the following methods of artificial lighting were reported as in use in different plants: Tungsten, 11 plants; nitrogen, 8 plants; tungsten and nitrogen combined, 9 plants; gas mantles, 1 plant; gas mantles and tungsten combined, 2 plants; gas, open flame, 1.

Heating was by direct steam in 17 of the plants, by coal stoves in 2, by indirect steam in 3, by hot water in 4, by vapor in 2, and by miscellaneous methods in 4 others. Heating facilities were considered adequate in 32 of the plants, while the facilities for carrying off surplus heat were considered adequate in 29. Thermometers were used in 3 plants and automatic heat regulators in 1 plant.

The machinery equipment of the different plants was as follows:

TABLE 54.—NUMBER OF MACHINES AND CONDITION AS TO ELIMINATION OF HEAT AND GASES, BY KIND OF MACHINE

Kind of machines	Number of plants having	Number of machines			Number of machines not piped
		Condition as to elimination of heat and gases		Total	
		Satisfactory	Unsatisfactory		
Linotype machines	11	25	4	29	5
Monotype machines	2	2	1	3	
Casters	1	2		2	
Remelting furnaces	13	13		13	2
Total		42	5	47	7

According to this table the 33 plants in question had 47 machines, including casters and remelting furnaces, of which 42 were found in a satisfactory condition and 5 in an unsatisfactory condition, while

7 were not piped. The proportion of machines not piped must be considered as remarkably low.

With reference to specific mechanical equipment, the following reports were received:

In 4 plants remelting furnaces were in the composing room and in 9 they were not. Linotype pots could be closed in 8 plants but could not be in 3 others. They were found closed at the time of inspection in 6 plants and not closed in 5 others. The pots were heated by gas in 11 plants, and scrap lead was found on the floors at the time of inspection in 11. The bottoms of cases were flush with the floor in 26 instances, while in 11 cases the composing cases were furnished with sanitary leg bases.

The space under type cabinets was found to be unclean in 2 cases and in a fairly good condition in 8 others. Spigots for washing hands were provided in 32 plants, to the number of 62, an average of 1.9 spigots per plant. Separate dressing rooms for males were provided in 5 plants. None of the plants provided lunch rooms and only 1 plant provided lockers.

Drinking water was from bubble fountains in 1 plant, and individual drinking cups were provided in 32 plants, while in 3 plants common drinking cups were found to be still in use. Ice coolers were provided in 10 plants. Sanitary rules were posted in 2 plants, medical examinations were made in none, and professional supervision over sanitary conditions was exercised in only 1 plant. Washing the hands was compulsory in 5 plants and washing the face in 2 others.

The number of employees according to sex and class of work was as follows:

TABLE 55.—NUMBER OF EMPLOYEES IN THE COMPOSING ROOMS OF 33 PRINTING PLANTS IN WASHINGTON D. C., BY SEX AND CLASS OF WORK

Sex	Hand composition	Machine composition	Other work	Total
Males	73	45	125	243
Females	4	2	67	73
Total	77	47	192	316

The average floor space per employee in 32 plants was 120 square feet, and the average air space per employee was 1,336 cubic feet.

There were no tuberculous employees reported in any of the 32 plants answering the question.

MONTREAL, CANADA

For Montreal, 10 reports were furnished, all representing structures of brick or stone construction. Methods of fire protection for the different plants were as follows:

	Plants having	Plants not having
Automatic sprinklers	4	6
Fire hose	1	9
Extinguishers	10	0
Fire-alarm system	4	6
Fire escapes	9	1

All the plants were found in a clean and generally satisfactory condition. The total air space for 8 plants was 392,912 cubic feet, giving an average air space to a plant of 49,114 cubic feet. Artificial ventilation was practiced in 1 of the plants, the exhaust system being used with one fan. No odors were present in any of the plants and all were found adequately ventilated.

In one of the plants methods of natural lighting were inadequate. For artificial lighting purposes in the different plants the methods were as follows: Tungsten, 3 plants; tungsten and nitrogen, 7 plants. In all cases artificial lighting made up for any deficiencies in natural lighting.

Heating was by direct steam in 7 plants and by hot air and hot water and direct steam in 1 plant, and for the others the methods were not given. Heating facilities were adequate in 8 of the plants, 2 making no report. Facilities for carrying off surplus heat were adequate in 3 of the plants, 2 making no report, and 5 having no machines. Thermometers were used in 3 plants and automatic heat regulators in 2. The machinery equipment of the different plants was as follows:

TABLE 56.—NUMBER OF PLANTS AND CONDITION AS TO ELIMINATION OF HEAT AND GASES, BY KIND OF MACHINES

Kind of machines	Number of plants having	Number of machines			Number of machines not piped
		Condition as to elimination of heat and gases		Total	
		Satisfactory	Unsatisfactory		
Linotype machines	3	5	34	39	34
Monotype machines	3	5	----------	5	----------
Casters	5	10	9	19	9
Remelting furnaces	2	2	3	5	3
Total	----------	22	46	68	46

Remelting furnaces were found in the composing room in 1 of the plants. Linotype pots were found closed at time of inspection in 3 plants in which there were linotype machines. There was scrap lead on the floor in 1 of the plants. Pots were heated by gas in 1 plant and by electricity in another, and the methods were not given for the other. Composing cases were flush with the floor in 3 plants and not flush in 5; for 2 information was not given.

Sanitary leg bases were found in 6 plants, not found in 1 plant, and for 3 plants the information was not given. The space beneath the cases was clean in 4 of the plants. Type was cleaned by benzine in 9 plants, the method not being given for the other. The total number of spigots in all of the plants was 77, giving an average of 7.7 spigots to a plant. Dressing rooms were provided for males in 6 plants and for females in all. No lockers were provided in any of the plants, while lunch rooms were provided in 2.

Drinking water was from bubble fountains in 4 plants. Ice coolers were provided in 8 plants. Common drinking cups were used in 1 plant and individual drinking cups in 9 others. Washing of the hands

was compulsory in all, but in none was the washing of the face compulsory. Sanitary rules were found posted in 4 plants, but medical examinations were not required in any; professional supervision of sanitary conditions was exercised in all.

The number of employees according to sex and class of work was as follows:

TABLE 57.—NUMBER OF EMPLOYEES IN THE COMPOSING ROOMS OF 10 PRINTING PLANTS IN MONTREAL, CANADA, BY SEX AND CLASS OF WORK

Sex	Hand composition	Machine composition	Other work	Total
Males	91	51	316	458
Females		19	143	162
Total	91	70	459	620

The average floor space to an employee in 8 plants was 72 square feet and the average air space 847 cubic feet.

There were no tuberculous employees in any of the plants.

SANITARY CONDITIONS IN PHOTO-ENGRAVING PLANTS

A special inquiry was made into sanitary conditions in photo-engraving plants by means of a questionnaire, 161 of such questionnaires being returned more or less completely filled out. These 161 plants employed 2,603 workers, of whom 2,500 were men and 103 were women. By specific occupations the distribution of employees of the 157 plants reporting as to occupation was as follows:

TABLE 58.—NUMBER OF EMPLOYEES IN PHOTO-ENGRAVING PLANTS, BY SEX AND OCCUPATIONS

Occupation	Number of employees			Occupation	Number of employees		
	Males	Females	Total		Males	Females	Total
Photographers and strippers	548	7	555	Color artists	158	1	159
Half-tone etchers and printers	378		378	Proovers	175		175
Line etchers and printers	228		228	Offset and photogravure	27		27
Engravers	314		314	Others [1]	387	94	481
Routers and blockers	233		233	All-round workers	52	1	53
				Total	2,500	103	2,603

[1] Majority no doubt are office workers.

As regards the construction of buildings occupied for photo-engraving purposes, it appears that 91 were of brick, 31 of concrete, 11 of brick and concrete, 10 of brick and stone, 8 of stone, and the remainder of other types of construction.

The flooring in 98 plants was of wood, in 40 of concrete, in 7 of wood and concrete, in 6 of wood over concrete, and in the remainder of miscellaneous forms.

Information was obtained regarding the floor area, the ceiling height, the approximate air space, and the number of employees for 122 plants. For these plants the average height of ceiling was 12.4

feet, the average number of square feet of floor area per employee was 265.3, and the average number of cubic feet of air space per employee was 3,011.9, based on a total of 2,063 employees, a total floor area of 547,351 square feet and a total air space of 6,213,562 cubic feet.

In regard to ventilation, 146 plants reported that the rooms seemed to be adequately ventilated and 8 reported that they did not. One plant reported that the ventilation was bad in the morning and also during the winter months, and the reports for 4 plants were more or less indefinite.

As to lighting, in 135 plants the natural light seemed adequate and in 8 plants it did not, while for the remainder the reports were qualified. It may safely be assumed that in all of the plants not reporting specifically in the affirmative or negative, there was sufficient reason to question the adequacy of natural light during ordinary business operations.

With reference to use of gas masks for any part of the work the reports were as follows: In 137 plants, no; in 10 plants, yes; in 3 plants, for emergency use only; in 1 plant, for glass washing; in 1 plant, during the breaking the bulk of acids; in 1 plant, in zinc etching rooms and when using dragon's blood; in 1 plant in the dark rooms; in 1 plant, provided but not used; in 1 plant, used when needed; and 5 plants did not report. In 128 plants gas exclusively was used for heating equipment such as silver baths, hot plates, drying cabinets, and twirlers, in 6 plants electricity exclusively, in 15 plants gas and electricity, and in 1 plant natural steam heat, while for 11 plants the report was not definite.

The drinking facilities for employees' use provided the following accommodations: At 58 plants individual drinking cups were provided by the employer, and at 16 plants they were provided by the employees; at 30 plants common drinking cups were used; at 40 plants there were bubble fountains; and 17 plants made no report.

Sanitary facilities were in good condition in 144 plants, in poor condition in 6, in fair condition in 4, and for 7 the condition was not reported.

Rules were posted for the sanitary guidance of employees in 35 plants, and not posted in 97 plants; in 2 plants employees follow the rules of the international union, which constantly trains and inspects its men; 1 plant posts rules as required by statute; no report was made for 26 plants.

Medical examinations of employees were not required in 120 plants; in 5 plants such examination was obligatory, and in 4 for apprentices only; in 3 plants medical examinations were required by the union; in 1 plant they were limited to eye test, while in 1 plant they were given where sickness lasted over a certain period; in 1 other plant when employees are assumed to be suffering from some form of disease; and for 26 plants no report was made.

The information secured is general in character but suggestive of reasonable conformity in most of the establishments to modern sanitary requirements. It should be read in connection with the description of operations given in Bulletin No. 392 of the United States Bureau of Labor Statistics, Survey of Hygienic Conditions in the Printing Trades (pp. 20–24).

HEALTH OF AGED WORKERS IN PRINTING TRADES

This section of the health survey of the printing trades concerns 728 aged workers in the printing trades, 60 to 86 years old, who are still at work or who have retired. The returns were obtained in all cases through the cooperation of local labor organizations and as the result of personal inquiry during an inspection of printing plants. They therefore represent entirely the viewpoint of the men themselves, and in most cases the questionnaire was filled out by the person concerned. The questionnaire was made as simple as possible to elicit fundamental facts of practical importance.

Of the 728 printing employees, representing every branch of the trade and including a few women, 600 were under 70 years of age, 120 were from 70 to 79 years of age, and 8 were 80 years of age and over. The average age of the total number was 65.2 years. The average duration of the trade life to date of the 724 employees reporting on this point was 44.4 years, ranging from a minimum of 1½ years to a maximum of 70 years. The men had worked in the aggregate 32,135 years.

Details as to the duration of the trade life of these 724 workers, related to their age, are shown in Table 59:

TABLE 59.—NUMBER OF AGED WORKERS IN THE PRINTING TRADES BY CLASSIFIED YEARS OF TRADE LIFE AND AGGREGATE AND AVERAGE YEARS OF TRADE LIFE, BY AGE

Age	Number of workers	Number of workers whose trade life had lasted—					Aggregate years of trade life	Average years of trade life
		1 to 24 years	25 to 34 years	35 to 44 years	45 to 54 years	55 years and over		
60 years	61		4	39	18		2,550	41.8
61 years	79	6	4	35	34		3,038	38.5
62 years	72	6	6	26	34		3,067	42.6
63 years	84	6	1	22	55		3,581	42.6
64 years	61	5	3	17	36		2,581	42.3
65 years	63	3	2	14	43	1	2,796	44.4
66 years	58	5	3	9	39	2	2,522	43.5
67 years	59	5	3	9	39	3	2,554	43.3
78 years	33		4	4	20	5	1,564	47.4
69 years	28	1		1	21	5	1,363	48.7
70 years	32	2	1	4	16	9	1,529	47.8
71 years	26			3	13	10	1,339	51.5
72 years	18	1	1	2	6	8	873	48.5
73 years	11				6	5	600	54.5
74 years	8				2	6	443	55.4
75 years	5				2	3	279	55.8
76 years	6				1	5	347	57.8
77 years	5	1			1	3	234	46.8
78 years	4				1	3	230	57.5
79 years	3				1	2	175	58.3
80 years	2			1		1	105	52.5
81 years	1					1	63	63.0
83 years	1			1			40	40.0
84 years	2					2	137	68.5
85 years	1					1	70	70.0
86 years	1					1	55	55.0
Total	724	41	32	187	388	76	32,135	44.4
Per cent		5.7	4.5	25.8	53.4	10.5		

As to the present health of the persons concerned, it was reported as good in 585 cases, or 80.4 per cent of the total, as fair in 118 cases, or 16.2 per cent, and as bad in 25 cases, or 3.4 per cent. This result confirms the general impression resulting from the health survey of the

printing trades, that the various occupations in printing are at the present time of relatively minor effect in producing serious consequences, traceable in prolonged sickness or incapacity in old age. Of course the result might have been a little different if the men could all have been subjected to a thorough medical examination. The statements made are merely the opinions of the men themselves, but it may be assumed that they would be more inclined to overstate than to understate their present physical condition.

Specific inquiry was made as regards past record of tuberculosis. This was answered in the affirmative by only 2 persons, or 0.3 per cent of the total reporting. The fact must not be overlooked, of course, that few persons suffering or having suffered from tuberculosis would attain an age beyond 60 years, and such cases would most likely be found in the union homes. The question was asked as to whether the person concerned attributed any health injurious consequences to the occupation. Out of the 728 making answer to the questionnaire, 125, or 17.2 per cent, indicated that they had suffered in some manner or form from occupational exposure.

Details as to the present health and the past record of tuberculosis and trade sickness of these aged workers are shown in Table 60:

TABLE 60.—PRESENT HEALTH, AND TUBERCULOSIS AND TRADE SICKNESS RECORDS OF AGED WORKERS IN PRINTING TRADES, BY AGE

Age	Number of workers	Present health			Tuberculosis record		Trade sickness record	
		Good	Fair	Bad	No	Yes	No	Yes
60 years	63	54	7	2	63		51	12
61 years	79	69	8	2	79		62	17
62 years	72	60	9	3	72		56	16
63 years	84	62	22		83	1	69	15
64 years	61	52	7	2	61		51	10
65 years	63	51	10	2	63		57	6
66 years	58	45	11	2	58		47	11
67 years	59	49	7	3	59		49	10
68 years	34	32	2		34		31	3
69 years	28	23	4	1	28		26	2
70 years	32	20	8	4	32		26	6
71 years	26	17	9		26		23	3
72 years	18	12	4	2	18		12	6
73 years	12	9	3		12		11	1
74 years	8	7	1		8		6	2
75 years	5	2	2	1	4	1	3	2
76 years	6	6			6		3	3
77 years	5	4	1		5		5	
78 years	4	3	1		4		4	
79 years	3	3			3		3	
80 years	2	2			2		2	
81 years	1	1			1		1	
83 years	1			1	1		1	
84 years	2	1	1		2		2	
85 years	1		1		1		1	
86 years	1	1			1		1	
Total	728	585	118	25	726	2	603	125
Per cent		80.4	16.2	3.4	99.7	0.3	82.8	17.2

The replies to the inquiry regarding particular diseases from which the men had suffered, other than pronounced tuberculosis, indicate that in only a few cases was present sickness of such a nature as to be apparently directly traceable to the occupation followed or to insanitary or otherwise injurious plant conditions.

Table 61 gives a list of typical diseases from which the men had suffered at some time or other during their lives:

TABLE 61.—SOME TYPICAL DISEASES REPORTED BY AGED WORKERS IN PRINTING TRADES, BY AGE

Age (years)	Disease
60	Brain fever.
60	Flu.
60	Infantile ailments.
60	Measles, catarrh.
60	Typhoid, asthma.
60	Rheumatism.
60	Rheumatism.
60	Indigestion, biliousness.
60	Locked bowels.
60	Rheumatism, gout.
60	Bronchial trouble, cough.
60	Typhoid, malaria fever—piles.
60	Rheumatism, varicose veins.
61	Slight attack bronchial pneumonia.
61	Influenza, 3 months.
61	Whooping cough, measles, etc., in childhood.
61	Grippe.
61	Dysentery, malaria, minor ailments.
61	Bright's disease.
61	Grippe.
61	Typhoid fever.
61	Grippe and pneumonia.
61	High blood pressure.
61	Bronchitis, several breakdowns.
61	Sick a number of times in past 3 years.
61	Appendicitis, pneumonia.
62	Children's diseases.
62	Operation for rupture, right side.
62	Rheumatism.
62	Typhoid, pneumonia, malaria, german measles.
62	Stomach trouble in early manhood.
62	Gall stones removed.
62	Indigestion.
62	Flu.
62	Appendicitis.
62	Pneumonia.
62	Pneumonia.
62	Typhoid, malaria.
62	Slight stroke apoplexy.
62	Pleurisy, bladder and kidney.
62	Tonsillitis, constipation.
63	Rheumatism.
63	Bronchitis, slight heart trouble.
63	Typhoid, acute indigestion, appendicitis.
63	Flu.
63	Nervous breakdown.
63	Occasional attacks of pneumonia.
63	Injured in street-car accident.
63	Stomach trouble.
63	Typhoid, pneumonia.
63	Usual children's ailments, smallpox.
63	Rheumatism.
63	Stiff knee (accident).
63	Operation for piles, ptomaine poisoning.
63	Bad cold in 1921.
63	Influenza.
63	Typhoid, bronchitis.
63	Grippe.
63	Stroke, paralysis.
63	Lumbago, gout.
63	Rheumatism.
63	Rheumatism.
63	Injuries.
63	Flu.
63	Flu.
63	Rheumatism.
63	Alleged tuberculosis in 1882; recovery in Colorado in 1½ years.
63	Pneumonia.
64	Malaria fever, hay fever.
64	Typhoid fever.
64	Children's diseases only.
64	Eyesight only trouble.
64	Partial paralysis.
64	Pneumonia.
64	Blood poisoning from infection or wound.
64	Pain in the sacro iliac joint result of fall.
64	Pneumonia.
64	Trouble with stomach.
64	Heart trouble.
64	Rheumatism.
64	Inflammatory rheumatism and paralysis.
64	Scarlet fever.
64	Stomach trouble.
64	Indigestion.
65	Pneumonia, appendicitis.
65	Tonsillitis, grippe, hay fever.
65	Slight colds.
65	Typhoid fever.
65	Flu.
65	Grippe twice, flu three times.
65	Piles, flu.
65	Intermittent fever.
65	Smallpox, pneumonia, measles.
65	Rheumatism.
65	Has been sick about 1 year.
65	Typhoid fever, pneumonia.
65	Slight trouble with lungs.
65	Lead poisoning, rheumatism, neuralgia.
66	Measles, chicken pox, whooping cough, smallpox, etc.
66	Smallpox.
66	Vertigo.
66	Influenza.
66	Pneumonia, colds, grippe.
66	Typhoid fever.
66	Rheumatism.
66	Grippe, pneumonia.
66	Typhoid fever.
66	Pneumonia, ulcerated stomach.
66	Grippe, indigestion, blood poisoning.
66	Flu.
66	Flu, accident to leg.
66	Rupture.
66	Nervous attack.
66	Nervous breakdown in 1915, wreck ever since.
66	Grippe.
66	Tonsillitis, bronchial trouble, high followed by low blood pressure.
66	Heart disease.
67	Severe cold.
67	Occasional gallbladder pain.
67	Typhoid, appendicitis.
67	Operation for varicose veins.
67	Pleurisy, blood clots on brain.
67	Acid stomach 25 years ago, high blood pressure.
67	Pneumonia.
67	Grippe.
67	Typhoid fever.
67	Malaria fever.
67	Operation (female worker).
67	Typhoid fever, grippe.
67	Indigestion.
67	Diphtheria.
67	Operation for appendicitis.
67	Light typhoid fever.
67	Bronchitis.
67	Typho-malaria, lumbago, nervous attack.
67	Pleurisy, rheumatism.
67	Pneumonia.
67	Flu.
67	Pleurisy.
67	Heart trouble, bowel trouble.
67	Typhoid fever.
67	Hernia (operation).
67	Pneumonia, flu, some bad bruises.
67	Periodical catarrh, habitual constipation.

TABLE 61.—SOME TYPICAL DISEASES REPORTED BY AGED WORKERS IN PRINTING TRADES, BY AGE—Continued

Age (years)	Disease	Age (years)	Disease
67	Pneumonia.	70	High blood pressure.
68	Bronchial pneumonia, infectious eye.	71	Pneumonia.
68	11½ years rectal trouble.	71	Fever.
68	Grippe.	71	Typhoid.
68	Fever.	71	Operation for hernia.
68	Flu.	71	Typhoid.
68	Flu.	71	Appendicitis.
68	Brain fever, typhus fever, acute articular rheumatism.	71	Congestion of brain, hardening of arteries.
69	Children's disease.	71	Appendicitis, mastoid, neuritis.
69	Flu.	71	Typhoid, carbuncle, major operation removal of prostate gland.
69	Eye trouble.	72	Bleeding of lungs, pneumonia, bronchitis.
69	Typhoid fever.	72	Rheumatism.
69	Little stomach trouble.	72	Grippe.
69	Typhoid fever.	72	Smallpox.
69	Influenza.	72	Nervous breakdown.
69	Influenza.	72	Paralyzed.
69	Broken leg, fall on icy sidewalk, broken arm and collar bone, cold, 2 carbuncle operations.	73	Erysipelas, pneumonia.
69	Stomach and heart trouble.	73	Rheumatic fever, catarrh, pleurisy.
69	Stomach operation for ulcers, erysipelas.	73	Typhoid fever, gastritis, grippe.
70	Flu, high blood pressure.	73	Asthma, typhoid fever.
70	Torpid liver, lumbago.	74	Right kidney removed by operation.
70	Rheumatism.	75	Lame back, sciatica, grippe.
70	Rheumatism.	75	Billious fever.
70	Colds, lung congestion, renal colds.	76	Cataract on both eyes.
70	Scarlet fever, bronchitis.	76	Acute rheumatism.
70	Measles, flu.	77	Rheumatism.
70	Typhoid, billious and malaria fever.	78	Rheumatism.
70	Rheumatism, pleurisy.	78	A couple of accidents.
70	Children's diseases.	78	Smallpox.
70	Rheumatism.	79	Fever and cold.
70	Rheumatism.	81	Attack of indigestion.
		83	Cancer on neck.
		86	Pneumonia.

The largest group had at one time or another experienced an attack of influenza, frequently referred to as grippe, of which there had been 52 cases, often complicated by pneumonia and occasionally by high blood pressure. The second most important group represented in the list was typhoid fever, of which there had been 47 cases, occasionally complicated by malaria, pneumonia, and rheumatism. The third most important group concerns rheumatism, of which there had been 45 cases, uncomplicated in all but a very few cases. The fourth in the order of importance was pneumonia, of which there had been 29 cases, occasionally complicated by pleurisy or influenza. Following these in the order of their importance were intestinal complications, chiefly indigestion, constipation, and stomach trouble.

Most of the other diseases had been of comparatively minor importance. There were 10 cases of bronchitis, 1 complicated by scarlet fever, 10 cases of malaria, 8 cases of appendicitis, 7 cases of heart trouble, 7 cases of renal diseases, other than Bright's disease, 7 cases of hernia, 7 cases of smallpox, 6 cases of gall-bladder infections, including gallstones, 6 cases of neurasthenia, 5 cases of common colds, 4 cases of paralysis, 4 cases of pleurisy, 3 cases of cataract, 3 cases of abscesses, 3 cases of blood poisoning, 3 cases of high blood pressure, 2 cases of apoplexy and brain fever, 2 cases of tuberculosis, 1 case of diabetes, 2 cases of asthma, 1 case of cancer of the neck, 1 case of diphtheria, 1 case of vertigo, 1 case of concussion of the brain, 1 case of skin trouble, 1 case of jaundice, 1 case of billiousness, 1 case of meningitis, 1 case of Bright's disease, 1 case of operation for enlarged prostate, 1 case of erysipelas, 1 case of operation for varicose vein, and 1 case of tracheitis.

The foregoing does not, include cases of lead poisoning, which are dealt with separately (see p. 74), nor does it bear directly upon visual impairments, loss of vision, etc., other than the occurrence of the cases of cataract referred to.

In a general way, results are suggestive of the conclusion that printing employees who have survived to old age have, broadly speaking, been workers who have suffered comparatively little from the numerous affections which terminate in early death. The predominating importance of influenza is, of course, readily attributable to the epidemic of 1918–19. This, being a passing phase, may not repeat itself, at least to a similar extent, for many years to come. Influenza in fatal form during the last epidemic affected relatively a larger number of young men than of men far advanced in years, differing in this respect materially from the preceding epidemic of 1889–1891.

Typhoid fever also represents conditions rather of the past than of to-day. The disease has diminished very considerably in frequency throughout the country and is now of relatively small importance, both as to morbidity and mortality, in the experience of labor organizations. Of much greater importance is rheumatism, which is unquestionably often the result of sanitary conditions or neglect of personal hygiene, which obviously admit of being improved. Damp workshops are no longer common, but in many cases much may be done to improve the floors by a better covering. With diminishing habits of excessive alcoholic indulgence, rheumatism and gout are now becoming a matter of passing importance. How far erroneous dietary habits bear upon the frequency of these diseases is still an open question, but they may be understood to represent for practical purposes an important factor concerning the health of aged printers who but for rheumatism infections might anticipate a much longer life than is usually the case.

Similar observations apply to the incidence of dietary disorders as made manifest in stomach troubles, inflammation of the bowels, indigestion, and most of all constipation. How far the occurrence of the latter is complicated by lead absorption is, of course, not known, but there is unquestionably such a relation, however difficult it may be to measure its relative incidence. It is significant, however, that among 728 aged printers only 5 should specifically mention constipation. The importance of the latter is a contributory cause or condition, especially in cancer, and should not be underrated. With an increasing average age proper attention to dietary habits in daily life assumes an increasing importance. Improvements in matters of personal hygiene in various directions are, therefore, of the very first importance and matters which lie largely with the workmen themselves rather than with outside agencies concerned chiefly with questions of public or factory hygiene. Hence it may safely be asserted as the result of the present inquiry as to health experience of aged printers that those who live long, and have been long at work, are usually men who have suffered relatively little from the ordinary infectious diseases and not excessively from the organic diseases of later life. Since the frequency of such diseases in the general population is either diminishing or practically stationary, it may safely be anticipated that there will be a further improvement in the health and mortality of workers in the different branches of the printing trades.

Inquiry was made into the present condition as to eyesight, the same being reported as either good, fair, or bad. Of the 728 printing employees answering the question, 451 reported their present eyesight as good and 224 as fair, while 53 reported their condition as bad. The number of employees of each age having good, fair, and bad eyesight is shown in Table 62:

TABLE 62.—NUMBER OF AGED WORKERS IN THE PRINTING TRADES HAVING GOOD, FAIR, AND BAD EYESIGHT

Age	Number of workers	Eyesight or vision			Age	Number of workers	Eyesight or vision		
		Good	Fair	Bad			Good	Fair	Bad
60 years	63	39	23	1	75 years	5	3	2	
61 years	79	56	19	4	76 years	6	2	3	1
62 years	72	43	22	7	77 years	5	3	1	1
63 years	84	54	24	6	78 years	4	1	3	
64 years	61	40	16	5	79 years	3	3		
65 years	63	39	19	5	80 years	2		2	
66 years	58	35	18	5	81 years	1	1		
67 years	59	29	28	2	83 years	1		1	
68 years	34	25	6	2	84 years	2		1	1
69 years	28	15	10	3	85 years	1		1	
70 years	32	15	11	6	86 years	1	1		
71 years	26	19	7						
72 years	18	14	1	3	Total	728	451	224	53
73 years	12	8	3	1					
74 years	8	5	3		Per cent		62.0	30.8	7.3

It goes without saying that the men's information regarding their eyesight can not be accepted as conclusive. While they would be reasonably competent to pass upon clearness of vision, they would, of course, have no means of determining the existence of astigmatism, causing eye strain, with more or less serious consequences to health generally. There are many reasons for believing that the general effect of employment in the printing trades upon the eyes is a matter deserving of much more consideration than is generally given to it. Certainly the medical examination, which is much more trustworthy, reveals a considerable amount of visual impairment, which if early corrected would prove relatively harmless. The investigation confirms the view, based upon various lines of inquiry, that impaired eyesight is one of the most important and serious consequences of printing employments.

The questionnaire made specific inquiry as to past attacks of lead poisoning. Out of the 728 persons making replies only 27, or 3.7 per cent, at one time or another during their trade experience have suffered from lead poisoning. The age distribution of these cases is as follows:

	Cases		Cases
60 years	1	68 years	1
61 years	5	70 years	1
63 years	6	72 years	4
64 years	1	79 years	1
65 years	3		
66 years	3	Total	27
67 years	1		

The length of trade life and the age attained for each one of the 27 cases in which lead poisoning had occurred are shown in Table 63. It is felt that the results are in strict conformity to other facts and observations, and to the conclusion that lead poisoning is not as

common in the printing trades as has frequently been assumed to be the case. Here again, of course, a very thorough medical examination might have revealed unsuspected cases of lead absorption, but for practical purposes the foregoing data may be considered conclusive. It is certainly suggestive in this connection that the 27 persons reporting themselves as having suffered from lead poisoning had an average trade life of 45 years. The evidence in this respect, of course, should be carefully considered in the light of other data on lead poisoning presented elsewhere in this report. (See pp. 110 to 116.)

TABLE 63.—LENGTH OF TRADE LIFE AND STATE OF HEALTH OF AGED WORKERS IN THE PRINTING TRADES WHO HAD SUFFERED FROM LEAD POISONING, BY AGE

Age	Trade life (years)	Health	Age	Trade life (years)	Health
60 years	34	Bad.	66 years	26	Fair.
61 years	45	Fair.	66 years	49	Fair.
61 years	44	Fair.	66 years	50	Good.
61 years	47	Good.	67 years	50	Good.
61 years	50	Good.	68 years	47	Fair.
61 years	40	Fair.	70 years	34	Fair.
63 years	47	Fair.	72 years	38	Good.
63 years	46	Fair.	72 years	53	Fair.
63 years	43	Good.	72 years	51	Good.
63 years	46	Good.	72 years	54	Fair.
63 years	40	Fair.	79 years	50	Good.
63 years	47	Good.			
64 years	53	Fair.	Total	1,225	
65 years	48	Fair.			
65 years	48	Good.	Average	45.4	
65 years	45	Fair.			

PHYSICAL AND MEDICAL EXAMINATIONS OF PRINTERS

PHYSIQUE OF PRINTERS

There are few useful references to the physique of printers, while such as are available hardly extend beyond the mere fact of height and weight. The subject is very briefly referred to and discussed in Bulletin No. 209 of the United States Bureau of Labor Statistics, Hygiene of the Printing Trades, by Hamilton and Verrill, which includes a tabulation derived from the experience of the Prudential Insurance Co., based, however, only on deaths. It therefore seemed advisable in this survey to go somewhat more thoroughly into this matter and quite a number of measurements have been secured for different occupations in the printing trades, including several important bodily proportions concerning which no previous information is available. It may be said in this connection that vitality, for practical purposes, is best indicated by chest mobility, while the nutritional condition is clearly suggested by the abdominal circumference and the weight. Physical strength is ascertainable only by a complex method of measurement which was not available for the present purpose.

There were 1,215 printing employees examined, who were of an average age of about 40 years and with an approximate trade life of 20 years, possibly somewhat longer. The average height was 169 centimeters (66½ inches). The average weight was about 150 pounds, which would give about 2.3 pounds to the inch, which must be considered a satisfactory indication of nutritional development. Nor-

mally it is safe to assume that undernutrition is represented by a weight of less than 2 pounds to the inch, while hypernutrition is represented by a weight in excess of 3 pounds to the inch; perhaps a satisfactory average would be 2.5 pounds but no arbitrarily fixed standard is advisable. The chest circumference was 89 centimeters or about 35 inches. The chest circumference of soldiers on discharge subsequent to the great war was 34.94 inches, or 88.74 centimeters—practically the same.[7]

Here, then, is evidence that the physical condition of printers conforms reasonably well to the average of healthy young men acceptable for military services.

The abdominal circumference was about 83.5 centimeters, or not quite 33 inches. No comparative figures are available which would justify a definite conclusion as to whether this conforms to the normal of healthy men of corresponding ages but my own investigations would seem to confirm this point of view. The arm length was about 77 centimeters (30.3 inches) and the hip height, or the height from the crest of the iliac to the floor, was about 101 centimeters (39.8 inches). The knee height was about 48.5 centimeters (19.1 inches). All of the foregoing figures are approximate averages. The measurements were not secured in precise conformity to modern anthropometric measurements, since exact instruments for this purpose were not available, nor would it have been possible to secure the measurements with more painstaking attention to matters of small detail in view of the working conditions under which they were usually obtained.

That the foregoing averages are reasonably trustworthy is indicated by a supplementary examination of 89 printing employees at the printing plant of the Prudential Insurance Co., Newark, N. J. The average height was 66.9 inches and the average weight 150.6 pounds, or approximately 2.3 pounds of weight to the inch, precisely the same as for other printing employees. The chest expansion was found to be 35 inches, which compares with 34.96 inches for white troops examined on demobilization.[8] The chest at inspiration was 36.4 inches and on expiration 33.8 inches, a difference of 2.6 inches or about 7 centimeters. This is apparently somewhat less than what might be expected of thoroughly well developed men of corresponding age, but the difference is not sufficiently pronounced to be suggestive of men of a decidedly inferior physique seeking employment in the printing trades. The data are not sufficiently numerous for exhaustive analysis by occupations.

MEDICAL EXAMINATION OF PRINTERS AT UNION HOMES

The medical examinations made in connection with the present survey of the printing trades are also unfortunately of rather limited extent, although apparently of a fair degree of intrinsic value. They consist of examinations of: 1. Tuberculous printers at the Union Printers' Home of the International Typographical Union; 2. Nontuberculous printers, including old-age pensioners at the same institution; 3. Patients at the Union Pressman's Home.

[7] U. S. Surgeon General's Office. The Medical Department of the United States Army in the World War, Vol. XV, Medical Statistics of the War. Part 1, Army Anthropology. Washington, 1921, p. 140.
[8] Idem, p. 141.

The number of tuberculous printers examined at the Union Printers' Home was 109, who were of an average age of 41 years, ranging from 23 to 74 years. The average duration of trade life of these printers, practically all of whom were, of course, compositors and machine operators, was 18.3 years, ranging from 2 to 47 years.

The average known previous duration of the disease, as determined by the condition on admission, was 5.6 years, ranging from less than 1 to 20 years. The prognosis of the disease on admission was favorable in 78 out of the 109 cases, or 71.6 per cent. The condition was considered to have improved in 48 cases, or 44 per cent of the cases under observation.

The average height without shoes was 67.8 inches, the range in height being from 61 to 75 inches. The average weight in ordinary clothing was 131.2 pounds. The relative weight or the amount of body weight per inch of height was 1.9 pounds, which contrasts with about 2.3 pounds for employed printers generally.

The average circumference of the chest at rest was 85.1 centimeters, or approximately 33.5 inches. This compares with 34.96 inches for white soldiers in the Army and 35 inches for printers generally. The average circumference of the chest on inspiration was 89.1 centimeters (35.1 inches) and of the chest at expiration 82.9 centimeters (32.6 inches). This would give an average chest mobility of 6.2 centimeters (2.4 inches), fairly characteristic of the tubercular type. As these results are based on small numbers they can not of course be accepted as conclusive. As said before, in healthy men the chest expands about 8 centimeters or 3 inches. There can be no question that printers by their working habits are preeminently predisposed to pulmonary diseases, irrespective of the sanitary condition of their surroundings. A curious factor involved here is that the average height of tuberculous printers is probably somewhat greater than that of nontuberculous printers, and that it is probably the tall men who are primarily predisposed to respiratory afflictions of the tubercular type. In such cases exceptional care in health supervision is obviously called for.

Out of the 109 tuberculous printers examined, 51, or 46.8 per cent, had a stooping posture, and 67, or 61.5 per cent, gave indications of spinal curvature, which under certain conditions may have serious pathological significance. This indicates the great practical importance of the physical development of young persons in the printing trades, and supervision thereof during the period of apprenticeship is urgently called for in the furtherance of health conservation efforts.

The situation is often made worse or complicated by improper seating arrangements, especially at type-setting machines, and by ill-adjusted composing cases, which, in proportion to the stature of the person concerned, may either be too high or too low. The suggestion may therefore be made that all printing apprentices should undergo an annual examination. This examination should include the ascertainment of possible visual errors. There are reasons for believing that in many cases the glasses worn by compositors and machine operators are not only ill-fitted for the exacting needs of the occupation but also that in fact they do more harm than good.

The average systolic blood pressure of tuberculous printers was 118.4 millimeters, while the diastolic blood pressure was 77.6 millimeters, giving a resulting pulse pressure of 40.8 millimeters. Low blood

pressure is characteristic of tubercular patients, as is clearly indicated by the fact that among the nontuberculous printers examined in the Union Printers' Home the systolic blood pressure was 150.7 millimeters, while the diastolic blood pressure was 88.8 millimeters. This, then, is another indication of the direction in which health-promoting efforts could be made successful, for a periodical medical examination would in many cases clearly establish the early evidence of a condition which if promptly dealt with might be passed over without serious results. Of the 109 tuberculous printers only 6 gave evidence of cardiac trouble or heart impairments on admission and only 10 of renal impairments, which are frequently assumed to be closely related to the after effects of lead absorption. In not a single case did the tuberculous printers present evidences of lead poisoning, although it may be said that special efforts were made to discover traces of lead absorption. Nor was there evidence of a single instance of malignant disease in a tuberculous printer, which conforms to the general viewpoint that cancer and tuberculosis rarely coincide.

Of nontuberculous printers at the Union Printers' Home 119 cases were examined, of an average age of 62.6 years, the ages ranging from 34 to 82 years. Most of these men were old-age pensioners or otherwise permanently disabled. The average duration of trade life of these nontuberculous cases was 35.7 years, ranging from 11 to 60 years. Of the 119, 41 gave a history of disease based on condition on admission of an average known previous duration of 7.6 years. The prognosis on admission was favorable in 19 cases and unfavorable in 69 cases. An improved condition after admission was shown in 50 of the cases observed. The impairments reported include such a wide variety of diseases that they can not with advantage be dealt with here.

The average height of the nontuberculous printers, without shoes, was 67.5 inches, which compares with 67.8 inches for the tuberculous cases. The average weight was 146.2 pounds, which contrasts with 131.2 pounds for tuberculous printers. The relative weight was, therefore, 2.2 pounds to the inch, which compares with 1.9 pounds per inch for tuberculous cases and 2.3 pounds for noninstitutional printers. The chest expansion or chest mobility was not ascertained. This is much to be regretted, but considering the circumstances under which the examinations were made was apparently unavoidable.

A stooping posture was observed in 43, or 36.1 per cent, of the 119 cases. This compares with 46.8 per cent for tuberculous printers. There was spinal curvature in 29 of the 119 cases. The proportion of scoliosis for nontuberculous printers was therefore 24.4 per cent, while for tuberculous printers the proportion was 61.5 per cent.

As to vision, errors of refraction were ascertained in 100 out of the 119 cases. This is so large a proportion that on first consideration the results may seem not acceptable, but the examinations were made by qualified physicians and under conditions which would demand a reasonably perfect diagnosis. It must be considered, of course, that the average duration of trade life was relatively long, being 35.7 years. What has been said as to tuberculous printers regarding injurious results of ill-adjusted seating arrangements and ill-adjusted composing cases as regards visual disturbances holds true as to nontuberculous printers. In all of these cases, of course, improper

methods of artificial lighting also have a most important effect and possibly a more serious one than improper seating arrangements.

There was evidence on admission of cardiac trouble in 28 cases and of renal trouble in 30. There was no evidence of lead poisoning nor of malignant disease found in a single one of the 119 cases examined.

Corresponding information was obtained for 40 patients at the Union Pressmen's Home. These were all tuberculous cases, of an average age of 36.8 years, and of a trade life of 18.1 years. The number of cases is, however, too small for a thoroughly trustworthy conclusion. The pressmen were found to be slightly taller and slightly heavier than the printers. The average chest at rest was also dimensionally somewhat larger, but the chest mobility was practically the same as for printers. As regards vision errors of refraction were found in 52.5 per cent of the cases. The blood pressure was distinctly lower among pressmen, but the numbers are too small for a safe generalization.

Summarizing the foregoing, the following conclusions would seem to be justified: 1. Both nontuberculous printers and tuberculous pressmen are of a better physique than tuberculous printers; 2. The tuberculous printers show a lesser development of the chest and a lower degree of chest mobility than the tuberculous pressmen; 3. The tuberculous printers show a distinctly lower blood pressure than the nontuberculous printers and also a distinctly larger proportion of men with a stooping posture and with evidence of spinal curvature; 4. All of the foregoing strongly suggests the value of a periodical medical examination, particularly in the case of printers' apprentices.

VITAL STATISTICS OF PRINTERS

The vital statistics of printing employees secured in connection with this survey have been derived chiefly from the actual experience of printers' labor organizations, supplemented, for comparative purposes, by data secured through the cooperation of the registrar of vital statistics of a number of representative American cities. The United States Census Office does not classify the American mortality by occupations, and efforts which have been made to utilize such data have, as a rule, led to inconclusive results. It would, of course, have been preferable to have included specific death rates calculated on the basis of the number of persons exposed to risk for each year, or group of years, with due regard to the particular occupations followed, but such an investigation, to be of practical value, would need to be extended over a period of years and would require exceptional facilities for securing the ages of the living as well as those of the dead and in each case the specific occupation. Such information, unfortunately, is not available.

Something in this direction might be feasible if some of the large labor organizations having complete membership data as well as mortality returns could be induced to initiate extended actuarial investigations, but this would involve considerable expense which the probable results would hardly justify. At the same time this feature of the investigation is unquestionably one of first importance, and it is to be hoped that in the future some investigations in this field will become feasible.

As a compromise I have for many years utilized the so-called proportionate mortality method, which requires the calculation of specific percentages of deaths, for divisional periods of life, due to important selected causes of death. While this method is not applicable to the calculation of precise contingencies as common in insurance practice, it is nevertheless an extremely suggestive method and often quite conclusive regarding the practical utility of such data in connection with health-promoting agencies.

Tables limited to four specific causes essentially important in the consideration of the possible health injurious aspects of the printing trades are hereafter presented, supplemented by tables giving details for each cause of death. It should be pointed out in this connection that for practical purposes the number of deaths considered must, of course, be sufficiently large to yield trustworthy averages. Hence it has not been considered feasible to deal with particular occupations other than those represented by certain trade organizations. The present investigation consists of the records of the International Typographical Union, the International Printing Pressmen and Assistants' Union, the International Photo-Engravers' Union, the International Stereotypers and Electrotypers' Union, and the International Brotherhood of Bookbinders.

For purposes of comparison there is also presented experience of the National Society of Operative Printers and Assistants of Great Britain and original returns of vital statistics of printing employees generally in certain American cities. The latter data, of course, include many of the deaths represented in the returns for the international labor organizations.

It became apparent after the inquiry had proceeded to a measurable degree that entire completeness of the returns was out of the question, as many of the death certificates or published mortuary returns were incomplete either as regards age at death or cause of death, and sometimes both. The tendency apparently is not in the direction of material improvement in this respect. For instance, the vital statistics of the International Typographical Union for 1912–1918 include 3,338 tabulatable returns and 74 which did not properly specify the age or cause of death. The proportion of such cases was very much larger during the subsequent period, 1919–1923, when there were 3,447 tabulatable deaths and 719 which could not be properly utilized for all purposes.

In the case of the International Printing Pressmen and Assistants' Union, during the period 1912–1917 there were 793 tabulatable deaths and 162 which could not be tabulated chiefly on account of the lack of information regarding ages at death. During the year 1918 there were 303 tabulatable deaths and 70 which could not be fully utilized. During the period 1919–1923 there were 598 tabulatable deaths and 98 additional deaths which could not be included in the detailed tabulations for the reasons stated.

In the experience of the International Photo-Engravers' Union during the period 1919–1923 there were 206 tabulatable deaths and 18 which had to be excluded. In the experience of the International Stereotypers and Electrotypers' Union for the period 1919–1923 there were 275 tabulatable deaths while 20 were incomplete as regards the information required.

Equally incomplete were the returns for the International Brotherhood of Bookbinders. For the period 1920–1923 there were 189 male deaths which were tabulatable, while 67 could not be completely utilized. In the case of females there were 104 deaths which could be utilized, while 56 were incomplete.

By way of contrast, the returns for American cities, representing 775 deaths from all causes, were, with the exception of a single death complete as regards age and cause. This clearly emphasizes the fact that incompleteness in the returns of trade organizations is largely a matter of lack of appreciation of the importance of the data, since official death certificates in each and every case contained all the information needed as to age and cause.

The foregoing observations might at first seem to justify the conclusion that the results of the present investigation are open to serious question as to completeness and it is frankly admitted that to a certain extent this conclusion is justified. But the facts being what they are, there is no alternative to excluding such data altogether but that of using them in their present but imperfect form. After giving the matter extended thought and viewing the situation in the light of other evidence, I am reasonably satisfied that resulting conclusions may safely be accepted as approximately correct.

The returns of the various trade organizations here utilized have been obtained by somewhat different methods. The returns for the International Typographical Union have been obtained by a transcript of the union mortality returns given from month to month in the Typographical Journal, including, of course, deaths reported from the Union Printers' Home. A similar method has been followed with reference to the International Printing Pressmen and Assistants' Union. The returns for the International Stereotypers and Electrotypers' Union[d] have been furnished through the courtesy of that organization, as was the case with the returns for the International Brotherhood of Bookbinders. The information regarding the mortality of the International Photo-Engravers' Union has been derived from the convention reports of that organization. The vital statistics of American cities were furnished from the official returns of the registrars of vital statistics and local and State boards of health. The statistics for the National Society of Operative Printers and Assistants of Great Britain were obtained through the courtesy of its honorary secretary.

INTERNATIONAL TYPOGRAPHICAL UNION

Table 64 briefly presents the essential facts as to the mortality experience of the International Typographical Union. The table is amplified in considerable detail in Table 67, which gives a complete analysis of the entire mortality in conformity to the international classification of the causes of death. Granting the inherent limitations of the data presented, the tabulations will serve the useful purpose of calling attention to deficiencies which could easily be overcome in the future, while suggesting a standardized method of presenting returns, which would greatly aid in the correct interpretation of occupational mortality tendencies.

[d] Original death certificates were furnished by this organization.

TABLE 64.—MORTALITY FROM SPECIFIED CAUSES AMONG THE MEMBERS OF THE INTERNATIONAL TYPOGRAPHICAL UNION, 1912 TO 1918, BY AGE GROUPS

Age at death	All causes	Tuberculosis		Cancer—all forms		Pneumonia		Bright's disease	
		Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent
15 to 19 years	3	1	33.1						
20 to 24 years	118	43	36.4	3	2.5	5	4.2	2	1.7
25 to 29 years	202	91	45.0	1	.5	11	5.4	5	2.5
30 to 34 years	257	117	45.5	2	.8	16	6.2	11	4.3
35 to 39 years	344	112	32.6	9	2.6	26	7.6	23	6.7
40 to 44 years	402	125	31.1	10	2.5	32	8.0	29	7.2
45 to 49 years	399	89	22.3	10	2.5	30	7.5	45	11.3
50 to 54 years	396	56	14.1	29	7.3	32	8.1	41	10.4
55 to 59 years	349	31	8.9	22	6.3	26	7.4	38	10.9
60 to 64 years	265	21	7.9	20	7.5	29	10.9	26	9.8
65 to 69 years	207	4	1.9	14	6.8	16	7.7	32	15.5
70 to 74 years	183	4	2.2	11	6.0	15	8.2	23	12.6
75 to 79 years	127			5	3.9	15	11.8	16	12.6
80 to 84 years	66	2	3.0	3	4.5	11	16.7	3	4.5
85 to 89 years	16	1	6.3			2	12.5	1	6.3
90 years and over	4								
Total	3,338	697	20.9	139	4.2	266	8.0	295	8.8

As appears by Table 64, during the period 1912–1918 there were 3,338 tabulatable deaths among the members of the International Typographical Union of which 697, or 20.9 per cent, were from tuberculosis. The proportionate mortality was highest during the age period 30 to 34 years, when the rate was 45.5 per cent of the mortality from all causes. This must be looked upon as excessive and suggestive of the urgency of sanitary and other measures of improvement.

In this connection reference may be made to an extended investigation of health conditions in the printing trades included in my report on Mortality from Respiratory Diseases in Dusty Trades (Inorganic Dusts), published as Bulletin No. 231 of the United States Bureau of Labor Statistics. That discussion includes a table (p. 138) which gives the proportionate mortality of printers, lithographers, and pressmen in the United States registration area for the period 1908–1909. While the deaths are limited to pulmonary tuberculosis, other forms of tuberculosis are so extremely rare among printers that the omission does not impair the conclusions stated. In that period there were 2,847 deaths from all causes, of which 840, or 29.5 per cent, were attributable to pulmonary tuberculosis. This, when compared with 20.9 per cent shown for the experience of the International Typographical Union during the period 1912–1918, shows a decided improvement.

It has been thought worth while to give some special attention to the mortality from cancer, which in the general experience of the population at large is rapidly on the increase. The proportionate mortality from cancer in the aggregate experience of the International Typographical Union for 1912–1918 was 4.2 per cent. The highest proportionate mortality rate occurred at ages 60 to 64, or 7.5 per cent.

The proportionate mortality from pneumonia in the experience of the International Typographical Union for the period 1912–1918 was 8 per cent. During 1908–1909 it was 6.8 per cent, a somewhat higher rate, largely due however, to the epidemic of influenza and its resulting complications.

It has also seemed advisable to give special attention to the mortality from Bright's disease, especially in view of the close relation which exists between chronic lead poisoning and renal impairments, a large proportion of the deaths from chronic lead poisoning being always complicated by chronic or acute nephritis. In the experience of the International Typographical Union for the period 1912–1918 the proportionate mortality from Bright's disease was 8.8 per cent. Though it is somewhat hazardous in this connection to utilize insurance experience data which are more or less affected by selection, it may be stated that in the experience of the industrial department of the Metropolitan Life Insurance Co. for 1911–1913,[9] the proportionate mortality from Bright's disease for compositors and printers was 8.9 per cent, or practically the same as the proportion observed in the experience of the International Typographical Union. The proportionate mortality in the experience of the latter was highest at ages 65 to 69, being 15.5 per cent, while in the experience of the Metropolitan Life Insurance Co. at ages 65 and over it was 13.4 per cent.

Table 65 presents the mortality experience of the International Typographical Union for the period 1919–1923:

TABLE 65.—MORTALITY FROM SPECIFIED CAUSES AMONG MEMBERS OF THE INTERNATIONAL TYPOGRAPHICAL UNION, 1919 TO 1923, BY AGE GROUPS

Age at death	All causes	Tuberculosis		Cancer—all forms		Pneumonia		Bright's disease	
		Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent
20 to 24 years	73	24	32.9			12	16.4		
25 to 29 years	197	54	27.4	6	3.0	59	29.9	3	1.5
30 to 34 years	243	89	36.6	2	1.8	48	19.8	6	2.5
35 to 39 years	218	68	31.2	4	1.8	52	23.9	4	1.8
40 to 44 years	281	73	26.0	21	7.5	43	15.3	11	3.9
45 to 49 years	361	77	21.3	37	10.2	37	10.2	19	5.3
50 to 54 years	412	68	16.5	38	9.2	55	13.3	29	7.0
55 to 59 years	416	29	7.0	47	11.3	38	9.1	46	11.1
60 to 64 years	399	13	3.3	51	12.8	40	10.0	39	9.8
65 to 69 years	357	11	3.1	32	9.0	35	9.8	37	10.4
70 to 74 years	211	4	1.9	27	12.8	27	12.8	19	9.0
75 to 79 years	167	2	1.2	14	9.4	14	8.4	13	7.8
80 to 84 years	78			2	2.6	2	2.6	6	7.7
85 to 89 years	27					1	3.7	1	3.7
90 years and over	7								
Total	3,447	512	14.9	281	8.2	463	13.4	233	6.7

Contrasting the data for the period 1919–1923 with the earlier data it appears that during the years under review there were 3,447 deaths from all causes, of which 512, or 14.9 per cent were from tuberculosis, as compared with 20.9 per cent in 1912–1918. There has, therefore, been a decided decrease which can not be looked upon as otherwise than reflecting progress in sanitation and personal hygiene. The highest proportionate mortality from tuberculosis during 1919–1923 occurred at ages 30 to 34, being 36.6 per cent, as compared with 45.5 per cent during 1912–1918. In the light of extended occupational disease investigations, I am absolutely satisfied that the indicated reduction in the proportionate mortality from pulmonary tuberculosis from 20.9 per cent during 1912–1918 to 14.9 per cent during

[9] See U. S. Bureau of Labor Statistics Bul. No. 231: Mortality from respiratory diseases in dusty trades (organic dusts), p. 140. Washington, 1918.

1919–1923, may be safely accepted as conclusive evidence of the downward tendency of the tuberculosis death rate in the experience of the printing trades.

While during 1912–1918, the proportionate mortality from cancer was 4.2 per cent, during 1919–1923 it was 8.2 per cent. The highest proportionate death rate during 1912–1918 occurred at ages 60–64, being 7.5 per cent, which by 1919–1923 had increased to 12.8 per cent. In view of my many years' experience with cancer statistics and my active connection with the cancer movement, I am thoroughly convinced that this increase in the liability to cancer on the part of members of the International Typographical Union is a real increase and not due to improvement in diagnosis or changes in methods of death certification. The increase suggests the supreme importance of educational methods which emphasize to those concerned the imperative necessity of the earliest possible diagnosis and the value of qualified methods of treatment.

The proportionate mortality from pneumonia during 1919–1923 was 13.4 per cent against 8 per cent during 1912–1918. The increase, which affects particularly the younger years of life, is primarily accounted for by the epidemic of pneumonia during 1918–19, the results and after effects of which have not as yet entirely disappeared. It is decidedly significant that the proportionate mortality for ages 70 and over should have been much higher during the earlier period than during later years.

Mortality from Bright's disease, which is frequently assumed to represent a residuum of mortality from lead posioning, so masked by renal affections as not to admit of a definite diagnosis of lead colic, has slightly declined. The proportionate mortality from Bright's disease in the experience of the International Typographical Union during the period 1919–1923 was 6.7 per cent as against 8.8 per cent during 1912–1918.

It would not be practicable to consider in detail the many other causes of death, which are tabulated in accordance with the nearly 200 subdivisions of the international classification. Full details of the number of deaths from every important cause, classified by age, are given in Table 66. For the present purpose, however, it may be advantageous to mention a few of the more important causes without extended observations, keeping in mind the fact that the number of deaths for each of the two periods is practically the same, 3,447 during the first period and 3,338 during the second. No percentages are used in Table 66, which presents the mortality from specified causes for the two periods:

TABLE 66.—MORTALITY FROM SPECIFIED CAUSES AMONG THE MEMBERS OF THE INTERNATIONAL TYPOGRAPHICAL UNION, 1912 TO 1918 AND 1919 TO 1923

Cause	1912–1918	1919–1923	Cause	1912–1918	1919–1923
Typhoid fever	47	11	Ulcer of the stomach	10	20
Influenza	3	80	Appendicitis	36	44
Syphilis	2	3	Hernia	21	15
Diabetes	45	77	Cirrhosis of the liver	71	33
Anemia, chlorosis	19	26	Biliary calculi	3	6
Chronic lead poisoning	6	15	Suicides	61	9
Locomotor ataxia	14	13	Food poisoning	6	1
Paralysis of the insane	36	11	Other acute poisonings	8	2
Organic diseases of the heart	54	419	Gas absorption	33	4
Angina pectoris	11	33	Miscellaneous accidents	56	40
Diseases of the arteries	37	113	Homicides	6	1

The foregoing comparison affords a wide range of data for extended consideration. Foremost among the gratifying evidences of sanitary progress is the extraordinary decrease in the actual mortality from typhoid fever which, of course, corresponds to the observed decrease in the disease practically throughout the country.

Particularly suggestive is the relatively slight incidence of syphilis. Of considerable importance, however, is the heavy increase in the recorded mortality from diabetes, which in the case of printers falls heaviest upon those of the older ages. The increase in anemia and chlorosis is not sufficient to require extended consideration, being probably the result in part of changes in death classification.

Deaths from chronic lead poisoning are shown to have increased from 6 to 15, but during the earlier period there were also 33 deaths from other chronic poisonings while there were none during the period 1919–1923. Combining the two returns as possibly covering the same affliction due to metallic substances, there were 39 deaths during the earlier period as against 15 in the latter period. In the light of other data based upon a nation-wide inquiry, I feel satisfied that the conclusion that lead poisoning during recent years has very materially diminished in practically every branch of the printing trades is entirely justified by the facts.

Most gratifying is the return of the mortality from general paralysis of the insane, which shows a decrease from 36 to 11.

Of vastly greater importance is the heavy increase in the mortality from organic diseases of the heart—from 54 to 419. In part, this is the result of improved methods of death classification. There is also to be considered the increasing average age of printers, which would account in part for mortality changes. However, the matter is one well worthy of serious and more detailed consideration. It will also be observed that there was an increase in diseases of the arteries, arteriosclerosis, etc.—from 37 deaths during the first period to 113 deaths during the second.

Recalling what has been said regarding the increase in cancer, it is suggestive that ulcers of the stomach during the first period caused only 10 deaths and during the second period 20 deaths.

There were 36 deaths from appendicitis during the first period and 44 during the second. In general experience, appendicitis has also shown a slight increase during recent years, so that the experience of the International Typographical Union in this respect is in conformity with facts derived from other sources. The causative factors of appendicitis are unquestionably in many cases the result of intestinal disturbances, which, by inference, are of a similar nature to those in cancer causation.

Especially gratifying is the considerable decrease in the mortality from cirrhosis of the liver, which was reduced from 71 deaths during the first period to 33 deaths during the second. This affliction is in most cases the result of chronic alcoholism, the actual mortality from which, however, in the experience of the International Typographical Union is represented by a single death during each of the two periods under review. This would seem to justify the conclusion that chronic alcoholism, as well as the more serious consequences of venereal disease, are of decidedly less importance in recent mortality experience than in the experience of the past.

The decline in suicides—from 61 to 9—is rather extraordinary, but the data has been gone over with exceptional care and there seems to be no possibility of serious error. In the experience at large for American cities the suicide rate has practically been stationary during recent years.

Most gratifying, perhaps, are the returns as to the relative infrequency of homicides in the experience of the International Typographical Union.

There were only six deaths from this cause during the earlier period and only one death during the later one. This is in marked contrast to the relative increase in homicides throughout the country, which during recent years has reached startling proportions.

The foregoing vital statistics of the International Typographical Union, on the whole, show that the tendencies concerning preventable diseases are all in the direction of a decided improvement. The increase observed in the mortality from cancer, diabetes, and organic diseases of the heart are deserving, however, of extended and thorough consideration. All the evidence is apparently conclusive that, measured by specific causes, the present-day mortality of the International Typographical Union is in gratifying contrast to that of the past.

Supplementary to the foregoing is a special return of the mortality of the International Typographical Union for the year 1925, based on the data furnished in the 12 monthly issues of the Typographical Journal. This experience covers 877 deaths, of which 87 or 9.9 per cent, were from tuberculosis. There were 66 deaths from cancer (7.8 per cent), 12 deaths from diabetes (1.4 per cent), 68 deaths from cerebral hemorrhage (8.0 per cent), 121 from organic diseases of the heart (13.8 per cent), 32 from diseases of the arteries, including arteriosclerosis (3.6 per cent), 74 from pneumonia (8.4 per cent), 6 from appendicitis (0.7 per cent), 8 from cirrhosis of the liver (0.9 per cent), and 55 from Bright's disease (6.3 per cent). As far as it is possible to judge there was only a single suicide and no homicides, but there was 1 death due to firearms which may possibly have been a murder. There were two deaths from chronic lead poisoning and one death from alcoholism.

Table 67 presents detailed figures for the mortality of the International Typographical Union, by causes, for the three periods, 1912–1918, 1919–1923, and 1925:

TABLE 67.—MORTALITY OF INTERNATIONAL TYPOGRAPHICAL UNION, 1912 TO 1918, 1919 TO 1923, AND 1925, BY CAUSES AND AGE GROUPS

1912 TO 1918

International list number [1]	Cause of death	Age at death (years)																
		All ages	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40 to 44	45 to 49	50 to 54	55 to 59	60 to 64	65 to 69	70 to 74	75 to 79	80 to 84	85 to 89	90 and over
1	Typhoid fever	47		6	7	8	4	8	3	6	4	1						
4	Malaria	3			1	1		1										
5	Smallpox	3			2		1											
7	Scarlet fever	4		2	1	1												
10	Influenza	3								1	1					1		
14	Dysentery	2						1					1					
18	Erysipelas	15				1		2	2	2	5	2					1	

[1] United States Bureau of the Census. Manual of the International List of Causes of Death. Washington, 1916. 309 pp.

TABLE 67.—MORTALITY OF INTERNATIONAL TYPOGRAPHICAL UNION, 1912 TO 1918, 1919 TO 1923, AND 1925, BY CAUSES AND AGE GROUPS—Continued

1912 TO 1918—Continued

International list number	Cause of death	Age at death (years)															
		All ages	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40 to 44	45 to 49	50 to 54	55 to 59	60 to 64	65 to 69	70 to 74	75 to 79	80 to 84	85 to 89	90 and over
20	Purulent infection and septicæmia	17		2	1	1	1	1	2	3	2	1	1			2		
24	Tetanus	3						1		1		1						
25	Mycoses	1							1									
26	Pellagra	5						1	2	1				1				
28	Tuberculosis of lungs	697	1	43	91	117	112	125	89	56	31	21	4	4		2	1	
29	Acute miliary tuberculosis	1			1													
30	Tuberculous meningitis	3					2				1							
31	Abdominal tuberculosis	6		1	1		2		2									
32	Pott's disease	5		1				1	2			1						
34	Tuberculosis of other organs	3			2				1									
37	Syphilis	2				1					1							
40	Cancer of stomach and liver	15						3		5	2	1	2	1	1			
41	Cancer of peritoneum, intestines, rectum	2										1		1				
45	Cancer of other organs or of organs not specified	122		3	1	2	9	7	10	24	20	18	12	9	4	3		
46	Other tumors	10		1		1	2	2			2	1			1			
47	Acute articular rheumatism	8					1				3	1	1	1		1		
50	Diabetes	45	1	1	2	3	5	4	6	6	7	5	4		1			
52	Addison's disease	2				1		1										
53	Leucæmia	4						2	1	1								
54	Anemia, chlorosis	19			2	1		1	3	3	4	4			1			
56	Alcoholism (acute or chronic)	1								1								
57	Chronic lead poisoning	6						1	2	3								
59	Other chronic poisonings	33		3	1	3	5	3	6	4	2	1	1	1	1	2		
60	Encephalitis	4			2	2												
61	Meningitis	29		4	2	1	1	9	5	3	2	2						
62	Locomotor ataxia	14						3	4		4	2		1				
63	Other diseases of spinal cord	4		1					1		1				1			
64	Cerebral hemorrhage, apoplexy	162		2	1	6	7	8	14	21	27	26	18	14	15	2	1	
65	Softening of the brain	9				1	1	2	3									2
66	Paralysis without specified cause	107		3	2	1	6	7	11	12	11	15	13	11	11	1	1	2
67	General paralysis of the insane	36				2	4	7	10	4	2	3	1	1	2			
68	Other forms of mental alienation	17			5	3	3		3	1	2							
69	Epilepsy	3									1		1	1				
70	Convulsions (nonpuerperal) (5 years and over)	2					1		1									
73	Neuralgia and neuritis	5				1						2	1	1				
74	Other diseases of nervous system	19			2	1	6			4	3	2		1				
78	Acute endocarditis	67		2	2	3	9	10	9	5	13	3	4	4	2	1		
79	Organic diseases of heart	54		1			1	3	8	6	2	15	7	6	2	2	1	
80	Angina pectoris	11						2		5		1	1	1	1			
81	Diseases of arteries, arteriosclerosis, etc	37						4		4	5	5	5	8	4	2		
82	Embolism and thrombosis	8				2	1	2	1	1			1					
85	Other diseases of circulatory system	373		5	12	17	27	40	43	49	45	36	39	35	15	8	2	
87	Diseases of larynx	2				1					1							
88	Diseases of thyroid body	3				1				1			1					
89	Acute bronchitis	1									1							
90	Chronic bronchitis	16						4	1	1	2	1	2	1	4			
91	Broncho-pneumonia	2								1				1				
92	Pneumonia	266		5	11	16	26	32	30	32	26	29	16	15	15	11	2	
93	Pleurisy	13		1			1		3	3	1	1	1	1	1			
94	Pulmonary congestion	18						3	3	5	2	2	1		1	1		
96	Asthma	22		1		2		1	2	2	2	5	2	3	1	1		
98	Other diseases of respiratory system	10			1	2		1	2	1	2	1						
100	Diseases of pharynx	4		1			1			2								
102	Ulcer of stomach	10		1			2		2	2		1		2				
103	Other diseases of stomach	43			2	3	3	8	5	10	3	2	1	3	3			
105	Diarrhoea and enteritis (under 2 years)	5					1			2		1				1		
108	Appendicitis and typhlitis	36		5	6	4	8	2	3	4	2	1	1					
109	Hernia	21			2		4	1	1	5	3		2	2		1		
	Intestinal obstruction	14			2		4			2	2	1	1	1		1		
110	Other diseases of intestines	16					3	1	1	2	4	1	2	1		1		
113	Cirrhosis of liver	71			4	3	9	10	18	5	13	5	4					
114	Biliary calculi	3							1		2							
115	Other diseases of liver	7					1	1	2	1		1		1				
116	Diseases of spleen	1									1							
117	Simple peritonitis (nonpuerperal)	25			2	5	4	5	2	4	1	1	1					
118	Other diseases of digestive system	2			1		1											
119	Acute nephritis	3			2			1										

TABLE 67.—MORTALITY OF INTERNATIONAL TYPOGRAPHICAL UNION, 1912 TO 1918, 1919 TO 1923, AND 1925, BY CAUSES AND AGE GROUPS—Continued

1912 TO 1918—Continued

International list number	Cause of death	Age at death (years)																
		All ages	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40 to 44	45 to 49	50 to 54	55 to 59	60 to 64	65 to 69	70 to 74	75 to 79	80 to 84	85 to 89	90 and over
120	Bright's disease	295		2	5	11	23	29	45	41	38	26	32	23	16	3	1	
122	Other diseases of kidneys	16			1	3	1	1	2	4	2			1	1			
123	Calculi of urinary passages	1												1				
124	Diseases of bladder	10					1	2	1	2	1		1	1	1			
125	Diseases of urethra	1												1				
142	Gangrene	7					1	1			3	1	1					
144	Acute abscess	3				1		1		1								
154	Senility	59									1		5	14	15	18	6	
163	Other suicides	61		3	6	5	11	7	10	6	7	3	1	2				
164	Poisoning by food	6				1	1	1	2						1			
165	Other acute poisonings	8		1			3		1		1	1		1				
167	Burns	1		1														
168	Absorption of deleterious gases	33		2	2	3	3	10	3	2	3	2	2	1				
169	Accidental drowning	35		5	6	3	4	3		4	2	3	3	1	1			
170	Traumatism by firearms	9		1	1	1	4		1		1							
175	Traumatism by other crushing (vehicles, etc):																	
	Railroad accident	12		1		2	1	2	3		1		1		1			
	Street car accident	2											2					
178	Excessive cold	1									1							
179	Effects of heat	1		1														
181	Electricity (lightning excepted)	1		1														
184	Homicides by other means	6	1		2		1			1	1							
185	Fractures (cause not specified)	10		1			1	2	3	3								
186	Other external violence	56		4	3	7	5	6	6	5	5	3	5	3	3	1		
187	Ill-defined organic diseases	39			2	2	4	5		11	9	2	2	1	1			
188	Sudden death	3						1			2							
	Total	3,338	3	118	202	257	314	402	399	396	349	265	207	183	127	66	16	4

1919 TO 1923

1	Typhoid fever	11				4	3	1			3							
4	Malaria	2							1				1					
5	Smallpox	1				1												
6	Measles	1									1							
7	Scarlet fever	2			1	1												
9	Diphtheria and croup	3			1	1									1			
10	Influenza	80		6	16	19	11	6	3	6	2	1	6		2	1		1
14	Dysentery	4				1	1								1	1		
18	Erysipelas	6								1	2	2			1			
20	Purulent infection and septicæmia	21		1	4	2	1	2	4	2		2	1		1	1		
23	Rabies	1												1				
25	Mycoses	1							1									
26	Pellagra	1						1										
28	Tuberculosis of lungs	512		24	54	89	68	73	77	68	20	13	11	4	2			
29	Acute miliary tuberculosis	2			1							1						
30	Tuberculous meningitis	8			2	1	2		3									
32	Pott's desease	2									1		1					
37	Syphilis	3								1	2							
39	Cancer of buccal cavity	2									1				1			
40	Cancer of stomach and liver	19						3	4	3	2	4	2	1				
41	Cancer of peritoneum, intestines, rectum	5								2	1		2					
44	Cancer of skin	1											1					
45	Cancer of other organs or of organs not specified	254			6	2	4	18	33	33	43	47	27	26	13	2		
46	Other tumors	8				1	1		1	1	2		1	1				
47	Acute articular rheumatism	4						1			1	1	1					
50	Diabetes	77		4	4	4	1	6	7	5	9	16	11	4	4	1	1	
53	Leucæmia	5		1			2	2										
54	Anemia, chlorosis	26				1	2		2	6	6	1	6	2				
55	Other general diseases	4					1		3									
56	Alcoholism (acute or chronic)	1							1									
57	Chronic lead poisoning	15			1	1	1	2	2	1	2	4	1					
60	Encephalitis	13		2		5	1	3			2							
61	Meningitis	22		1	3	3	4		5	1	1	2	2					
62	Locomotor ataxia	13						1	2	1	5	3	1					
63	Other diseases of spinal cord	5				1	1		1	1		1						
64	Cerebral hemorrhage, apoplexy	222			2	4	8	9	23	26	33	44	29	23	12	7	1	1
65	Softening of the brain	4					1	2		1								
66	Paralysis without specified cause	177			1	3	2	10	21	16	28	25	30	20	20	1		
67	General paralysis of the insane	11				2	1		3	3	1		1					

TABLE 67.—MORTALITY OF INTERNATIONAL TYPOGRAPHICAL UNION, 1912 TO 1918, 1919 TO 1923, AND 1925, BY CAUSES AND AGE GROUPS—Continued

1919 TO 1923—Continued

International list number	Cause of death	Age at death (years)															
		All ages	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40 to 44	45 to 49	50 to 54	55 to 59	60 to 64	65 to 69	70 to 74	75 to 79	80 to 84	85 to 89	90 and over
68	Other forms of mental alienation	3							1	1			1					
69	Epilepsy	5			1			1	1		2							
70	Convulsions (nonpuerperal) (5 years and over)	3						1	2									
73	Neuralgia and neuritis	6			1		1			1		2			1			
74	Other diseases of nervous system	17				1	4	1	3	1	2	4			1			
76	Diseases of ears	1				1												
77	Pericarditis	3					1					1		1				
78	Acute endocarditis	15						3	4	2	4	2						
79	Organic diseases of the heart	419		8	7	7	9	23	38	59	63	66	69	34	23	7	3	3
80	Angina pectoris	33						2	1	8	8	5	6	1	1		1	
81	Diseases of arteries, arteriosclerosis, etc	112						2	2	8	18	15	21	6	21	17	2	1
82	Embolism and thrombosis	12					1		1	1	3	3	3					
85	Other diseases of circulatory system	24			1	1		4	2	2	2	3	3	4	1	1		
87	Diseases of larynx	2		1				1										
90	Chronic bronchitis	12							2	2		1	3		2		2	
91	Broncho-pneumonia	6			1					1	1	2				1		
92	Pneumonia	463		12	59	48	52	43	37	55	38	40	35	27	14	2	1	
93	Pleurisy	10			1	1		1	2	1	1	1		2				
94	Pulmonary congestion	17			1		1	2	3	3		3	1	2	1			
96	Asthma	19						1	4	4	2	1	3		1	1	2	
98	Other diseases of respiratory system	14		1		2	1	3	4	3								
100	Diseases of pharynx	1		1														
102	Ulcer of stomach	20			1	2		1	3	5	5		1	1	1			
103	Other diseases of stomach	39				2	2	4	2	3	11	4	5	3	2	1		
105	Diarrhoea and enteritis (2 years and over)	4			1					1	1		1					
108	Appendicitis and typhlitis	44		4	5	5	6	6	4	5	1	4	2	1	1			
109	Hernia	15		1	3	1	1	2			2	1	2	1		1		
110	Other diseases of intestines	2										1	1					
113	Cirrhosis of liver	33				1	1	2	5	2	6	9	3	2	1	1		
114	Biliary calculi	6							1	2	2	1						
115	Other diseases of liver	14			1			3	1	1	2	3	1	1	1			
116	Diseases of spleen	1								1								
117	Simple peritonitis (nonpuerperal)	26			1	2	3	6	3	6	2	1		2				
118	Other diseases of digestive system	2					1	1										
119	Acute nephritis	7					1	1	1		2	1	1					
120	Bright's disease	233			3	6	4	11	19	29	46	39	37	19	13	6	1	
122	Other diseases of kidneys	21			1	2	2	1	2	1	1	4	2	3	2			
123	Calculi of urinary passages	1									1							
124	Diseases of bladder	9									1	2	3	2	1			
126	Diseases of prostate	2										1			1			
142	Gangrene	10							1		1	2	2	2	1	1		
143	Furuncle	3					1			2								
144	Acute abscess	9		1	1	1	3	1	1					1				
145	Other diseases of skin	3				1			1	1								
146	Diseases of bones	3			1			1		1								
149	Other diseases of organs of locomotion	1										1						
150	Congenital malformations	12												2	2	3	5	
154	Senility	50										1	3	7	13	18	7	1
163	Other suicides	9			1	1	2	1		2			1		1			
164	Poisoning by food	1											1					
165	Other acute poisonings	2				1		1										
167	Burns	2												1	1			
168	Absorption of deleterious gases	4								2	1						1	
169	Accidental drowning	16		1	5	5		1	2	1		1						
170	Traumatism by firearms	1								1								
175	Traumatism by other crushing (automobile accidents)	5			1		1	1		1	1							
179	Effects of heat	3				1				1						1		
180	Lightning	1								1								
184	Homicide by other means	1									1							
185	Fractures (cause not specified)	20			2	2	2	3	4	2	1	1		1	1	1		
186	Other external violence	40		4	2	3	2	3	6	6	3	3	5		1	2		
187	Ill-defined organic disease	20						3	1	3	2	3	5	3				
188	Sudden death	5								2	2		1					
	Total	3,447		73	197	243	218	281	361	412	416	399	357	211	167	78	27	7

TABLE 67.—MORTALITY OF INTERNATIONAL TYPOGRAPHICAL UNION, 1912 TO 1918, 1919 TO 1923, AND 1925, BY CAUSES AND AGE GROUPS—Continued

1925

International list number	Cause of death	Age at death (years)															
		All ages	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40 to 44	45 to 49	50 to 54	55 to 59	60 to 64	65 to 69	70 to 74	75 to 79	80 to 84	85 to 89	90 and over
1	Typhoid fever	3				1		1			1							
5	Smallpox	1					1											
10	Influenza	3					1		1					1				
18	Erysipelas	2					1							1				
20	Purulent infection and septicæmia	1				1												
28	Tuberculosis of lungs	87		3	11	11	12	7	10	12	10	7		2	2			
32	Pott's disease	1			1													
40	Cancer of stomach and liver	2									1	1						
45	Cancer of other organs and organs not specified	64					2	5	4	5	13	8	9	8	5	2	2	1
46	Other tumors	3			1								1				1	
47	Acute articular rheumatism	1							1									
50	Diabetes	12						1		3	3	2	1		2			
52	Addison's disease	1						1										
54	Anemia, chlorosis	7	1					1			1	1	2	2				
55	Other general diseases	1										1						
56	Alcoholism (acute or chronic)	1								1								
57	Chronic lead poisoning	2					1						1					
60	Encephalitis	2					1					1						
61	Meningitis	6				2	1			2	1							
62	Locomotor ataxia	1									1							
63	Other diseases of spinal cord	3					1		1			1						
64	Cerebral hemorrhage, apoplexy	68				1	1		6	8	12	11	11	9	3	3	2	1
65	Softening of the brain	1													1			
66	Paralysis without specified cause	21					1	2	2	2	5	4	1	1	2		1	
67	General paralysis of the insane	4						1	1			2						
68	Other forms of mental alienation	1								1								
69	Epilepsy	3							2					1				
73	Neuralgia and neuritis	2									1	1						
74	Other diseases of nervous system	1								1								
77	Pericarditis	1							1									
78	Acute endocarditis	11					1			3	3	1	1	1	1			
79	Organic diseases of the heart	121			1	1	1	6	6	14	14	18	27	19	8	4	2	
80	Angina pectoris	6								1	1		3		1			
81	Dise ses of arteries, arteriosclerosis, etc	32							1		7	8	4	5	2	4	1	
82	Embolism and thrombosis	3								1	2							
85	Other diseases of circulatory system	2						1			1							
88	Diseases of thyroid body	1										1						
90	Chronic bronchitis	5							1			1		1		2		
91	Broncho-pneumonia	1									1							
92	Pneumonia	73	1	2	1	2	5	3	2	10	14	10	12	7	1	2		1
93	Pleurisy	2										1		1				
94	Pulmonary congestion	4									1	1	1	1				
96	Asthma	7				1		1	1				1	3				
97	Emphysema	1								1								
98	Other diseases of respiratory system	2										1			1			
100	Diseases of pharynx	1						1										
102	Ulcer of stomach	3							1	1				1				
103	Other diseases of stomach	17							5	1	4	4		1	2			
105	Diarrhea and enteritis (2 years and over)	2							2									
108	Appendicitis and typhlitis	6			1		1		1		3							
109	Hernia	4							1	1				1	1			
209	Intestinal obstruction	7					1	1		1	1	1		2				
110	Other diseases of intestines	1								1								
111	Acute yellow atrophy of liver	1										1						
113	Cirrhosis of liver	8					1			1	1	1	3	1				
114	Biliary calculi	2					1					1						
115	Other diseases of liver	4							1			2	1					
117	Simple peritonitis (nonpuerperal)	6					1	1	1		2		1					
119	Acute nephritis	1									1							
120	Bright's disease	55				3	2	1	4	6	3	10	11	7	6	1	1	
122	Other diseases of kidneys	4						1			1	2						
124	Diseases of bladder	1											1					
125	Diseases of urethra	1								1								
126	Diseases of prostate	1													1			
142	Gangrene	4									1	1	1					1
143	Furuncle	1													1			
144	Acute abscess	3								1	2							
147	Diseases of joints	1										1						
154	Senility	14												4	6	3	1	
163	Other suicides	1					1											
165	Other acute poisonings	1										1						

TABLE 67.—MORTALITY OF INTERNATIONAL TYPOGRAPHICAL UNION, 1912 TO 1918, 1919 TO 1923, AND 1925, BY CAUSES AND AGE GROUPS—Continued

1925—Continued

International list number	Cause of death	Age at death (years)																
		All ages	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40 to 44	45 to 49	50 to 54	55 to 59	60 to 64	65 to 69	70 to 74	75 to 79	80 to 84	85 to 89	90 and over
167	Burns	2			1		1											
168	Absorption of deleterious gases	2								1	1							
169	Accidental drowning	3		1	2													
170	Traumatism by firearms	1								1								
175	Traumatism by other crushing (railroad accident)	2		1				1										
185	Fractures (cause not specified)	3						2			1							
186	Other external violence	20		1	2	1	1	2	2	2	2	3	1	1	1	1		
187	Ill-defined organic diseases	4							1				1	1	1			
188	Sudden death	1													1			
189	Not specified or ill defined	112			2	7	6	10	15	9	20	7	15	8	8	5		
	Total	877	1	8	23	31	46	50	74	92	136	117	110	90	57	27	11	4

INTERNATIONAL PRINTING PRESSMEN AND ASSISTANTS' UNION

The experience of the International Printing Pressmen and Assistants' Union has been divided into three periods—1912–1917, 1918, and 1919–1923. During the first period there were 793 tabulatable deaths from all causes, of which 245, or 30.9 per cent, were from pulmonary tuberculosis. The proportionate mortality was highest at ages 20 to 24, being 46.1 per cent which must be considered excessive. Other data for pressmen are included in Bulletin No. 231 of the United States Bureau of Labor Statistics, entitled "Mortality from respiratory diseases in dusty trades," in which is included the industrial experience of the Prudential Insurance Co. (p. 146). This experience covers the period 1897–1914 and represents 523 deaths from all causes, of which 207, or 39.6 per cent, were from pulmonary tuberculosis. In this experience, the proportionate mortality from pulmonary tuberculosis for ages 25 to 34 was 47.7 per cent. The details of the mortality experience of the International Printing Pressmen and Assistants' Union for 1912–1917 are given in Table 68:

TABLE 68.—MORTALITY FROM SPECIFIED CAUSES AMONG THE MEMBERS OF THE INTERNATIONAL PRINTING PRESSMEN AND ASSISTANTS' UNION, 1912 TO 1917, BY AGE GROUPS

Age at death	All causes	Tuberculosis		Cancer—all forms		Pneumonia		Bright's disease	
		Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent
13 to 19 years	6	1	16.7			1	16.7		
20 to 24 years	89	41	46.1			7	7.9	1	1.1
25 to 29 years	132	60	45.5	1	0.8	13	9.8		
30 to 34 years	88	35	39.8	1	1.1	6	6.8		
35 to 39 years	104	37	35.6	3	2.9	12	11.5	1	1.0
40 to 44 years	115	33	28.7	9	7.8	9	7.8		
45 to 49 years	85	22	25.9	4	4.7	7	8.2		
50 to 54 years	58	7	12.1	4	6.9	8	13.8		
55 to 59 years	50	6	12.0	1	2.0	5	10.0	1	2.0
60 to 64 years	38	1	2.6	6	15.8	4	10.5		
65 to 69 years	9	1	11.1	1	11.1	1	11.1		
70 to 74 years	14	1	7.1			1	7.1		
75 to 79 years	4					2	50.0		
85 to 89 years	1					1	100.0		
Total	793	245	30.9	30	3.8	77	9.7	3	0.4

Cancer, in the experience of this organization during 1912–1917, formed 3.8 per cent of the mortality from all causes, pneumonia 9.7 per cent, and Bright's disease 0.4 per cent. It must not, of course, be overlooked that pressmen and assistants are possibly and perhaps in all probability of a somewhat younger average age than compositors and machine operators. Bright's disease was apparently of decidedly minor importance, there having been only 3 deaths, equivalent to 0.4 per cent. The experience of 1918 is considered separately on account of the heavy incidence of pneumonia complicated with influenza in that year. There were 303 deaths from all causes, of which 46 or 15.2 per cent were due to tuberculosis. The proportionate mortality for cancer was 2.0 per cent, and that for pneumonia 21.5 per cent as against 9.7 per cent during the previous period. Bright's disease formed 1.0 per cent of the mortality from all causes. Details of this experience are given in Table 69:

TABLE 69.—MORTALITY FROM SPECIFIED CAUSES AMONG MEMBERS OF THE INTERNATIONAL PRINTING PRESSMEN AND ASSISTANTS' UNION, 1918, BY AGE GROUPS

Age at death	All causes	Tuberculosis		Cancer—all forms		Pneumonia		Bright's disease	
		Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent
15 to 19 years	2								
20 to 24 years	49	4	8.2			8	16.3		
25 to 29 years	61	8	13.1			16	26.3	2	3.3
30 to 34 years	55	10	18.2			19	34.5		
35 to 39 years	47	9	19.1	1	2.1	8	17.0		
40 to 44 years	30	8	26.7	2	6.7	6	20.0	1	3.3
45 to 49 years	26	3	11.5			3	11.5		
50 to 54 years	16	2	12.5	2	12.5	2	12.5		
55 to 59 years	7					2	28.6		
60 to 64 years	4	1	25.0			1	25.0		
65 to 69 years	4	1	25.0	1	25.0				
70 to 74 years	2								
Total	303	46	15.2	6	2.0	65	21.5	3	1.0

In the experience of the International Printing Pressmen and Assistants' Union during 1919–1923, presented in Table 70, there were 598 deaths, of which 111, or 18.6 per cent, were from tuberculosis. This is in marked contrast to the first period, when the mortality from that cause was 30.9 per cent. The decline conforms to the results revealed by the analysis of the vital statistics of the International Typographical Union.

TABLE 70.—MORTALITY FROM SPECIFIED CAUSES AMONG MEMBERS OF THE INTERNATIONAL PRINTING PRESSMEN AND ASSISTANTS' UNION, 1919 TO 1923, BY AGE GROUPS

Age at death	All causes	Tuberculosis		Cancer—all forms		Pneumonia		Bright's disease	
		Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent
18 to 19 years	6					1	16.7		
20 to 24 years	34	10	29.4	1	2.9	6	17.6		
25 to 29 years	63	16	25.4			14	22.2	2	3.2
30 to 34 years	74	22	29.7	2	2.7	7	9.5	1	1.4
35 to 39 years	84	24	28.6	5	6.0	8	9.5		
40 to 44 years	75	16	21.3	3	4.0	7	9.3		
45 to 49 years	71	10	14.1	8	11.3	4	5.6	1	1.4
50 to 54 years	58	9	15.5	2	3.4	4	6.9	2	3.4
55 to 59 years	46	2	4.3	6	13.0	3	6.5		
60 to 64 years	32	1	3.1	4	12.5	3	9.4		
65 to 69 years	25			1	4.0	2	8.0	1	4.0
70 to 74 years	19	1	5.3	1	5.3	1	5.3		
75 to 79 years	8			2	25.0				
80 to 84 years	1								
85 to 89 years	1								
90 years and over	1							1	100.0
Total	598	111	18.6	35	5.9	60	10.0	8	1.3

The proportion of deaths from cancer during 1919–1923 was 5.9 per cent, as against 3.8 per cent during the first period. This also is within a fair degree of conformity to the corresponding experience of the International Typographical Union. It would not, of course, be permissible to carry such a comparison too far and anticipate entirely identical results, if only because of the variations in the age composition of the two groups of employees.

The proportionate mortality from pneumonia was 10 per cent, as against 9.7 per cent during the first period. This slight increase is partly accounted for by the aftereffects of the influenza epidemic. The proportionate mortality from Bright's disease was 1.3 per cent, still remaining a relatively unimportant element in the mortality of this group of employees. The proportion is in marked contrast to the much higher figures for the International Typographical Union, which during the period 1919–1923 was 6.7 per cent. Here again the age factor may be of decided influence.

Detailed data of the mortality experience of the International Printing Pressmen and Assistants' Union for the three periods, 1912–1917, 1918, and 1919–1923 are given in Table 71:

TABLE 71.—MORTALITY EXPERIENCE OF THE INTERNATIONAL PRINTING PRESSMEN AND ASSISTANTS' UNION, 1912–1917, 1918, AND 1919–1923, BY CAUSES AND AGE GROUPS

1912 TO 1917

International list number[1]	Cause of death	Age at death (years)															
		All ages	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40 to 44	45 to 49	50 to 54	55 to 59	60 to 64	65 to 69	70 to 74	75 to 79	80 to 84	85 to 89	90 and over
1	Typhoid fever	9		3	5	1												
4	Malaria	1			1													
6	Measles	1		1														
10	Influenza	2			1						1							
18	Erysipelas	3			1		1			1								
20	Purulent infection and septicæmia	4				1					2	1						
26	Pellagra	1		1														
28	Tuberculosis of lungs	245	1	41	60	35	37	33	22	7	6	1	1	1				
30	Tuberculous meningitis	2		1				1										

[1] United States Bureau of the Census. Manual of the International List of Causes of Death. Washington, 1916. 309 pp.

TABLE 71.—MORTALITY EXPERIENCE OF THE INTERNATIONAL PRINTING PRESSMEN AND ASSISTANTS' UNION, 1912-1917, 1918, AND 1919-1923, BY CAUSES AND AGE GROUPS—Continued

1912 TO 1917—Continued

International list number	Cause of death	Age at death (years)															
		All ages	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40 to 44	45 to 49	50 to 54	55 to 59	60 to 64	65 to 69	70 to 74	75 to 79	80 to 84	85 to 89	90 and over
31	Abdominal tuberculosis	1			1													
34	Tuberculosis of other organs	2			1	1												
37	Syphilis	1									1							
39	Cancer of buccal cavity	2						1	1									
40	Cancer of stomach and liver	14				1	1	4	3	2		3						
41	Cancer of peritoneum, intestines, rectum	4			1					1		1	1					
45	Cancer of other organs or of organs not specified	10					2	4		1	1	2						
46	Other tumors	9	1			1	3	1	2	1								
47	Acute articular rheumatism	1					1											
48	Chronic rheumatism and gout	1						1										
50	Diabetes	10	1			2	2			2	3							
51	Exophthalmic goiter	1			1													
52	Addison's disease	1									1							
53	Leucæmia	1						1										
54	Anemia, chlorosis	3							2			1						
56	Alcoholism (acute or chronic)	9					3	2	1	3								
61a	Cerebrospinal meningitis	8	1	2	1		2	1	1									
62	Locomotor ataxia	3							1	1		1						
63	Other diseases of the spinal cord (acute anterior poliomyelitis)	1			1													
64	Cerebral hemorrhage, apoplexy	21			2	1	1		3	3	5	5			1			
66	Paralysis, without specified cause	17				5	4	3	2	1	1		1					
67	General paralysis of the insane	5					2	2				1						
68	Other forms of mental alienation	3						2				1						
69	Epilepsy	2					2											
70	Convulsions (nonpuerperal) 5 years and over	2						1						1				
73	Neuralgia and neuritis	2				1	1											
74	Other diseases of nervous system	2								1				1				
77	Pericarditis	3					2	1										
78	Acute endocarditis	19		1	6			2	4	1	4		1					
79	Organic diseases of the heart	54	1		6	6	4	10	9	8	2	4	1	2	1			
80	Angina pectoris	3		1			1		1									
81	Diseases of arteries, arteriosclerosis, etc	6								1	2	2		1				
82	Embolism and thrombosis	4				2						1		1				
83	Diseases of veins	1									1							
84	Diseases of lymphatic system	1						1										
85	Other diseases of circulatory system	6		2	2	1							1					
86	Diseases of nasal fossæ	1			1													
87	Diseases of larynx	1						1										
91	Broncho-pneumonia	3				1	1				1							
92	Pneumonia	77	1	7	13	6	12	9	7	8	5	4	1	1	2		1	
93	Pleurisy	1				1												
94	Pulmonary congestion	3					1	1	1									
103	Other diseases of stomach	8		1	1	2		1			1	1	1					
108	Appendicitis and typhlitis	8		1	2		1	3		1								
109	Intestinal obstruction	3		1		1			1									
110	Other diseases of intestines	3						2	1									
113	Cirrhosis of liver	9			1			2	4	1				1				
115	Other diseases of the liver	2		1					1									
117	Simple peritonitis (nonpuerperal)	4			2	1	1											
119	Acute nephritis	66		4	5	6	7	13	5	8	8	6	1	3				
120	Bright's disease	3		1			1				1							
121	Chyluria	1							1									
122	Other diseases of kidneys	8				1	1	2	2		1			1				
124	Diseases of bladder	3					1			1	1							
142	Gangrene	2			1				1									
145	Other diseases of the skin	1									1							
147	Diseases of joints	1						1										
148	Amputations	2						1				1						
154	Senility	1												1				
156	Suicide by asphyxia	1				1												
157	Suicide by hanging	2				1						1						
159	Suicide by firearms	1								1								
163	Other suicides	8			1	1	3	1	1	1								
164	Poisoning by food	1				1												
165	Other acute poisonings	3				1	1	1										
166	Conflagration	1		1														
167	Burns	1					1											
168	Absorption of deleterious gases	7		1			1	2	2			1						
169	Accidental drowning	10		4	2	2			2									
170	Traumatism by firearms	3		1	1		1											

TABLE 71.—MORTALITY EXPERIENCE OF THE INTERNATIONAL PRINTING PRESSMEN AND ASSISTANTS' UNION, 1912-1917, 1918, AND 1919-1923, BY CAUSES AND AGE GROUPS—Continued

1912 TO 1917—Continued

International list number	Cause of death	Age at death (years)																
		All ages	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40 to 44	45 to 49	50 to 54	55 to 59	60 to 64	65 to 69	70 to 74	75 to 79	80 to 84	85 to 89	90 and over
172	Traumatism by fall	2				1			1									
	Traumatism by fall down elevator shaft	2							2									
	Traumatism by fall from height	1								1								
175	Traumatism by other crushing:																	
	Street-car accident	1		1														
	Automobile accident	5		1	3					1								
	Motorcycle accident	2		1		1												
179	Effects of heat	1							1									
182	Homicides by firearms	1				1												
183	Homicides by cutting or piercing instruments	1			1													
185	Fractures (cause not specified)	9		3	3		1	1		1								
186	Other external violence	8		2	1	1		2			1							
187	Ill-defined organic diseases	1					1											
	Killed in action	9		5	4													
	Total	793	6	89	132	88	104	115	85	58	50	38	9	14	4		1	

1918

10	Influenza	43	1	4	14	11	9	3	1									
28	Tuberculosis of lungs	46		4	8	10	9	8	3	2		1	1					
30	Tuberculous meningitis	1				1												
31	Abdominal tuberculosis	1						1										
37	Syphilis	1									1							
39	Cancer of buccal cavity	1						1										
40	Cancer of stomach and liver	1						1										
45	Cancer of other organs or of organs not specified	4					1			2			1					
46	Other tumors	1					1											
50	Diabetes	1			1													
54	Anemia, chlorosis	1					1											
57	Chronic lead poisoning	1		1														
61	Meningitis	4			2				2									
64	Cerebral hemorrhage, apoplexy	7					1		2	2		1	1					
66	Paralysis without specified cause	3		1		1		1										
67	General paralysis of the insane	2				1	1											
76	Diseases of ears	1						1										
78	Acute endocarditis	4			1				2	1								
79	Organic diseases of the heart	17	1	1	1	1	3	1	6	1	2							
80	Angina pectoris	1							1									
81	Diseases of arteries, arteriosclerosis, etc	3							1			1		1				
85	Other diseases of circulatory system	2					1	1										
91	Broncho-pneumonia	9		4	1	1	1		1	1								
92	Pneumonia	65		8	16	19	8	6	3	2	2	1						
93	Pleurisy	3		1		1		1										
96	Asthma	1								1								
99	Diseases of mouth and annexa	1						1										
105	Diarrhea and enteritis (2 years and over)	1									1							
109	Hernia	1								1								
	Intestinal obstruction	1								1								
110	Other diseases of intestines	2			1			1										
113	Cirrhosis of liver	3					2	1										
119	Acute nephritis	13		3			4		3		1		1	1				
120	Bright's disease	3			2			1										
142	Gangrene	1								1								
143	Furuncle	1					1											
156	Suicide by asphyxia	1							1									
157	Suicide by hanging	1				1												
163	Other suicides	2			1		1											
165	Other acute poisonings	1		1														
168	Absorption of deleterious gases	1						1										
169	Accidental drowning	2		1	1													
170	Traumatism by firearms	2		1		1												
175	Traumatism by other crushing:																	
	Railroad accidents	1			1													
	Automobile accidents	1		1														
185	Fractures (cause not specified)	4				2	1			1								
	Killed in action	36		18	11	5	2											
	Total	303	2	49	61	55	47	30	26	16	7	4	4	2				

TABLE 71.—MORTALITY EXPERIENCE OF THE INTERNATIONAL PRINTING PRESSMEN AND ASSISTANTS' UNION, 1912-1917, 1918, AND 1919-1923, BY CAUSES AND AGE GROUPS—Continued

1919 TO 1923

International list number	Cause of death	Age at death (years)															
		All ages	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40 to 44	45 to 49	50 to 54	55 to 59	60 to 64	65 to 69	70 to 74	75 to 79	80 to 84	85 to 89	90 and over
1	Typhoid fever	1	1															
6	Measles	1			1													
10	Influenza	9			2	2	3	1		1								
18	Erysipelas	3							1		1		1					
20	Purulent infection and septicæmia	10		1	2			3	1	2			1					
24	Tetanus	1			1													
28	Tuberculosis of lungs	111		10	16	22	24	16	10	9	2	1		1				
30	Tuberculous meningitis	3	1		1		1											
31	Abdominal tuberculosis	2					2											
34	Tuberculosis of other organs	2			2													
39	Cancer of buccal cavity	6						2	2		1				1			
40	Cancer of stomach and liver	13				1	1		4		3	3						
41	Cancer of peritoneum, intestines, rectum	5				1	1			1		1		1				
45	Cancer of other organs or of organs not specified	11		1			3	1	2	1	2		1					
46	Other tumors	3			1	1	1											
47	Acute articular rheumatism	1			1													
50	Diabetes	9					1	3	1	2	2							
51	Exophthalmic goiter	1				1												
53	Leucæmia	1				1												
54	Anæmia, chlorosis	6				1			2			2				1		
61	Meningitis	1				1												
62	Locomotor ataxia	2							1	1								
64	Cerebral hemorrhage, apoplexy	20			2	1	1	2	2	1	3	3	1	2	2			
65	Softening of the brain	2						1			1							
66	Paralysis without specified cause	4						2	1					1				
67	General paralysis of the insane	11				4	1	5	1									
68	Other forms of mental alienation	1							1									
69	Epilepsy	1									1							
78	Acute endocarditis	17		1	2	1	5		1	3	2		2					
79	Organic diseases of the heart	78	1		2	4	11	6	12	8	13	7	8	6				
80	Angina pectoris	13				1	1	1	4	1	1	1		2	1			
81	Diseases of arteries, arteriosclerosis, etc	9		1			1		1			1	1	2	1		1	
82	Embolism and thrombosis	1								1								
83	Diseases of veins	6				1		1	2		1	1						
85	Other diseases of circulatory system	7					2	1	2		1	1						
89	Acute bronchitis	1											1					
91	Broncho-pneumonia	8				3	3	1			1							
92	Pneumonia	60	1	6	14	7	8	7	4	4	3	3	2	1				
94	Pulmonary congestion	3					1	1						1				
96	Asthma	4					1	1		2								
97	Pulmonary emphysema	1								1								
98	Other diseases of respiratory system	2					2											
100	Diseases of pharynx	1						1										
102	Ulcer of stomach	4						1	2	1								
103	Other diseases of stomach	1			1													
108	Appendicitis and typhlitis	12		2	1	1	2	2	2					1	1			
109	Hernia	5						1	1	2		1						
110	Other diseases of intestines	1									1							
113	Cirrhosis of liver	10						4			3	2	1					
115	Other diseases of liver	3			1			1		1								
117	Simple peritonitis (nonpuerperal)	7		2	2	1		1	1									
118	Other diseases of digestive system	3							1	1				1				
119	Acute nephritis	36		1	1	5	3	5	3	5	3	4	5		1			
120	Bright's disease	8			2	1			1	2			1					1
122	Other diseases of kidneys	3		1	1				1									
124	Diseases of bladder	1										1						
146	Diseases of bones	2				1				1								
155	Suicide by poison	3		1		2												
163	Other suicides	3		1			1			1								
168	Absorption of deleterious gases	10			1	2	2		2	2	1							
175	Traumatism by other crushing (automobile accidents)	6		2	1	3												
179	Effects of heat	1		1														
184	Homicide by other means	1				1												
185	Fractures (cause not specified)	9			1	2	1	3		2								
186	Other external violence	6	1	2		1		1		1								
	Capital punishment	1				1												
	Killed in war	3		2	2													
	Total	598	6	34	63	74	84	75	71	58	46	32	25	19	8	1	1	1

INTERNATIONAL PHOTO-ENGRAVERS' UNION

The experience of the International Photo-Engravers' Union is available only for the period 1919–1923. This organization also represents a much larger proportion of younger persons than does the International Typographical Union. For 1919–1923 there was a total of 206 deaths from all causes, of which 41, or 19.9 per cent, were attributable to tuberculosis. The proportionate rate was highest at ages 35 to 39, being 33.3 per cent, but it was 32.4 per cent for ages 30 to 34. On account of the variation in the age distribution, a strict comparison with other groups of printing employees is not admissible. Details of the experience for the period under review are given in Table 72:

TABLE 72.—MORTALITY FROM SPECIFIED CAUSES AMONG THE MEMBERS OF THE INTERNATIONAL PHOTO-ENGRAVERS' UNION, 1919 TO 1923, BY AGE GROUPS

Age at death	All causes	Tuberculosis		Cancer—all forms		Pneumonia		Bright's disease	
		Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent
20 to 24 years	16	3	18.8			1	6.3		
25 to 29 years	37	7	18.9			12	32.4		
30 to 34 years	34	11	32.4	1	2.9	7	20.6	1	2.9
35 to 39 years	18	6	33.3			3	16.7	2	11.1
40 to 44 years	25	6	24.0	2	8.0	4	16.0		
45 to 49 years	20	2	10.0	1	5.0	3	15.0	1	5.0
50 to 54 years	20	4	20.0	2	10.0	3	15.0		
55 to 59 years	11	2	18.2	2	18.2	3	27.3		
60 to 64 years	13			2	15.4			3	23.1
65 to 69 years	6							1	16.7
70 to 74 years	3			1	33.3				
75 to 79 years	2								
80 to 84 years	1								
Total	206	41	19.9	11	5.3	36	17.5	8	3.9

The proportionate mortality from cancer was 5.3 per cent, which must be considered relatively high considering the small number of deaths at ages 65 and over. The corresponding proportion for the International Typographical Union was 8.2 per cent, while for the International Printing Pressmen and Assistants' Union it was 5.9 per cent. The actual number of deaths from this disease is, however, too small for extended consideration.

The proportionate mortality from pneumonia was 17.5 per cent, which is relatively high but is partly accounted for by the peculiar age distribution of the experience under consideration. It is well known that the influenza epidemic of 1918–19 fell most heavily upon ages under 40. The proportionate mortality by different periods of life for pneumonia was highest at ages 25 to 29—32.4 per cent. At this age period the corresponding proportionate mortality from pneumonia in the experience of the International Typographical Union was 29.9 per cent and the International Printing Pressmen and Assistants' Union 22.2 per cent. Hence the conclusion that, broadly speaking, the pneumonia-influenza epidemic affected more seriously the International Photo-Engravers' Union than the International Typographical Union and the International Printing Pressmen and Assistants' Union. The proportionate mortality from Bright's disease was 3.9 per cent. This can not be looked upon as

excessive, considering the age distribution of the organization. It is higher than that in the International Printing Pressmen and Assistants' Union but lower than that in the International Typographical Union.

Table 73 presents detailed data of the mortality experience of the International Photo-Engravers' Union:

TABLE 73.—MORTALITY EXPERIENCE OF THE INTERNATIONAL PHOTO-ENGRAVERS' UNION, 1919 TO 1923, BY CAUSES AND AGE GROUPS

International list number[1]	Cause of death	Age at death (years)													
		All ages	20 to 24	25 to 29	30 to 34	35 to 39	40 to 44	45 to 49	50 to 54	55 to 59	60 to 64	65 to 69	70 to 74	75 to 79	80 to 84
1	Typhoid fever	2		1										1	
10	Influenza	11	2	6			2	1							
28	Tuberculosis of lungs	41	3	7	11	6	6	2	4	2					
29	Acute miliary tuberculosis	1	1												
30	Tuberculous meningitis	2	1			1									
39	Cancer of buccal cavity	2						1			1				
40	Cancer of stomach and liver	3							2	1					
41	Cancer of peritoneum, intestines, and rectum	1									1				
45	Cancer of other organs or of organs not specified	5			1		2			1			1		
50	Diabetes	3				1	1	1							
54	Anemia, chlorosis	1		1											
60	Encephalitis	2				1	1								
61	Meningitis	1					1								
63	Other diseases of spinal cord	1			1										
64	Cerebral hemorrhage, apoplexy	8		1		1		1	1	2	1	1			
66	Paralysis without special cause	1									1				
67	General paralysis of the insane	4			1		1		2						
68	Other forms of mental alienation	2				1		1							
74	Other diseases of nervous system	1										1			
79	Organic diseases of the heart	27	2	3	4	1	2	3	4		4	1	2		1
80	Angina pectoris	2									1			1	
82	Embolism and thrombosis	2						1		1					
91	Broncho-pneumonia	6		1	3				1	1					
92	Pneumonia	36	1	12	7	3	4	3	3	3					
94	Pulmonary congestion	2	1	1											
102	Ulcer of stomach	1						1							
103	Other diseases of stomach	1				1									
108	Appendicitis and typhlitis	4	2				1				1				
109	Intestinal obstruction	2						1				1			
117	Simple peritonitis (nonpuerperal)	3		1	1				1						
120	Bright's disease	8			1	2		1			3	1			
124	Diseases of bladder	2					2								
142	Gangrene	2							2						
143	Furuncle	1					1								
144	Acute abscess	1										1			
146	Diseases of bones	1		1											
155	Suicide by poison	1			1										
163	Other suicides	4	1		2			1							
164	Poisoning by food	1					1								
165	Other acute poisonings	1						1							
168	Absorption of deleterious gases	1	1												
169	Accidental drowning	4	1	1	1			1							
184	Homicide by other means	1		1											
	Total	206	16	37	34	18	25	20	20	11	13	6	3	2	1

[1] United States Bureau of the Census. Manual of the International List of Causes of Death. Washington, 1916. 309 pp.

INTERNATIONAL STEREOTYPERS AND ELECTROTYPERS' UNION

The available experience of the International Stereotypers and Electrotypers' Union has been divided into two periods, 1914–1918 and 1919–1923. During the first period, as will be seen in Table 74, there were 288 deaths from all causes, of which 62, or 21.5 per cent, were from pulmonary tuberculosis. This proportion compares with 20.9 per cent for the International Typographical Union during

1912–1918 and 30.9 per cent for the International Printing Pressmen and Assistants' Union for 1912–1917. The experience is, of course, affected by the age distribution of the organization, there being a relatively large proportion of deaths at ages 25 to 54.

TABLE 74.—MORTALITY FROM SPECIFIED CAUSES AMONG MEMBERS OF THE INTERNATIONAL STEREOTYPERS AND ELECTROTYPERS' UNION, 1914 TO 1918, BY AGE GROUPS

Age at death	All causes	Tuberculosis		Cancer—all forms		Pneumonia		Bright's disease	
		Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent
20 to 24 years	2							1	50.0
25 to 29 years	28	9	32.1		5.9	6	21.4		
30 to 34 years	34	8	23.5	2	5.9	7	20.6	2	5.9
35 to 39 years	47	19	40.4	2	4.3	9	19.1	1	2.1
40 to 44 years	46	7	15.2			9	19.6	6	13.0
45 to 49 years	43	11	25.6	3	7.0	10	23.3	3	7.0
50 to 54 years	26	5	19.2	1	3.8	7	26.9	1	3.6
55 to 59 years	22	2	9.1	2	9.1	3	13.6	1	4.5
60 to 64 years	19	1	5.3	4	21.1	2	10.5	5	26.3
65 to 69 years	8					1	12.5		
70 to 74 years	6					1	16.7	1	16.7
75 to 79 years	4					1	25.0		
80 to 84 years	3					1	33.3	1	33.3
Total	288	62	21.5	14	4.8	57	19.8	22	7.6

The proportionate mortality from cancer was 4.8 per cent, which is a little higher than the corresponding mortality for the International Typographical Union. The proportionate mortality from pneumonia was 19.8 per cent and from Bright's disease 7.6 per cent.

During the 1919–1923 experience of this organization, as will be seen in Table 75, there were 275 deaths from all causes, or about the same as during the previous period. The proportionate mortality from tuberculosis has slightly declined, being 18.2 per cent, while the proportionate mortality from cancer increased to 8.7 per cent. The proportionate mortality from pneumonia was 13.8 per cent as against 19.8 per cent during the previous period, which, of course, includes the larger portion of the influenza epidemic. The proportionate mortality from Bright's disease was 6.2 per cent.

TABLE 75.—MORTALITY FROM SPECIFIED CAUSES AMONG THE MEMBERS OF THE INTERNATIONAL STEREOTYPERS AND ELECTROTYPERS' UNION, 1919–1923, BY AGE GROUPS

Age at death	All causes	Tuberculosis		Cancer—all forms		Pneumonia		Bright's disease	
		Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent
20 to 24 years	3	1	33.3						
25 to 29 years	19	6	31.6			1	5.3		
30 to 34 years	31	9	29.0			12	38.7	2	6.5
35 to 39 years	42	13	31.0	1	2.4	7	16.7	2	4.8
40 to 44 years	30	9	30.0	1	3.3			1	3.3
45 to 49 years	35	6	17.1	3	8.6	5	14.3	4	11.4
50 to 54 years	30	2	6.7	4	13.3	3	10.0	1	3.3
55 to 59 years	23	2	8.7			4	17.4	3	13.0
60 to 64 years	27	1	3.7	7	25.9	1	3.7	2	7.4
65 to 69 years	21	1	4.8	2	9.5	1	4.8	2	9.5
70 to 74 years	11			4	3.6	3	27.3		
75 to 79 years	1								
80 to 84 years	1								
85 to 89 years	1					1	100.0		
Total	275	50	18.2	24	8.7	38	13.8	17	6.2

Some additional observations as to the experience of this organization may serve a useful purpose. The mortality from typhoid fever was the same for both periods, which is practically true also of influenza complicated with pneumonia. There were no deaths from chronic lead poisoning during the first period but there was one death during the second. Deaths from diabetes increased from no recorded mortality in the first period to three deaths in the second. Organic diseases of the heart diminished from 51 during 1914–1918 to 34 during 1918–1923. The mortality from ulcers of the stomach remained the same during both periods. There were five deaths from appendicitis during the earlier period, and six deaths during the later one. Suicides increased from two to three and miscellaneous accidents diminished from nine to two. As far as it is possible to judge, the mortality of this organization during recent years has undergone an improvement, keeping in mind the fact that the number of deaths in each period is about the same, 288 and 275, respectively.

The mortality from pulmonary tuberculosis diminished from 62 to 50, while the mortality from cancer increased from 14 to 24. Deaths from pneumonia, largely complicated by influenza, however, declined from 57 to 38. There were comparatively few deaths from other respiratory affections. The one death from lead poisoning is of no importance. The general conclusion would seem justified that the mortality from almost all important causes is diminishing.

Since the foregoing analysis was prepared original death certificates have been furnished covering the period 1904–1924, representing in the aggregate 1,044 tabulatable deaths from all causes, of which 203, or 19.4 per cent were from pulmonary tuberculosis, while there were 6 deaths from other forms of tuberculosis, a total of 209. All forms of cancer caused a mortality of 63 deaths, aside from which there were 2 deaths from nonmalignant tumors. There were 6 deaths from diabetes, 2 deaths from chronic alcoholism, and 3 deaths from chronic lead poisoning. Among the diseases of the nervous system there were 38 deaths from cerebral hemorrhage and apoplexy. There were 99 deaths from organic diseases of the heart and 12 deaths from diseases of the arteries and arteriosclerosis. There were 132 deaths from pneumonia, or 12.6 per cent of the total. Among the deaths from diseases of the digestive system mention may be made of 8 from ulcers of the stomach and 14 from appendicitis. There were also 13 deaths from cirrhosis of the liver. There were 77 deaths from Bright's disease, or 7.4 per cent of the total. There were 10 deaths from suicide and 60 deaths from accidents of all kinds. In the entire experience there is only 1 homicide. The details of this experience, as well as of that for the two periods 1914–1918 and 1919–1923, are given in Table 76:

TABLE 76.—MORTALITY EXPERIENCE OF THE INTERNATIONAL STEREOTYPERS AND ELECTROTYPERS' UNION, 1914 TO 1918, 1919 TO 1923, AND 1904 TO 1924, BY CAUSE AND AGE GROUPS

1914 TO 1918

International list number[1]	Cause of death	Age at death (years)													
		All ages	20 to 24	25 to 29	30 to 34	35 to 39	40 to 44	45 to 49	50 to 54	55 to 59	60 to 64	65 to 69	70 to 74	75 to 79	80 to 84	85 to 89
1	Typhoid fever	1					1									
10	Influenza	6		3	2	1										
20	Purulent infection and septicæmia	1						1								
28	Tuberculosis of lungs	62		9	8	19	7	11	5	2	1					
30	Tuberculous meningitis	2			1		1									
40	Cancer of stomach and liver	2			1			1								
45	Cancer of other organs or of organs not specified	12			1	2		2	1	2	4					
46	Other tumors	1							1							
60	Encephalitis	2			1		1									
61	Meningitis	2		1					1							
64	Cerebral hemorrhage, apoplexy	9			1	3			1	1	1	2				
66	Paralysis without specified cause	8					2	1	1	1	2		1			
67	General paralysis of the insane	1				1										
79	Organic diseases of the heart	51		4	6	4	10	3	7	5	3	4	2	3		
81	Diseases of arteries, arteriosclerosis, etc	1						1								
90	Chronic bronchitis	1								1						
92	Pneumonia	57		6	7	9	9	10	7	3	2	1	1	1	1	
98	Other diseases of respiratory system	2				1				1						
102	Ulcer of stomach	3					1			2						
103	Other diseases of stomach	3			1	1	1									
108	Appendicitis and typhlitis	5		1			2	2								
109	Hernia	1						1								
113	Cirrhosis of liver	3					1	1		1						
115	Other diseases of liver	1			1											
117	Simple peritonitis (nonpuerperal)	2					1			1						
120	Bright's disease	22	1		2	1	6	3	1	1	5		1		1	
122	Other diseases of kidneys	4					1	2					1			
142	Gangrene	1						1								
154	Senility	1													1	
163	Other suicides	2				1		1								
185	Fractures (cause not specified)	2								1	1					
186	Other external violence	9		1	1	2	2	2				1				
187	Ill-defined organic diseases	2				1			1							
	Killed in war	6	1	3	1	1										
	Total	288	2	28	34	47	46	43	26	22	19	8	6	4	3	

1919 TO 1923

1	Typhoid fever	1					1									
10	Influenza	7		3	3			1								
18	Erysipelas	2		1				1								
20	Purulent infection and septicæmia	2				1				1						
28	Tuberculosis of lungs	50	1	6	9	13	9	6	2	2	1	1				
32	Pott's disease	1				1										
40	Cancer of stomach and liver	1										1				
41	Cancer of peritoneum, intestines, rectum	1						1								
45	Cancer of other organs or of organs not specified	22				1	1	3	4		7	2	4			
47	Acute articular rheumatism	1								1						
50	Diabetes	3			1				2							
53	Lucæmia	1										1				
54	Anemia, chlorosis	4			1		1			1	1					
57	Chronic lead poisoning	1			1											
61	Meningitis	1							1							
62	Locomotor ataxia	1						1								
64	Cerebral hemorrhage, apoplexy	14		1		1			3	3	4	1	1			
66	Paralysis without specified cause	11				2	4	1			1	2	1			
67	General paralysis of the insane	2						1		1						
68	Other forms of mental alienation	2		1		1										
74	Other diseases of nervous system	2					1					1				
78	Acute endocarditis	1						1								
79	Organic diseases of the heart	34		1		5	5	2	5	3	4	7	2			
80	Angina pectoris	1						1								
81	Diseases of arteries, arteriosclerosis, etc	9				1		1	3	1	2			1		
90	Chronic bronchitis	1							1							
92	Pneumonia	38		1	12	7		5	3	4	1	1	3			1
93	Pleurisy	1					1									
96	Asthma	1						1								

[1] United States Bureau of the Census. Manual of the International List of Causes of Death. Washington, 1916. 309 pp.

TABLE 76.—MORTALITY EXPERIENCE OF THE INTERNATIONAL STEREOTYPERS AND ELECTROTYPERS' UNION, 1914 TO 1918, 1919 TO 1923, AND 1904 TO 1924, BY CAUSE AND AGE GROUPS—Continued

1919 TO 1923—Continued

International list number	Cause of death	Age at death (years)													
		All ages	20 to 24	25 to 29	30 to 34	35 to 39	40 to 44	45 to 49	50 to 54	55 to 59	60 to 64	65 to 69	70 to 74	75 to 79	80 to 84	85 to 89
98	Other diseases of respiratory system	1	---	---	---	---	---	---	---	1	---	---	---	---	---	---
102	Ulcer of stomach	3	---	---	---	---	1	1	---	---	1	---	---	---	---	---
103	Other diseases of stomach	2	---	---	---	---	---	---	---	---	---	1	---	---	1	---
105	Diarrhea and enteritis (2 years and over)	2	---	---	---	---	1	---	---	---	1	---	---	---	---	---
108	Appendicitis and typhlitis	6	---	1	---	2	2	---	---	1	---	---	---	---	---	---
110	Other diseases of intestines	1	---	---	---	---	---	---	---	---	---	1	---	---	---	---
114	Biliary calculi	1	---	---	---	---	---	---	---	1	---	---	---	---	---	---
115	Other diseases of liver	2	---	---	---	---	1	---	1	---	---	---	---	---	---	---
116	Diseases of spleen	1	---	---	---	---	---	---	---	---	1	---	---	---	---	---
117	Simple peritonitis (nonpuerperal)	2	---	---	---	1	---	1	---	---	---	---	---	---	---	---
120	Bright's disease	17	---	---	2	2	1	4	1	3	2	2	---	---	---	---
122	Other diseases of kidneys	1	---	---	---	---	---	---	1	---	---	---	---	---	---	---
125	Diseases of urethra	1	---	---	---	---	---	1	---	---	---	---	---	---	---	---
144	Acute abscess	4	---	1	---	---	1	---	2	---	---	---	---	---	---	---
163	Other suicides	3	---	---	1	1	---	---	1	---	---	---	---	---	---	---
168	Absorption of deleterious gases	1	---	---	---	---	---	1	---	---	---	---	---	---	---	---
186	Other external violence	2	---	---	---	---	---	1	---	---	1	---	---	---	---	---
187	Ill-defined organic diseases	2	---	---	---	2	---	---	---	---	---	---	---	---	---	---
	Killed in war	7	2	3	1	1	---	---	---	---	---	---	---	---	---	---
	Total	275	3	19	31	42	30	35	30	23	27	21	11	1	1	1

1904 TO 1924

1	Typhoid fever	10	3	1	2	---	3	1	---	---	---	---	---	---	---	---
5	Smallpox	2	---	2	---	---	---	---	---	---	---	---	---	---	---	---
10	Influenza	20	---	8	7	2	2	1	---	---	---	---	---	---	---	---
14	Dysentery	1	---	---	1	---	---	---	---	---	---	---	---	---	---	---
18	Erysipelas	4	---	1	---	---	---	1	1	---	---	1	---	---	---	---
20	Purulent infection and septicæmia	11	---	---	---	2	3	1	2	3	---	---	---	---	---	---
24	Tetanus	2	1	---	1	---	---	---	---	---	---	---	---	---	---	---
28	Tuberculosis of lungs	203	7	31	39	48	36	24	8	7	1	1	1	---	---	---
29	Acute miliary tuberculosis	1	---	---	---	---	1	---	---	---	---	---	---	---	---	---
30	Tuberculous meningitis	2	---	---	---	---	---	1	1	---	---	---	---	---	---	---
31	Abdominal tuberculosis	1	---	---	1	---	---	---	---	---	---	---	---	---	---	---
32	Pott's disease	1	---	---	---	1	---	---	---	---	---	---	---	---	---	---
34	Tuberculosis of other organs	1	---	---	1	---	---	---	---	---	---	---	---	---	---	---
40	Cancer of stomach and liver	18	---	---	1	2	3	---	5	3	3	1	---	---	---	---
41	Cancer of peritoneum, intestines, rectum	2	---	---	---	---	---	1	---	---	---	1	---	---	---	---
45	Cancer of other organs or of organs not specified	43	---	---	---	3	4	5	4	7	11	3	6	---	---	---
46	Other tumors	2	---	---	---	---	---	---	1	1	---	---	---	---	---	---
47	Acute articular rheumatism	3	---	1	---	---	1	---	---	1	---	---	---	---	---	---
48	Chronic rheumatism and gout	2	---	---	---	1	---	---	1	---	---	---	---	---	---	---
50	Diabetes	6	---	---	1	---	---	2	3	---	---	---	---	---	---	---
53	Leucæmia	1	---	---	---	---	---	---	---	---	---	1	---	---	---	---
54	Anæmia, chlorosis	5	---	---	1	---	1	---	---	2	1	---	---	---	---	---
56	Alcoholism (acute or chronic)	2	---	---	1	---	1	---	---	---	---	---	---	---	---	---
57	Chronic lead poisoning	3	---	1	1	---	---	---	1	---	---	---	---	---	---	---
60	Encephalitis	1	---	---	1	---	---	---	---	---	---	---	---	---	---	---
61	Meningitis	9	---	1	2	1	1	1	3	---	---	---	---	---	---	---
62	Locomotor ataxia	2	---	---	---	---	---	1	---	---	1	---	---	---	---	---
63	Other diseases of spinal cord	1	---	---	---	---	---	---	---	---	1	---	---	---	---	---
64	Cerebral hemorrhage, apoplexy	38	---	1	1	3	2	3	6	7	7	5	1	1	1	---
65	Softening of the brain	1	---	---	1	---	---	---	---	---	---	---	---	---	---	---
66	Paralysis without specified cause	29	---	---	1	2	7	4	4	2	5	2	2	---	---	---
67	General paralysis of the insane	9	---	---	---	2	1	1	1	2	---	2	---	---	---	---
68	Other forms of mental alienation	4	---	1	---	2	1	---	---	---	---	---	---	---	---	---
70	Convulsions (nonpuerperal) (5 years and over)	1	---	---	---	---	---	---	---	---	---	---	1	---	---	---
74	Other diseases of nervous system	4	---	1	---	---	2	---	---	---	---	1	---	---	---	---
77	Pericarditis	2	---	---	---	1	---	---	1	---	---	---	---	---	---	---
78	Acute endocarditis	8	---	1	---	2	1	3	1	---	---	---	---	---	---	---
79	Organic diseases of the heart	99	1	5	7	10	17	11	10	12	10	10	5	1	---	---
80	Angina pectoris	2	---	---	---	---	---	1	1	---	---	---	---	---	---	---
81	Diseases of arteries, arteriosclerosis, etc	12	---	---	---	1	---	2	2	3	2	---	---	1	1	---
82	Embolism and thrombosis	2	---	---	---	---	---	2	---	---	---	---	---	---	---	---
85	Other diseases of circulatory system	2	---	---	1	1	---	---	---	---	---	---	---	---	---	---
88	Diseases of thyroid body	2	---	---	---	---	---	1	---	---	1	---	---	---	---	---
90	Chronic bronchitis	4	---	---	1	---	---	---	3	---	---	---	---	---	---	---
91	Broncho-pneumonia	5	---	1	1	---	2	---	---	---	---	1	---	---	---	---
92	Pneumonia	132	2	10	23	26	12	20	14	10	6	2	4	1	1	1

TABLE 76.—MORTALITY EXPERIENCE OF THE INTERNATIONAL STEREOTYPERS AND ELECTROTYPERS' UNION, 1914 TO 1918, 1919 TO 1923, AND 1904 TO 1924, BY CAUSE AND AGE GROUPS—Continued

1904 TO 1924—Continued

International list number	Cause of death	Age at death (years)														
		All ages	20 to 24	25 to 29	30 to 34	35 to 39	40 to 44	45 to 49	50 to 54	55 to 59	60 to 64	65 to 69	70 to 74	75 to 79	80 to 84	85 to 89
93	Pleurisy	3	---	---	---	---	2	---	---	---	---	1	---	---	---	---
94	Pulmonary congestion	2	---	1	---	---	1	---	---	---	---	---	---	---	---	---
96	Asthma	2	---	---	---	---	---	1	---	1	---	---	---	---	---	---
98	Other diseases of respiratory system	15	1	1	3	2	1	3	---	3	1	---	---	---	---	---
100	Diseases of pharynx	1	---	---	---	---	---	1	---	---	---	---	---	---	---	---
102	Ulcer of stomach	8	---	---	---	1	2	1	---	2	1	---	1	---	---	---
103	Other diseases of stomach	11	---	1	---	1	3	2	2	---	---	1	---	---	1	---
105	Diarrhea and enteritis (2 years and over)	2	---	---	---	---	1	---	---	---	1	---	---	---	---	---
108	Appendicitis and typhlitis	14	---	2	2	2	4	2	---	2	---	---	---	---	---	---
109	Hernia	4	---	---	---	1	---	2	1	---	---	---	---	---	---	---
110	Other diseases of intestines	5	---	1	---	1	2	---	---	---	---	1	---	---	---	---
113	Cirrhosis of liver	13	---	1	1	3	2	1	1	3	---	---	1	---	---	---
114	Biliary calculi	3	---	---	---	1	---	1	---	1	---	---	---	---	---	---
115	Other diseases of liver	5	---	1	1	---	2	1	---	---	---	---	---	---	---	---
116	Diseases of spleen	1	---	---	---	---	---	---	---	---	1	---	---	---	---	---
117	Simple peritonitis (nonpuerperal)	4	---	---	---	1	1	1	1	---	---	---	---	---	---	---
119	Acute nephritis	3	---	---	---	---	---	1	1	1	---	---	---	---	---	---
120	Bright's disease	77	2	5	9	8	12	15	6	6	8	3	3	---	---	---
122	Other diseases of kidneys	6	---	---	---	---	2	2	1	---	---	---	1	---	---	---
124	Diseases of bladder	1	---	---	---	---	---	---	---	1	---	---	---	---	---	---
144	Acute abscess	2	---	---	---	---	1	---	1	---	---	---	---	---	---	---
147	Diseases of joints	1	---	---	---	---	---	---	---	1	---	---	---	---	---	---
154	Senility	3	---	---	---	---	---	---	---	---	---	1	---	---	1	1
155	Suicide by poison	1	---	---	---	1	---	---	---	---	---	---	---	---	---	---
159	Suicide by firearms	4	---	---	---	2	---	1	---	---	1	---	---	---	---	---
163	Other suicides	5	---	1	2	---	---	---	1	1	---	---	---	---	---	---
165	Other acute poisonings	8	---	3	1	---	4	---	---	---	---	---	---	---	---	---
168	Absorption of deleterious gases	5	1	---	---	---	---	1	---	---	1	2	---	---	---	---
169	Accidental drowning	9	---	3	1	3	1	1	---	---	---	---	---	---	---	---
170	Traumatism by firearms	5	1	2	1	---	---	1	---	---	---	---	---	---	---	---
172	Traumatism by fall	2	1	---	---	---	1	---	---	---	---	---	---	---	---	---
174	Traumatism by machines	1	---	---	---	---	---	---	---	---	1	---	---	---	---	---
175	Traumatism by other crushing:															
	Street-car accidents	1	---	---	---	---	1	---	---	---	---	---	---	---	---	---
	Automobile accidents	2	---	---	---	2	---	---	---	---	---	---	---	---	---	---
177	Starvation	1	---	---	---	---	---	---	---	1	---	---	---	---	---	---
179	Effects of heat	1	---	---	---	---	1	---	---	---	---	---	---	---	---	---
185	Fractures (cause not specified)	7	---	1	---	1	2	1	---	1	1	---	---	---	---	---
186	Other external violence	17	---	3	3	3	---	4	1	3	---	---	---	---	---	---
184	Homicides by other means	1	---	---	---	---	1	---	---	---	---	---	---	---	---	---
187	Ill-defined organic disease	11	---	---	1	4	1	3	1	---	---	1	---	---	---	---
189	Not specified or ill-defined	52	1	2	2	6	8	5	5	9	4	6	2	2	---	---
190	Disappearance (war)	10	3	5	1	1	---	---	---	---	---	---	---	---	---	---
	Total	1,044	24	99	124	154	157	138	95	96	69	47	28	6	5	2

INTERNATIONAL BROTHERHOOD OF BOOKBINDERS

The experience of the International Brotherhood of Bookbinders is too limited for extended consideration. For the present purpose, male and female workers are considered separately, the experience covering the period 1920–1923. For male bookbinders the deaths from all causes, as shown in Table 77, were 189, of whom 37, or 19.6 per cent, were from tuberculosis. The proportionate mortality from cancer was 7.9 per cent, for pneumonia 11.6 per cent, and from Bright's disease 13.2 per cent.

TABLE 77.—MORTALITY FROM SPECIFIED CAUSES AMONG THE MALE MEMBERS OF THE INTERNATIONAL BROTHERHOOD OF BOOKBINDERS, 1920 TO 1923, BY AGE GROUPS

Age at death	All causes	Tuberculosis		Cancer—all forms		Pneumonia		Bright's disease	
		Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent
15 to 19 years	1								
20 to 24 years	7	2	28.6			2	28.6	1	14.3
25 to 29 years	10	3	30.0					1	20.0
30 to 34 years	22	9	40.9			4	18.2	3	13.6
35 to 39 years	21	8	38.1	3	14.3	2	9.5	1	4.8
40 to 44 years	19	5	26.3	1	5.3	2	10.5	1	5.3
45 to 49 years	14	2	14.3	1	7.1	6	42.9	1	7.1
50 to 54 years	22	2	9.1	3	13.6			8	36.4
55 to 59 years	29	3	10.3	3	10.3	2	6.9	3	10.3
60 to 64 years	18	2	11.1	1	5.6	3	16.7	1	5.6
65 to 69 years	12	1	8.3	3	25.0			1	8.3
70 to 74 years	4							1	25.0
75 to 79 years	6					1	16.7	2	33.3
80 to 84 years	2							1	50.0
85 to 89 years	1								
90 years and over	1								
Total	189	37	19.6	15	7.9	22	11.6	25	13.2

The mortality for female bookbinders includes only 104 deaths, as shown in Table 78, of which 19, or 18.3 per cent, were from tuberculosis, 9, or 8.7 per cent, from cancer, 9, or 8.7 per cent, from pneumonia, and 10, or 9.6 per cent, from Bright's disease.

TABLE 78.—MORTALITY FROM SPECIFIED CAUSES AMONG FEMALE MEMBERS OF THE INTERNATIONAL BOOKBINDERS' UNION, 1920 TO 1923, BY AGE GROUPS

Age at death	All causes	Tuberculosis		Cancer—all forms		Pneumonia		Bright's disease	
		Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent
15 to 19 years	4	1	25.0					1	25.0
20 to 24 years	11	6	54.5			1	9.1		
25 to 29 years	16	7	43.8	1	6.3			1	6.3
30 to 34 years	8	2	25.0			2	25.0		
35 to 39 years	3	1	33.3						
40 to 44 years	9	1	11.1	2	22.2			1	11.1
45 to 49 years	9			4	44.4			1	11.1
50 to 54 years	10			1	10.0			3	30.0
55 to 59 years	7	1	14.3			3	42.9		
60 to 64 years	10			1	10.0	1	10.0	2	20.0
65 to 69 years	6					1	16.7	1	16.7
70 to 74 years	4								
75 to 79 years	6					1	16.7		
80 to 84 years	1								
Total	104	19	18.3	9	8.7	9	8.7	10	9.6

It is thus shown that in the experience of male bookbinders the proportionate mortality was higher for pulmonary tuberculosis, pneumonia, and Bright's disease than in that of female bookbinders, and slightly lower for cancer. It should be kept in mind that bookbinders, both men and women, represent largely persons below the age of 50.

For all bookbinders the numbers considered are rather small but they seem to justify the conclusion that tuberculosis in this group of

employments is still relatively of a high degree of frequency. The proportionate mortality from tuberculosis at ages 20 to 24 was 28.6 per cent for men and 54.5 per cent for women. At ages 30 to 34 it was 40.9 per cent for men and 25.0 per cent for women, but the numbers are rather too small for a safe generalization. No workers in the printing trades are at the present time deserving of more extended consideration than female bookbinders, who are frequently of inferior physique and required to work in an unnatural posture which is inimical to health.

The bookbinding trade is often carried on in connection with printing establishments and not under the best conditions. Limited observations have forced the conclusion that much remains to be done to raise the standards of health and physical efficiency in this group of occupations.

The details of the mortality experience of the International Bookbinders' Union are given in Table 79:

TABLE 79.—MORTALITY EXPERIENCE OF THE INTERNATIONAL BROTHERHOOD OF BOOKBINDERS, 1920–1923, BY CAUSE AND AGE GROUPS

MALES

International list number[1]	Cause of death	Age at death (years)																
		All ages	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40 to 44	45 to 49	50 to 54	55 to 59	60 to 64	65 to 69	70 to 74	75 to 79	80 to 84	85 to 89	90 and over
10	Influenza	6				1		1	2	1	1							
28	Tuberculosis of lungs	37		2	3	9	8	5	2	2	3	2	1					
45	Cancer of other organs or of organs not specified	15					3	1	1	3	3	1	3					
50	Diabetes	5				1				1	1	1	1					
64	Cerebral hemorrhage, apoplexy	17						1		3	6	1	4	1			1	
67	General paralysis of the insane	1					1											
68	Other forms of mental alienation	3		1				1					1					
78	Acute endocarditis	1						1										
79	Organic diseases of the heart	32	1	1		2	4	2	1	3	9	5		1	2			1
80	Angina pectoris	3					1	1				1						
81	Diseases of arteries, arteriosclerosis, etc	2												1	1			
85	Other diseases of circulatory system	2							1		1							
87	Diseases of larynx	1						1										
90	Chronic bronchitis	1														1		
92	Pneumonia	22		2		4	2	2	6		2	3			1			
103	Other diseases of stomach	2					1					1						
108	Appendicitis and typhlitis	2			1	1												
109	Intestinal obstruction	1			1													
110	Other diseases of intestines	1										1						
117	Simple peritonitis (nonpuerperal)	1						1										
120	Bright's disease	25		1	1	3	1	1	1	8	3	1	1	1	2	1		
143	Furuncle	1											1					
163	Other suicides	1			1													
167	Burns	1			1													
169	Accidental drowning	1				1												
170	Traumatism by firearms	1			1													
185	Fractures (cause not specified)	3			1			1		1								
186	Other external violence	1										1						
	Total	189	1	7	10	22	21	19	14	22	29	18	12	4	6	2	1	1

[1] United States Bureau of the Census. Manual of the International List of Causes of Death. Washington, D. C. 309 pp.

TABLE 79.—MORTALITY EXPERIENCE OF THE INTERNATIONAL BROTHERHOOD OF BOOKBINDERS, 1920-1923, BY CAUSE AND AGE GROUPS—Continued

FEMALES

International list number	Cause of death	Age at death (years)																
		All ages	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40 to 44	45 to 49	50 to 54	55 to 59	60 to 64	65 to 69	70 to 74	75 to 79	80 to 84	85 to 89	90 and over
1	Typhoid fever	1	1															
10	Influenza	1			1													
28	Tuberculosis of lungs	19	1	6	7	2	1	1			1							
45	Cancer of other organs or of organs not specified	9			1			2	4	1		1						
50	Diabetes	2				1				1								
54	Anemia, chlorosis	2		1									1					
61	Meningitis	1			1													
64	Cerebral hemorrhage, apoplexy	10					1		1	1	1	1		4		1		
67	General paralysis of the insane	1													1			
78	Acute endocarditis	1			1													
79	Organic diseases of the heart	17		1	1	2	1	1	1	2	1	3	2		2			
81	Diseases of arteries, arteriosclerosis, etc	1													1			
83	Diseases of veins	1						1										
92	Pneumonia	9		1		2					3	1	1		1			
96	Asthma	2							1			1						
103	Other diseases of stomach	2								1	1							
108	Appendicitis and typhlitis	3		1		1		1										
109	Hernia	1										1						
110	Other diseases of intestines	1							1									
117	Simple peritonitis (nonpuerperal)	3	1					1		1								
120	Bright's disease	10	1		1			1	1	3		2	1					
154	Senility	2											1		1			
163	Other suicides	2			2													
169	Accidental drowning	1		1														
185	Fractures (cause not specified)	1						1										
186	Other external violence	1			1													
	Total	104	4	11	16	8	3	9	9	10	7	10	6	4	6	1		

AMERICAN CITIES

In the returns for certain American cities, representing all types of printing employees, and covering the period 1919–1923, there were 775 deaths from all causes, of which 89 or 11.5 per cent were from tuberculosis. There were 60 deaths from cancer, or 7.7 per cent of the mortality from all causes, and 41 from pneumonia, or 5.3 per cent. The mortality from Bright's disease was 64, or 8.3 per cent from all causes. The experience in a general way would seem to conform to the corresponding returns for the printers' labor organization, and emphasizes the fact that tuberculosis to-day is of relatively diminishing importance, while cancer is gaining steadily and becoming of even greater importance at certain age groups than tuberculosis of the respiratory organs. It is certainly suggestive that against 89 deaths from tuberculosis there should have been 60 deaths from all forms of cancer. The data for this experience are given in Table 80.

TABLE 80.—MORTALITY OF PRINTING EMPLOYEES IN AMERICAN CITIES, 1919–1923, BY CAUSE

Cause of death	Deaths	
	Number	Per cent
Influenza	22	2.8
Pulmonary tuberculosis	89	11.5
Cancer	60	7.7
Cerebral hemorrhage, apoplexy	62	8.0
Organic diseases of the heart	143	18.4
Broncho-pneumonia	26	3.4
Pneumonia	41	5.3
Bright's disease	64	8.3
All other causes	268	34.6
Total	775	100.0

The detailed data for the mortality among printers in American cities are given in Table 81:

TABLE 81.—MORTALITY AMONG PRINTING EMPLOYEES IN AMERICAN CITIES 1919 TO 1923, BY CAUSE AND BY AGE GROUPS

International list number[1]	Cause of death	Age at death (years)															
		All ages	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40 to 44	45 to 49	50 to 54	55 to 59	60 to 64	65 to 69	70 to 74	75 to 79	80 to 84	85 to 89	90 and over
1	Typhoid fever	1			1													
4	Malaria	1								1								
9	Diphtheria and croup	1	1															
10	Influenza	22	2	3	2	2	4		2	1		3		2	1			
14	Dysentery	1													1			
18	Erysipelas	3							1	1	1							
20	Purulent infection and septicæmia	6	1	1					2	1	1							
28	Tuberculosis of the lungs	89	11	14	14	11	10	9	9	7	3	1						
30	Tuberculous meningitis	5	2		1	2												
31	Abdominal tuberculosis	1								1								
32	Pott's diseases	2					1	1										
37	Syphilis	3							1	1	1							
39	Cancer of buccal cavity	3							1		1	1						
40	Cancer of stomach and liver	18							4	2	2	1	3	3	1	2		
41	Cancer of peritoneum, intestines, rectum	13					1		1	2	7		2					
42	Cancer of female genital organs	2								1		1						
44	Cancer of skin	1										1						
45	Cancer of other organs or of organs not specified	23					3	2	2	1	4	5	2	2	2			
47	Acute articular rheumatism	2					1						1					
50	Diabetes	14	1		1		1		1	2	3	1	1	2	1			
53	Leucæmia	1							1									
54	Anemia, chlorosis	5		1		1			1			1	1					
55	Other general diseases	1						1										
56	Alcoholism (acute or chronic)	4	1					1	1	1								
60	Encephalitis	2							1			1						
61	Meningitis	4								1	1	1	1					
63	Other diseases of spinal cord	1									1							
64	Cerebral hemorrhage, apoplexy	62			1	1	1	2	1	3	11	10	8	7	6	8	3	
65	Softening of the brain	1													1			
66	Paralysis without specified cause	3				1		1							1			
67	General paralysis of the insane	9			1			4	2	1		1						
68	Other forms of mental alienation	1		1														
69	Epilepsy	3		1					1	1								
74	Other diseases of nervous system	4		2		1						1						
77	Pericarditis	1										1						
79	Organic diseases of the heart	143	5	3	4	5	5	7	15	10	21	26	16	13	10	1	1	1
80	Angina pectoris	7								1	1	3		1	1			
81	Diseases of arteries, arteriosclerosis, etc	26								6		4	4	4	3	4	1	
82	Embolism and thrombosis	9				1		1		2	2	1	1		1			

[1] United States Bureau of the Census. Manual of the International List of Causes of Death. Washington, 1916. 309 pp.

TABLE 81.—MORTALITY AMONG PRINTING EMPLOYEES IN AMERICAN CITIES, 1919 TO 1923, BY CAUSE AND BY AGE GROUPS—Continued

International list number	Cause of death	Age at death (years)															
		All ages	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40 to 44	45 to 49	50 to 54	55 to 59	60 to 64	65 to 69	70 to 74	75 to 79	80 to 84	85 to 89	90 and over
85	Other diseases of circulatory system	3	1			1				1								
91	Broncho-pneumonia	26	1	2	3	1	3	2	3		1	4		2	2	1	1	
92	Pneumonia	41		1	4	1	2	5	4	4	1	6	2	4	5	2		
93	Pleurisy	4		2	1									1				
94	Pulmonary congestion	1															1	
96	Asthma	1								1								
98	Other diseases of respiratory system	1				1												
102	Ulcer of stomach	2							1	1								
103	Other diseases of stomach	6	1					1	1	1		1	1					
105	Diarrhea and enteritis (2 years and over)	1											1					
108	Appendicitis and typhlitis	12		2	2	1	1	2		2	1		1					
109	Hernia	9					2		1	2		2	2					
110	Other diseases of intestines	2						1						1				
113	Cirrhosis of liver	5							1		1	1	1		1			
114	Biliary calculi	1							1									
115	Other diseases of liver	4					2		1					1				
116	Diseases of spleen	1									1							
117	Simple peritonitis (nonpuerperal)	5		1	3			1										
118	Other diseases of digestive system	2						1		1								
119	Acute nephritis	3	1			1					1							
120	Bright's disease	64			2	1	1	3	8	9	10	7	6	9	5	2		1
122	Other diseases of kidneys	2												1		1		
123	Calculi of urinary passages	1					1											
124	Diseases of bladder	5						1	1						1		1	1
126	Diseases of prostate	5										2	3					
142	Gangrene	1											1					
143	Furuncle	1								1								
144	Acute abscess	2			1	1												
146	Diseases of bones	1	1															
154	Senility	2												1	1			
155	Suicide by poison	3				1	1	1										
156	Suicide by asphyxia	5				1	1	2	1									
157	Suicide by hanging	1					1											
159	Suicide by firearms	5			1					2	1	1						
160	Suicide by cutting or piercing instruments	1							1									
163	Other suicides	3						1	2									
164	Poisoning by food	1										1						
165	Other acute poisonings	2								2								
167	Burns	2					1		1									
168	Absoption of deleterious gases	7						1	3	1	1	1						
169	Accidental drowning	5	1			1		2	1									
170	Traumatism by firearms	1					1											
175	Traumatism by other crushing:																	
	Railroad accidents	2						1						1				
	Street-car accidents	2		1							1							
	Automobile accidents	9	1		1	2	2	1	1					1				
182	Homicide by firearms	3		2			1											
184	Homicide by other means	1								1								
185	Fractures (cause not specified)	8	1	1	1	1				1			1	1		1		
186	Other external violence	2		1						1								
	Total	775	32	39	44	39	47	55	79	78	79	90	59	57	44	22	8	3

NATIONAL SOCIETY OF OPERATIVE PRINTERS AND ASSISTANTS OF GREAT BRITAIN

For purposes of comparison with the American data, information concerning the National Society of Operative Printers and Assistants of Great Britain has been obtained. This organization, however, consists chiefly of pressfeeders and their assistants and is not typically representative of other branches of the printing trades. In the experience of this organization during 1909–1922 there were 640 deaths from all causes, of which 171, or 26.7 per cent, were from pulmonary tuberculosis. This compares with 14.9 per cent for the

International Typographical Union for the period 1919–1923. At ages 35 to 39 the proportionate mortality from tuberculosis in the experience of the International Typographical Union was 31.2 per cent as against 38.5 per cent for the National Society of Operative Printers. In contrasting the tuberculosis mortality as it prevails among British printing employees, the fact must not be overlooked that the latter suffer very much more from chronic bronchitis. This is clearly shown by the fact that there were 47 deaths from chronic bronchitis and 7 deaths from acute bronchitis, both of which causes of death hardly ever figure to a serious extent in the mortality of American printers. For illustration, in the experience of the International Typographical Union during 1919–1923, there were only 12 deaths from chronic bronchitis among a very much larger mortality from all causes. No satisfactory explanation has ever been advanced for the high mortality from chronic bronchitis not only among British printers but in Great Britain generally. It may possibly be attributable to climatic conditions which are widely different from those which prevail in this country.

Broncho-pneumonia has also been much more common among British printers, 15 deaths, or 2.3 per cent, having been attributed to this cause out of a mortality of 640 deaths from all causes. There were only 6 deaths from this cause in the International Typographical Union out of a total of 3,447 deaths from all causes. The details of the experience are given in Table 82:

TABLE 82.—MORTALITY EXPERIENCE OF THE NATIONAL SOCIETY OF OPERATIVE PRINTERS AND ASSISTANTS OF GREAT BRITAIN, 1909 TO 1922, BY CAUSES AND AGE GROUPS

Age at death	All causes	Tuberculosis		Cancer—all forms		Pneumonia		Bright's disease	
		Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent
15 to 19 years	14	7	50.0			3	21.4		
20 to 24 years	24	8	33.3	1	4.2	2	8.3	2	8.3
25 to 29 years	39	14	35.9	1	2.6	3	7.7		
30 to 34 years	69	17	24.6	2	2.9	14	20.3	1	1.4
35 to 39 years	78	30	38.5	3	3.8	6	7.7	3	3.8
40 to 44 years	87	28	32.2	1	1.1	7	8.0	4	4.6
45 to 49 years	121	44	36.4	9	7.4	16	13.2	5	4.1
50 to 54 years	71	9	12.7	15	21.1	12	16.9	1	1.4
55 to 59 years	74	10	13.5	12	16.2	2	2.7	2	2.7
60 to 64 years	33	4	12.1	8	24.2	1	3.0	1	3.0
65 to 69 years	21			3	14.3	3	14.3	1	4.8
70 to 74 years	7			1	14.3			1	14.3
75 to 79 years	1								
80 to 84 years	1							1	100.0
Total	640	171	26.7	56	8.8	69	10.8	22	3.4

The proportionate mortality from cancer was 8.8 per cent as against 8.2 per cent in the experience of the International Typographical Union. There were no deaths from lead poisoning in the experience of this organization during the period under observation.

The detailed tables of mortality among printing employees (see Tables 67, 71, 73, 76, 79, and 81) provide much new material for a more extended study of health problems in the printing trades. They are the first comprehensive compilation on the subject. While

limited in completeness they nevertheless provide a basis for certain definite conclusions. They seem clearly to establish a diminishing incidence of tuberculosis and a rising frequency of cancer. They are suggestive of the conclusion that lead poisoning in fatal form is now of decidedly minor, if not negligible, importance. This conclusion is supported by the fact that renal diseases are also diminishing or in any event not seriously increasing. Finally, they emphatically sustain the point of view that social or venereal diseases are relatively infrequent, that chronic alcoholism is of no importance, that suicides are not excessive, and that homicides are extremely rare. On the whole, they provide an illuminating contrast with observations regarding health conditions in the printing trades of a generation or two ago. They support in all essentials the conclusions arrived at on the basis of the questionnaire addressed to employers and to labor organizations and the study of aged workers in the printing trades.

LEAD POISONING

The problem of lead poisoning in the printing industries is practically as old as the industry itself. Many prevailing views upon the subject, however, represent reflections and conclusions of an earlier period, the conditions of which have long since been replaced by modern shop conditions in marked contrast to those of the past. It would hardly serve a useful purpose to review the extended literature on the subject, which, broadly speaking, represents chiefly conditions in foreign printing plants rather than in the printing plants of the United States. The problem has at all times been complicated by the economic conditions of printers, for it is now generally accepted that low wages and long hours are among the most serious predisposing causes of ill health and premature mortality. The shorter hours now prevailing in printing plants are lessening industrial fatigue, which is now clearly recognized as an important factor in industrial health, and together with the higher wages are yielding better nutrition, thereby producing a decidedly higher degree of disease resistance. Furthermore, there is the factor of a considerable diminution in habits of gross intoxication, as well as a more general conformity to standards of personal hygiene. All of these combined have materially diminished evils which in former days formed a very just cause of complaint. In other words, the potential dangers of ill health, and especially the liability to lead poisoning, are always present, while the actual danger, as the result of the changes indicated, is now decidedly less. Sir Thomas Oliver, one of the ablest and foremost authorities on chronic lead poisoning, in his treatise on Lead Poisoning in 1914 (pp. 83–88), wrote as follows:

> Another occupation in which the dangers of lead poisoning are frequently observed is that of printing, also type founding. In addition to plumbism, printers are peculiarly liable to tuberculosis, owing to the work being carried on in close, warm, and ill-ventilated rooms, whereby the possibility of infection is favored. Some writers maintain that lead poisoning of itself predisposes to tuberculosis. The only way in which it can do so is by reducing the general vital resistance of the individual. When tuberculosis develops in a lead-poisoned person the phthisis usually runs a rapid course. Between 1900 and 1909 there were notified 200 cases of plumbism in printers, and of these 17 were fatal. Considering the large number of printers in this country, it can not be said that lead poisoning is extremely prevalent among them, and yet when the malady develops

the symptoms are unusually severe and persistent. In the dust given off by British type 14 per cent of lead was found, but this is only one-third of what has been found in continental printing shops. Type founders and linotypists suffer from plumbism through inhalation of the fumes of the molten metal.

If we take the statistics of the London Society of Compositors, it will be observed that there are fewer cases of plumbism among the members than of tuberculosis. Professor Hahn of Munich has shown, taking the figures for Vienna and Berlin from 1901 to 1907, that the number of cases of plumbism and the mortality from tuberculosis run concurrently. In Vienna the sickness from plumbism per 100 members of one of the sick-clubs during eight years declined 48 per cent, and during the same period the deaths from tuberculosis declined 57 per cent. In Berlin during the years 1901 to 1907 lead poisoning declined 46 per cent, and the deaths from tuberculosis 40 per cent. Comparing the polygraphic trades one with another, it was noticed that, while the highest figures for plumbism were given by printers and type founders, the highest death rate from tuberculosis also occurred in printers and type founders. Hahn is of the opinion that the predisposition to pulmonary tuberculosis on the part of printers is the result of chronic lead poisoning, but if this alone were the cause, why should the relationship be so noticeable in printers, to the exclusion of other trades? We do not find, for example, pulmonary tuberculosis prevalent to any abnormal extent in white-lead workers, and yet they are exposed to a form of dust finer and richer in lead than are printers. Printers, file cutters, and potters succumb to pulmonary phthisis in large numbers, a circumstance less due to the chemical than to the physical qualities of the dust inhaled and the conditions under which it is inhaled. Other factors than lead, therefore, are probably in operation to explain the high mortality rate of tuberculosis in printers. Infection, and the fact of the work being carried on too frequently in overheated, ill-ventilated, and artificially lighted rooms, are the more likely causes.

* * * As a contribution to the relationship of tuberculosis and lead poisoning experiments carried out by G. Loriga may be mentioned. To 10 guinea pigs he gave for one month nitrate of lead in food, to 10 guinea pigs sulphate of lead was given, while another group of 10 were fed normally. Of each group 8 were infected with tuberculosis. The animals which received lead declined in weight more rapidly than those fed normally. The nitrate-of-lead-fed animals lost weight more quickly than those which received sulphate. One of the nitrate-fed animals died of lead poisoning, and 7 of the tuberculosis group after an average of 79 days. Those of the sulphate group died after an average of 91 days, and the nonlead animals after 92 days. Loriga maintains, as a result of these experiments, that plumbism creates a predisposition to tuberculosis. It should be remembered, however, that there is only one day's difference as regards the date of death between the sulphate-fed animals and those which received no lead at all. Among printers and lead smelters, as in all dusty occupations, the effect of dust and tuberculosis combined is always greater than the influence of either separately; but, as already stated, there are, as regards printers, other circumstances in operation, such as the influence of overheated and ill-ventilated workrooms.

It has seemed advisable to give the foregoing observations of Sir Thomas Oliver in full since there is nothing that could be added thereto that would have greater weight, except the actual facts as ascertained from our American experience and by somewhat different methods though yielding substantially the same results.

Reference should also be made to the report on the Hygiene of the Printing Trades, by Dr. Alice Hamilton and Charles H. Verrill, published by the United States Bureau of Labor Statistics in 1917 as its Bulletin No. 209. Dr. Hamilton has since published an elaborate work on Industrial Poisons in which there are also numerous references to the printing trades. There can be no question but that since Bulletin No. 209 was published substantial progress has been made in the gradual elimination of the lead-poisoning hazard. There are, however, a number of exceedingly useful references in the report, from which I quote the following (p. 24) based upon investigations by Dr. Earl B. Phelps of the United States Public Health Service who, at the request of the Bureau of Labor Statistics, made tests of the air in

the Government printing plant amplified by experiments suggestive of the potential danger:

There is no detectable volatilization of lead within the range of temperature used at the Government Printing Office nor at a considerably higher temperature, but even at the lowest temperature used there is a formation of oxide upon the surface of the molten metal, this oxide film being in the form of finely divided dust. It is more or less affected by mechanical agitation and may quite readily be carried away by currents of air. It is frequently in practice skimmed off as dross.

Under the conditions of these tests and, it is believed, under conditions as observed in the printing office, this last effect is the only one deserving of serious attention. It is primarily a matter of mechanical agitation rather than of the temperature of the metal, which determines the pollution of the surrounding air with this fine metallic dust.

The report observes in this connection that molten lead as used in printing is at a temperature below the volatilization point, and lead fumes in the strict sense of the word are not given off, but stirring or skimming or ladling or otherwise disturbing the film of oxide constantly forming on the surface of the lead detaches it and allows it to be carried into the air so that there is, as shown by actual tests, a contamination of the air with lead. This is the reason why it is considered safer to have all melting pots provided with hoods, and most of the foreign authorities, who do not believe that lead fumes are a danger in printing, nevertheless, to be on the safe side, advise this precaution. The results of an analysis of dust specimens of the Government Printing Office as furnished by Doctor Phelps are given as follows:

Sample No.		Per cent of lead
1.	Newspaper office	0.51
2.	Newspaper office	.80
3.	Newspaper office	2.80
4.	Commercial printing office	.20
5.	Do	5.68
	Government Printing Office:	
6.	Open type case	5.68
7.	Empty case 2 feet from floor	.64
8.	Monotype case	5.12
9.	Galley rack 4 feet high	.72
10.	Old type case 4 feet from floor	.32
11.	Tops of cabinets	.64

These samples indicate the enormous range in lead contamination of different printing plants and different portions of the same plant, which makes it hazardous to conjecture on the probable average contamination of general air conditions. But the samples conclusively prove that lead is a potential danger, the effects of which can be guarded against only by the utmost care in matters of attention to sanitary conditions.

With particular reference to linotype machines the report states as follows (pp. 38, 39):

To prove that there are no lead fumes from linotype pots is not to prove that work on these machines is without risk to health nor even that there is no risk from lead poisoning. There are many sources of possible lead poisoning in machine composition as it is usually carried on, and it is not hard to find justification for the disappointment that was experienced when it was found that the introduction of mechanical typesetting and the displacement of hand work had not resulted in the abolition of lead poisoning as had been claimed.

As regards monotype casting it is said (p. 45) that "as a usual thing the casting is carried on in a separate room and whatever the risks they

are confined to the few men who do the actual work." This, of course, is true of practically all dangerous occupational processes. The risk, broadly speaking, never falls upon employees as a whole but often upon a small and sometimes a very small group of the workers. On the whole my own conclusions in respect to the foregoing observations coincide with those of the report.

As regards stereotyping, the report points out that this is, as a rule, done under poor conditions and that the workers are imperfectly safeguarded. The danger is increased by the tendency to place the foundry in the basement although there are certain advantages as regards ventilation. The same conclusions apply to electrotyping, in which the two chief dangers are lead dust and lead oxide from the pot and the backing tables. It is suggested "that some method should always be adopted to carry off fumes, either by installing a hood with a strong up-draft or placing a fan in the outer wall close to the kettle. As a usual thing there is no hood over the pot, and when there is, it is rarely adequate to serve its purpose. * * * This danger [of fumes], not only from the pot but also from the backing table, is recognized in all the better-class plants."

As regards the actual effects of lead poisoning the preceding sections of this health survey clearly emphasize that the hazard in fatal form is now extremely small. Contrasting the present with a generation ago, there has unquestionably been a very material improvement due to better shop conditions and, as pointed out, to an increased disease resistance on the part of the employees in consequence of better wages, shorter hours, and better habits as regards personal hygiene. The most striking definite evidence of the gradual decline of lead poisoning in printing plants is furnished by an analysis of the entire mortality from chronic lead poisoning in the registration area[e] during the 10 years ending with 1923. According to this experience, out of 1,442 deaths from chronic lead poisoning in all industries in the population at large, only 64 were deaths of printing plant employees, who died at an average age of 45.7 years, as compared with 49.4 years for all deaths from lead poisoning. There was an average of 6.4 deaths of printers per annum. The mortality of printing employees since 1914, by age at death is shown in Table 83:

TABLE 83.—DEATHS OF PRINTING EMPLOYEES FROM LEAD POISONING, UNITED STATES REGISTRATION AREA, 1914 TO 1923, BY AGE AT DEATH

Age at death	Number of deaths	Age at death	Number of deaths	Age at death	Number of deaths	Age at death	Number of deaths	Age at death	Number of deaths
19 years	2	31 years	1	43 years	1	55 years	1	67 years	-------
20 years	1	32 years	1	44 years	1	56 years	3	68 years	-------
21 years	1	33 years	-------	45 years	4	57 years	2	69 years	-------
22 years	-------	34 years	1	46 years	5	58 years	2	70 years	2
23 years	-------	35 years	-------	47 years	1	59 years	1	71 years	1
24 years	1	36 years	1	48 years	3	60 years	1	72 years	-------
25 years	-------	37 years	2	49 years	-------	61 years	1	73 years	-------
26 years	-------	38 years	2	50 years	1	62 years	-------	74 years	1
27 years	1	39 years	-------	51 years	-------	63 years	1	75 years	-------
28 years	1	40 years	4	52 years	3	64 years	-------	76 years	1
29 years	-------	41 years	4	53 years	1	65 years	-------	77 years	-------
30 years	1	42 years	3	54 years	-------	66 years	-------	78 years	-------

[e] The original death certificates for lead poisoning were furnished by the division of vital statistics of the United States Bureau of the Census.

The number of deaths from chronic lead poisoning during the five years ending with 1918 was 26, while during the five years following it was 38, but during 1924 only 3 deaths occurred. In 1925 there were 5 deaths. Of course, in considering such data as this the increased extent of printing plant operations must not be overlooked, for it is quite probable that the plants were more active during the last five years of the decade than during the first five years. But the actual number of deaths is so small in proportion to the total number of persons employed in connection with printing plants that the frequency rate is of negligible importance. The census of manufactures for 1923 estimates the total number of persons employed in printing and publishing and allied industries at 291,029 wage earners, as against 272,092 in 1914, and, making allowance for persons not included in the census of manufactures, it is probably a safe assumption that the actual number of persons exposed directly or indirectly to the risk of chronic lead poisoning in the printing industry is over 300,000. On that basis the frequency rate for 1924 would be approximately 1 death per 100,000 workers. That the statistics presented are approximately correct is indicated by the close conformity of the average age at death, which for the first five years was 45.6 years as against 45.8 years during the last five years of the decade ending with 1923. A careful analysis of the 64 death certificates indicates that the only important complicating disease in connection with chronic lead poisoning in the printing trades was acute and chronic nephritis, represented by 19 cases, or 29.7 of the total.

In a corresponding statement for Great Britain for the period 1914–1925, furnished by the Chief Inspector of Factories, the number of cases and deaths from lead poisoning in the printing industry in that country were given as follows:

TABLE 84.—NUMBER OF CASES OF LEAD POISONING AND DEATHS THEREFROM IN BRITISH PRINTING PLANTS, 1914 TO 1925, BY YEARS

Year	Cases	Deaths	Year	Cases	Deaths	Year	Cases	Deaths
1914	23	1	1919	10	1	1924	6	1
1915	27	3	1920	9		1925	8	
1916	12		1921	12	1			
1917	6	3	1922	11		Total	138	12
1918	8	1	1923	6	1			

It is shown by this table that the cases of lead poisoning in the British printing industry diminished over one-third during the five years ending with 1923 as compared with the previous five years, while the deaths were proportionately reduced at even a greater rate. During the entire 12 years there have been 138 cases of lead poisoning in the British printing industry, with 12 deaths, or approximately 11.5 cases to every death. If this proportion is applied to the three deaths which occurred in American printing industries during 1924 the probable number of cases of lead poisoning that year would be 35. Making allowances for a possibly somewhat higher case rate in this country, and also for the section of the United States not represented in the registration area, it is a safe assumption that the annual number of cases of lead poisoning in the American printing industry does not now exceed 50.

Out of 707 cases of lead poisoning reported to the New York State Department of Labor from January, 1912, to January, 1925, there

was not a single case of a printing employee, but it is frankly admitted that the returns are incomplete. For the State of Massachusetts, however, the returns for the five years 1921–1925 show that 14 cases of lead poisoning in the printing industry occurred in that State during the period under review. These cases occurred in the following order: Two in 1921, 7 in 1922, none in 1923, 3 in 1924, and 2 in 1925. In the entire State of New York, according to a consolidated report of the Department of Labor for the period September 1, 1911, to June 30, 1925, there were reported 21 cases of lead poisoning in the printing trades, with 5 deaths. This would give 4 cases to a death, instead of the British average of 11.5. If the Massachusetts ratio prevailed throughout the United States the result would be a materially reduced figure from the one previously estimated.

On page 13 of the present report, the statement is made that among more than 100,000 workers there occurred 34 known cases of lead poisoning. This would give a case rate of approximately 34 per 100,000 workers. On the basis of the previous estimates, this return would seem approximately correct but indicative of a larger proportion of cases to a death than is shown by the British and the Massachusetts experiences. It is not possible to harmonize these conflicting results, which are due, of course, in part to the smallness of the numbers involved, but they all yield the same conclusion that fatal chronic lead poisoning in the printing trades is at the present time a health factor of relatively small importance.

Of particular significance are the returns of aged printers. Of 728 such reports received from individual printers or printing employees 60 years of age and over the number who during their entire trade experience had suffered from chronic lead poisoning was only 27. But since the average trade life of these printers was 44 years and the lead poisoning experience covered the whole of the working life, these statistics must not be compared with other returns giving current rates of frequency occurrence. The statistics would seem to prove that lead poisoning is relatively of small importance as a factor seriously detrimental to health and in nonfatal form.

In the section of this report on the vital statistics of printers (pp. 79 to 110) are some very interesting data giving the relative frequency of lead poisoning in proportion to the total mortality from all causes. In the experience of the International Typographical Union during 1912–1918, out of 3,338 deaths from all causes 6, or 0.18 per cent, were from chronic lead poisoning. During the period 1919–1923, out of 3,447 deaths from all causes 15, or 0.43 per cent, were from chronic lead poisoning. During 1925, out of 877 deaths from all causes only 2, or 0.23 per cent, were from chronic lead poisoning. In the entire experience of the International Stereotypers and Electrotypers' Union covering the period 1904–1924, represented by 1,044 deaths from all causes only 3, or 0.29 per cent, were from chronic lead poisoning. In the experience of the International Printing Pressmen and Assistants' Union for the years 1912–1917, out of 793 deaths from all causes none were from lead poisoning. In the experience of the year 1918 out of 303 deaths 1 was from lead poisoning. In the experience of 1919–1923 out of 598 deaths from all causes none were from chronic lead poisoning. According to

the tabulated results of deaths of printing employees in certain American cities, numbering in the aggregate 775 deaths from all causes, none were from chronic lead poisoning. Hence it is a safe assumption from all of the foregoing evidence combined that chronic lead poisoning in the printing trades at the present time, when considered in fatal form, is a factor of comparatively small importance and, even when considered in nonfatal form, is not of very serious importance.

DUST AND FUMES AND THEIR RELATION TO LEAD POISONING

It has not been feasible to make an exhaustive technical study of the dust and fume problem and its relation to lead poisoning. The Bureau of Mines, however, has made for me certain special investigations at the Government Printing Office in Washington which are covered by the following reports and observations. The report of the chief surgeon of the Bureau of Mines, Dr. R. R. Sayers, reads as follows:

The lead dust in the air samples from the Government Printing Office was collected by the electric precipitation method similar to the Cottrell method. The total volume of the air collected was from 75 to 150 cubic feet. The method of collection retains practically all the dust in the air sampled.

Sample No. 1 was collected in the metal room between the two pots when both were in operation and represents the worst condition that occurred. This condition lasts from one to two hours.

Sample No. 2 was collected in the molding section of the casting and plate-making division two feet from the metal pot.

Sample No. 3 was collected six inches directly above the metal pot in the monotype room with the hood removed.

Sample No. 1 contained 0.0549 milligram lead per cubic feet of air; sample No. 2, 0.0049 milligram lead per cubic feet of air; sample No. 3, 0.0212 milligram lead per cubic feet of air.

This report is amplified by the following observation:

In some studies carried out by the Bureau of Mines, it has been found that animals breathing air containing from 0.03 to 0.08 milligrams of lead per cubic foot for 10 months develop no symtoms of lead poisoning but when the animals are killed for examination, lead can be found stored in the body of some species. Another species of animals, exposed simultaneously, has shown no lead storage or symptoms. The animals were exposed in two groups, one group for 3 hours, the other for 6 hours daily. Similar exposure of animals to air containing from 0.002 to 0.007 milligram for several months causes neither storage nor symptoms. Ten months is probably not long enough to determine whether chronic lead poisoning will or will not develop, but the fact that lead is found to be stored in the bodies of some of the animals would indicate that it is possible.

Dr. T. M. Legge has made some estimations and compared them with other estimations made by Mr. Duckering and concludes that about 2 milligrams of lead is the lowest daily dose, inhaled in the form of dust or fumes in the air, which in the course of years will cause chronic lead poisoning. If this estimate is correct, there is but little if any danger of lead poisoning among the employees of the Government Printing Office, with the possible exception of those in the metal room. With constant attention to adequate ventilation and to cleanliness, its occurrence can easily be prevented at this point. If the lead fumes in the monotype room or in the molding section of the casting and plate-making division were allowed to escape directly into the room, the hazard, of course, would be increased.

The report also includes the following as to the investigations made at the Government Printing Office:

Carbon monoxide in air breathed by men in monotype, linotype, and melting room less than 0.005 per cent. Gas fumes carried off by hoods and draft vents.

With reference to the method of collecting dust samples the statement from the associate chemist, W. P. Yant, appended to the report, reads as follows:

All the samples reported herewith were collected by the Cottrell precipitator method using a total volume of air of 75 to 150 cubic feet. The dust precipitated within the tubes was washed with nitric acid and chemical analysis made for lead content.

As a matter of record there are here included some observations on the presence of lead dust, also in printing plants in Washington, determined as the result of investigations made by Dr. Earle B. Phelps, of the United States Health Service, for the Bureau of Labor Statistics and included in Bulletin No. 201 of the bureau on Hygiene of the Printing Trades (p. 27):

The specimens were examined in accordance with a procedure which involved the extraction of the sample by shaking for one hour at common temperature with 1,000 times the sample weight of aqueous hydrochloric acid containing 0.25 per cent of H. Cl. The results are recorded in percentage of lead by weight. In each case, also, a qualitative test was obtained for antimony, and a distinct qualitative test was obtained for arsenic in the case of sample No. 6.

Samples of dust numbered 1, 2, and 3 were taken from three newspaper printing offices in Washington and contained, respectively, 0.51, 0.80, and 2.80 per cent of lead.

Samples numbered 4 and 5, which were from two commercial printing offices, showed, respectively, 0.20 and 5.68 per cent of lead.

Samples Nos. 6 to 11, inclusive, were all taken from the Government Printing Office and the original description of sources has been retained in the following paragraphs:

No. 6. Dust from open type case. Contained 5.68 per cent of lead.

No. 7. Dust from empty case, at a level of 2 feet from floor. Fine flocculent, mainly organic dust. Contained 0.64 per cent of lead.

No. 8. Dust from a "box" or compartment in a lower case, monotype. This dust contains microscopic particles of lead, as do all cases wherein monotype products are "laid." These particles of lead are too heavy to be air borne, except when (as occasionally occurs) the case is agitated. Fingers are soiled by such dust, and chewers of tobacco may convey such metal-contaminated fingers to the mouth. Contained 5.12 per cent of lead.

No. 9. This dust came from a "galley" rack, covered at top and exposed only at the front. This rack is about 4 feet high. The dust came from the two top shelves. This is fairly representatives of the air-borne dusts in a modern composing room. The cabinet had been well cleaned about 10 months previous. Contained 0.72 per cent of lead.

No. 10. Dust from an old type case (lifted from the case and not shaken therefrom) at about 4 feet from the floor. This dust does not contain the heavier bits of lead usually found in type cases under the hand system. Contained 0.32 per cent of lead.

No. 11. Dust from cabinet tops, at or about 5 or 6 feet from floor. Such dust rises from sweeping and is not the result of abrasion of metal. Contained 0.64 per cent of lead.

It is necessary, of course, to draw a distinction between the presence of lead in dust and in fumes in printing plants. The latter phase of the question has been dealt with in the above report, giving not only the results of foreign investigations, but also those of the study by Doctor Phelps in this connection, which are included in the present discussion as of use for future consideration:

There is no detectable volatilization of lead within the range of temperature used at the Government Printing Office, nor at a considerably higher temperature but even at the lowest temperature used there is a formation of oxide upon the surface of the molten metal, this oxide film being in the form of finely divided dust. It is more or less affected by mechanical agitation and may quite readily be carried away by currents of air. It is frequently in practice skimmed off as dross.

Under the conditions of these tests, and it is believed under conditions as observed at the Printing Office, this last effect is the only one deserving of serious attention. It is primarily a matter of mechanical agitation rather than of the temperature of the metal which determines the pollution of the surrounding air with this fine metallic dust.

On the basis of the foregoing and with due consideration of foreign investigations, the report states:

In other words, molten lead as used in printing is at a temperature far below the volatilization point, and lead fumes, in the strict sense of the term, are not given off, but stirring or skimming or ladling out the metal disturbs the film of oxide constantly forming on the surface of the lead, and this is carried into the air so that there is a contamination of the air from lead as shown by actual test.

This may be one reason why most of the foreign authorities who do not believe that lead fumes are a danger in printing, nevertheless, to be on the safe side, advise that all melting pots be provided with hoods. Legge and Goadby in Great Britain, Hahn in Germany, and the Austrian commission all consider this a desirable precaution. The Swiss law requires it.

The report also makes some observations with regard to acrolein fumes which are generally considered injurious. Such fumes, however, are apparently only likely to arise in connection with stereotyping, as to which it is said that, "The fumes which arise when old plates are being melted down, or burned off as it is usually called, * * * come from the ink and contain acrolein." As far as I have been able to ascertain, there is little risk of this fume being very troublesome. Of course, in linotype and monotype machines fumes are general and under certain conditions may involve a serious risk of lead poisoning. That this risk is now reduced to a small proportion is clearly indicated by the relative infrequency of lead poisoning, but it is a potential risk which at all times requires the utmost vigilance if far-reaching evils are to be avoided.

It does not fall within the present discussion to consider at length the highly technical problem of adequate ventilation and dust and fume control. Such investigations as have been made by me clearly indicate that in many instances, but especially in the case of small plants, both ventilation and dust removal are quite inadequate to secure the best results. But it is equally convincing that great progress in this respect has been made, particularly in the case of the larger printing plants during recent years.

THE TUBERCULOSIS PROBLEM

That pulmonary tuberculosis was of common occurrence in the printing trades in the past admits of no question. Many years ago Thackrah called attention to the diseases of printers, and in his opinion "few appeared to be enjoying good health." In my report on Mortality from Consumption in Dusty Trades, published in Bulletin No. 79 of the United States Bureau of Labor in 1908, are given, among other data, statistics for the Prudential Insurance Co. for the period 1897–1906, according to which out of 1,590 deaths of printers, including all branches of the occupation, 613, or 38.6 per cent, were classified as being due to pulmonary tuberculosis. The corresponding percentage for the registration area at about the same time was 14.8 per cent. The proportionate mortality was highest at ages 25 to 34, being 56.3 per cent, while the corresponding proportionate mortality for males in the registration area was 31.3 per cent. These are about the only trustworthy comparable data for past years

which are useful for the present purpose. Detailed statistics for compositors, pressmen, and photo-engravers were not numerically sufficient for safe generalization.

In the present investigation data have been collected for all of the principal branches of the printing industry as represented by the mortality experience of the printers' labor organizations. (See pp. 79 to 110.) Of this the most important is that of the International Typographical Union, which, briefly summarized, is as follows: For the period 1912–1918 the investigation includes 3,338 tabulatable deaths from all causes, of which 697, or 20.9 per cent, were from pulmonary tuberculosis. Corresponding statistics for 1919–1923 represent tabulatable returns of 3,447 deaths, of which 512, or 14.9 per cent, were from pulmonary tuberculosis. Aside from the foregoing tabulatable deaths data for the year 1925 were obtained. The total mortality was 877 deaths from all causes, of which 87, or 9.9 per cent, were from pulmonary tuberculosis. The distribution of deaths by divisional periods of life for the different periods of years is shown in Table 85:

TABLE 85.—MORTALITY FROM PULMONARY TUBERCULOSIS AMONG MEMBERS OF THE INTERNATIONAL TYPOGRAPHICAL UNION, 1912 TO 1918, 1919 TO 1923, AND 1925, BY AGE GROUPS

Age at death	1912–1918			1919–1923			1925		
	All causes	Pulmonary tuberculosis		All causes	Pulmonary tuberculosis		All causes	Pulmonary tuberculosis	
		Number	Per cent		Number	Per cent		Number	Per cent
Under 25 years	121	44	36.4	73	24	32.9	9	3	33.3
25 to 34 years	459	208	45.3	440	143	32.5	54	22	40.7
35 to 44 years	746	237	31.8	499	141	28.3	96	19	19.8
45 years and over	2,012	208	10.3	2,435	204	8.4	718	43	6.0
Total	3,338	697	20.9	3,447	512	14.9	877	87	9.9

In the experience of the International Photo-Engravers' Union for 1919–1923 there were 206 deaths from all causes, with 41 deaths from pulmonary tuberculosis, or 19.9 per cent of the total deaths, as will be seen in Table 86:

TABLE 86.—MORTALITY FROM PULMONARY TUBERCULOSIS AMONG THE MEMBERS OF THE INTERNATIONAL PHOTO-ENGRAVERS' UNION, 1919 TO 1923, BY AGE GROUPS

Age at death	All causes	Pulmonary tuberculosis	
		Number	Per cent
Under 25 years	16	3	18.8
25 and under 34 years	71	18	25.4
35 and under 44 years	43	12	27.9
45 years and over	76	8	10.5
Total	206	41	19.9

For the International Stereotypers and Electrotypers' Union data were obtained for two periods, 1914–1918 and 1919–1923, and also for

1904–1924, the entire period for which data are available. While the last period overlaps the two former ones, the data are, nevertheless, of great usefulness because of the relatively large mortality experience. During 1914–1918 there were 288 deaths from all causes, of which 62, or 21.5 per cent, were from pulmonary tuberculosis. The corresponding mortality for 1919–1923 includes 275 deaths from all causes, of which 50, or 18.2 per cent, were from pulmonary tuberculosis. The mortality for the entire period 1904–1924 represents 1,044 deaths from all causes, of which 203, or 19.4 per cent, were from pulmonary tuberculosis. The mortality by divisional periods of life for the different periods of years is shown in Table 87:

TABLE 87.—MORTALITY FROM PULMONARY TUBERCULOSIS AMONG THE MEMBERS OF THE INTERNATIONAL STEREOTYPERS AND ELECTROTYPERS' UNION, 1914 TO 1918, 1919 TO 1923, AND 1904 TO 1923, BY AGE GROUPS

Age at death	1914–1918			1919–1923			1904–1923		
	All causes	Pulmonary tuberculosis		All causes	Pulmonary tuberculosis		All causes	Pulmonary tuberculosis	
		Number	Per cent		Number	Per cent		Number	Per cent
Under 25 years	2			3	1	33.3	24	7	29.2
25 to 34 years	62	17	27.4	50	15	30.0	223	70	31.4
35 to 44 years	93	26	28.0	72	22	30.6	311	84	27.0
45 years and over	131	19	14.5	150	12	8.0	486	42	8.6
Total	288	62	21.5	275	50	18.2	1,044	203	19.4

The available experience of the International Pressmen and Assistants' Union begins with the period 1912–1917, during which there occurred 793 deaths from all causes, of which 245, or 30.9 per cent, were from pulmonary tuberculosis. The experience of this organization for 1918 was shown separately on account of the influenza epidemic. There were 303 deaths from all causes, of which 46, or 15.2 per cent, were from pulmonary tuberculosis. The experience for 1919–1923 includes 598 deaths from all causes, of which 111, or 18.6 per cent, were from pulmonary tuberculosis. The mortality by divisional periods of life for the different periods of years is shown in Table 88:

TABLE 88.—MORTALITY FROM PULMONARY TUBERCULOSIS AMONG THE MEMBERS OF THE INTERNATIONAL PRINTING PRESSMEN AND ASSISTANTS' UNION, 1912 TO 1917, 1918, AND 1919 TO 1923, BY AGE GROUPS

Age at death	1912–1917			1918			1919–1923		
	All causes	Pulmonary tuberculosis		All causes	Pulmonary tuberculosis		All causes	Pulmonary tuberculosis	
		Number	Per cent		Number	Per cent		Number	Per cent
Under 25 years	95	42	44.2	51	4	7.8	40	10	25.0
25 to 34 years	220	95	43.2	116	18	15.5	137	38	27.7
35 to 44 years	219	70	32.0	77	17	22.1	159	40	25.2
45 years and over	259	38	14.7	59	7	11.9	262	23	8.8
Total	793	245	30.9	303	46	15.2	598	111	18.6

The experience of the International Brotherhood of Bookbinders is rather limited but has been given separately for males and for females. The latter, of course, form an insignificant proportion of the total in all of the printing trades. Among the males there were in the period 1920–1923 189 deaths from all causes, of which 37, or 19.6 per cent, were from pulmonary tuberculosis. There were 104 deaths from all causes among female bindery workers, of which 19, or 18.3 per cent, were from pulmonary tuberculosis. The mortality by divisional periods of life for the two sexes separately is given in Table 89:

TABLE 89.—MORTALITY FROM PULMONARY TUBERCULOSIS AMONG THE MEMBERS OF THE INTERNATIONAL BROTHERHOOD OF BOOKBINDERS, 1920 TO 1923, BY SEX AND AGE GROUPS

Age at death	Males			Females		
	All causes	Pulmonary tuberculosis		All causes	Pulmonary tuberculosis	
		Number	Per cent		Number	Per cent
Under 25 years	8	2	25.0	15	7	46.7
25 to 34 years	32	12	37.5	24	9	37.5
35 to 44 years	40	13	32.5	12	2	16.7
45 years and over	109	10	9.2	53	1	1.9
Total	189	37	19.6	104	19	18.3

Before reviewing the foregoing data, the results of my investigation as to mortality from respiratory disease in dusty trades, published by the United States Bureau of Labor Statistics in its Bulletin No. 231 in 1918 will be dealt with briefly. In that investigation many details were quite thoroughly gone into but it would serve no useful purpose to enlarge upon them since they are readily available in the report referred to. Certain statistics were there published for the United States registration area for the years 1908–1909, representing 2,847 deaths from all causes for persons employed in the different printing trades, of which 840, or 29.5 per cent, were from pulmonary tuberculosis. A table was also included based on the experience of the Metropolitan Life Insurance Co. for the years 1911–1913, representing 1,056 deaths from all causes, of which 360, or 34.1 per cent, were from pulmonary tuberculosis. The foregoing data were amplified by the industrial experience of the Prudential Insurance Co. for the period 1897–1914, representing 3,863 deaths from all causes, of which 1,420, or 36.8 per cent, were from pulmonary tuberculosis. There is, therefore, a fair measure of basic data useful for comparative purposes.

Summarizing the present situation, the proportionate mortality from pulmonary tuberculosis for the entire labor organization experience, representing 10,899 deaths from all causes and 1,998 from pulmonary tuberculosis, has been 18.3 per cent, in contrast to a proportionate mortality of 38.6 per cent approximately 20 years ago. The evidence available has been derived from all accessible sources and fully supports the conclusion that pulmonary tuberculosis at the present time is about 50 per cent less common among printing employments than a score of years ago. But the actual situation is even better than as indicated, since the average of 18.3 per cent is based

upon some data as far back as 1904. More significant for the present purpose are the really extraordinary proportionate mortality changes in the experience of the International Typographical Union, in which the percentage of deaths due to pulmonary tuberculosis has decreased from 20.9 per cent during 1912–1918 to 14.9 per cent during 1919–1923, and to only 9.9 per cent during 1925. For the white male population of the registration area of ages 15 and over for the year 1923 the corresponding mortality from pulmonary tuberculosis was 7.9 per cent. The present proportionate mortality of the International Typographical Union is indicative of a marked and measurable decline in the frequency of pulmonary tuberculosis in the specific occupations represented by this organization. That the International Typographical Union's percentage of deaths from tuberculosis is approximately representative of all of the printing trades is illustrated by the returns of deaths from the printing trades for American cities covering the period 1919–1923, showing 775 deaths from all causes, of which 89, or 11.5 per cent, were from pulmonary tuberculosis. Hence, it is concluded that this disease to-day by no means holds the deplorable position given it in earlier discussions on the printing trades.

Sir Thomas Oliver, in a brief discussion on dust diseases of the lungs, contributed to Industrial Health by Kober and Hayhurst (p. 1076), observes:

> To the prevalence of pulmonary diseases in printers in the United States Dr. Frederick L. Hoffman has drawn attention. It has for long been known that printers as a class exhibit a high death rate from phthisis. In Great Britain this was the case 40 years ago more than it is to-day. I have generally attributed the circumstance to the men working in overheated and ill-ventilated rooms, to the inhalation of dust and the possibility of infection by diseased workmen, but Dr. E. Halford Ross, while admitting the influences of the above, attributes the malady mostly to inhalation of the dust which collects in the boxes which hold the type. This dust is rich in silica and iron. It has been examined and found sterile as far as tubercle bacilli are concerned. The opinion advanced by Ross is that printers' phthisis is in its incidence a silicosis. The statement has been subjected to hostile criticism by several observers. Since at the present time no decision has been arrived at it is sufficient perhaps just to raise the question of the causation of printers' phthisis, and to await the results of further observation and experiment.

But the best authorities on the subject who have thoroughly studied the question are of the opinion that silicosis, if it occurs at all in the printing trades, is of relatively rare occurrence and that the dust is not as serious a factor in this respect as has been assumed by Dr. Ross. Since I have fully discussed this question in an article in the Monthly Labor Review for September, 1922, on "Dust phthisis in the printing industry," its highly specialized aspects will not be here enlarged upon except to draw attention to a letter by Dr. Edgar L. Collis quoted therein and to some observations by Major Greenwood of the Lister Institute there summarized in the statement that—

> How much of this mortality is erroneously diagnosed as tubercular or nontubercular respiratory diseases instead of what may possibly have been a true form of silicosis is, of course, a matter of conjecture, but the evidence is absolutely conclusive that the tuberculosis mortality of English printers, throughout life, is relatively enormously in excess of an occupation generally assumed to be the healthiest of all occupations [clergymen]. While the comparison is a severe one, it is, nevertheless, strictly admissible.

In other words, specific occupational effects are best emphasized when compared or contrasted with employments practically free

from injurious occupational consequences. But from a practical point of view a general average is a more rational method of procedure in that it emphasizes the attainable rather than the ideal. The preceding statistical observations confirm the conclusion that the mortality from pulmonary tuberculosis among printing employees is approaching, if it does not already conform to, the general average degree of incidence of the disease in the white adult male population of this country. Further progress is possible and within reach. Better ventilation, more effective methods of dust prevention, better conditions of employment generally, aside from the higher wages and shorter hours of the present period, will unquestionably further accelerate the downward tendency of the tuberculosis death rate in the printing trade.

SUMMARY OF CONCLUSIONS

Briefly summarizing, the resulting conclusions of the present survey as based upon the evidence collected may be stated as follows:

1. General health conditions in the printing trades were found to have been decidedly more satisfactory than had been anticipated. This conclusion is based primarily upon the low rate of sickness incidence as revealed by returns made by employers and labor organizations, which practically confirm each other and are fully supported by the vital statistics of the printing trades.

2. Sanitary inspections of printing plants made by sanitary officials throughout the country in a sufficient number of representative cities reveal only minor defects and deficiencies as regards conformity to modern sanitary requirements. They are suggestive of material improvement during recent years particularly in the direction of larger floor and air space for employees, thus providing sufficient room for working and reasonably adequate ventilation. The defects which are occasionally pointed out are such as would naturally be expected in a large variety of plants, many of which operate under structural difficulties, increased by a rapidly expanding business. The condition in this respect is naturally least satisfactory in New York City where sufficient room and floor space is difficult to secure.

3. The returns of labor organizations imply, occasionally, sanitary conditions in need of improvement. Personal inspections have revealed that insanitary conditions are chiefly inherent in old printing plants which only with great difficulty can be adapted to modern requirements, but this type of plant is rapidly passing.

4. The returns of employers and employees regarding the incidence of tuberculosis must be accepted with reserve, for it was not feasible to make a medical examination of the employees to make sure of the facts, but, accepting the returns as they have been made from two independent sources, they indicate that tuberculosis is no longer a menace of serious proportions in the printing industry.

5. The incidence of lead poisoning was also found to have been much lower than had been anticipated. In this respect also the returns of employers and labor organizations confirm each other and are subsequently amplified by a detailed study of the vital statistics for the printing trades, presently to be referred to.

6. The special returns for aged printers, concerned with some 728 workers aged 60 years and over and an average trade life of 44

years, prove conclusively that long, continuous employment in the printing trades is not incompatible with reasonably good health. The specific ailments revealed by the investigation are such as would normally be expected among any group of aged wageworkers and are not peculiar to the printing trades. Here, again, the incidence of chronic lead poisoning is surprisingly small.

7. The printing-plant inspections reported on in detail in Bulletin No. 392, which represent an important phase of the present investigation carried on in cooperation with the United States Bureau of Labor Statistics, reveal defects in many instances suggestive of improvements, but the conclusions on the whole are not in contradiction to the conclusions independently arrived at as the result of the survey comprehending the larger aspects of the problem.

8. A special study of the photo-engraving plants proved inconclusive in view of the highly technical nature of the problems that would require consideration. In a general way, however, such plants as were inspected and reported upon conform to printing plants generally in meeting reasonably satisfactory sanitary requirements.

9. The physical and medical examination of printing employees revealed nothing of particularly striking importance. The men examined were apparently of good normal physique, their measurements corresponding to those of the soldiers discharged at the close of the World War. Tubercular printers, however, were generally found to be of somewhat inferior physique, suggestive of the great practical value of a periodical medical examination, particularly of young printers, for the purpose of eliminating persons physically unsuitable for the work required.

10. The physical and medical examinations brought out a fairly common occurrence of visual defects, probably in many cases the result of ill-adjusted posture. Printers who are above the average in stature, unless properly provided with suitable seating facilities, may develop spinal curvature, which is fairly common and closely correlated to eye strain and other visual defects. This result of the survey is perhaps one of the most important, in that it admits of remedial measures easily within the reach of even small printing plants, upon whom should fall the duty of adequately protecting workers in this direction. Periodical eye examinations are urgently called for as a measure of prevention of eye injuries causing not only much physical discomfort and related ills, but also an early decline in working capacity. The conservation of eyesight in the printing trades is, in my judgment, one of the most pressing needs of the present situation.

11. It was not feasible to make an extended technical study of the conditions of artificial illumination, but such investigations as were made conformed to the foregoing conclusions. Fortunately, in many modern printing plants adequate provision for artificial lighting is now the rule rather than the exception, but there are reasons for believing that many modern installations fall short of what is actually required and most important. Some special studies for this purpose were made in connection with the survey of the Nela Park Laboratories, but it has not been thought advisable to give extended consideration to those studies, because of the relatively small number of plants considered.

12. Like observations apply to the question of dust and ventilation. It was not feasible, in view of the large amount of information dealt

with, to go thoroughly into this highly specialized phase of the situation. Some investigations as to the nature of the dust in printing trades were made for the survey through the courteous cooperation of the United States Bureau of Mines, but here again the number of plants inspected was too small for a safe generalization. Nevertheless, the conclusion would seem justified that conditions as to dust and ventilation in most modern printing plants are at least reasonably satisfactory.

13. Special attention was given to the question of lead poisoning, but the evidence in this respect was mostly in the negative. The statistics presented, derived from widely different sources, seem to prove conclusively that chronic lead poisoning, while always a grave potential danger, demanding painstaking attention to all matters that bear upon its successful prevention, is now, at least in fatal form, of minor importance. The foregoing is confirmed by an independent study of deaths from lead poisoning which will shortly be available through the United States Bureau of Labor Statistics, representing an analysis of every death from lead poisoning reported to the division of vital statistics of the United States Census Office for the 10 years ending with 1924. For 1925, that office reports only five deaths from chronic lead poisoning among persons in the printing trades out of an aggregate of some 300,000 printers employed in different capacities. The deaths represent one proof reader aged 62, one typesetter aged 62, one printer aged 54, one electrotyper aged 56, and one printer aged 57. These deaths occurred in Toledo; Philadelphia; West Warwick, R. I.; Somerville, Mass.; and Monona, Iowa. While the evidence is therefore most gratifying as regards a substantial reduction of the liability of chronic lead poisoning in the printing trades, conditions of the plants otherwise inspected clearly suggest the necessity of every mode of precaution to prevent its occurrence, since it is an ever-present potential risk.

14. Finally, the question of tuberculosis naturally received extended consideration. Perhaps the most significant statistics are those of the International Typographical Union for 1912–1923. Dividing this period into two, it appears that during 1912–1918 the proportionate mortality from tuberculosis was 20.9 per cent, while during 1919–1923 it was only 14.9 per cent. Particularly gratifying is the reduction in the proportionate mortality during the early years of life or, say, ages 20 to 24, and the greater reduction during ages 25 to 29. During 1912–1918, the percentage deaths from tuberculosis were of deaths from all causes during the age period 20 to 24 years was 36.4, while during 1919–1923 it was only 32.9; during 1912–1918 the percentage for the age period 30 to 34 was 45.0, while during 1919–1923 the percentage was only 27.4. The tables presented afford every opportunity for a thorough study of the mortality situation. It should be said in this connection that the decline in tuberculosis among persons employed in the printing trades conforms in a general way to the observed decline in the population at large. It was unfortunately not feasible to calculate precise rates of incidence by age on the basis of the number of employees, but this may be possible some time in the future, now that the mortality data are available in a consolidated and strictly comparable form. But the evidence would appear to be incontrovertible that tuberculosis has not at present the significance attached to it which it

had in former years. The risk of tuberculosis as the result of unsatisfactory working conditions, defective posture, and possible dust exposure is an ever-present one, suggestive of the advisability of a periodical medical examination of all persons in the printing trades, and particularly of compositors and machine operators.

15. The mortality analysis reveals one striking phase of the present health situation, and that is the higher proportions of deaths from cancer at the present time compared with the past. According to the statistics of the International Typographical Union, during 1912–1918 the proportion of deaths from cancer was 4.2 per cent, while during 1919–1923 it was 8.2 per cent. In this respect the mortality of printers conforms to that of the general population, among whom cancer has been persistently on the increase for a long period of time. While cancer can not be prevented in most cases, it is possible by means of an early diagnosis and an early operation or other methods of qualified treatment to prolong the life of cancer patients for a number of years. Here again the value of periodical medical examinations is obvious, but it should be amplified by cancer instructions to adult printers on the basis of the best judgment of the medical and surgical profession.

16. In the case of the International Typographical Union the mortality data have been brought down to the end of 1925. It is regrettable that in quite a number of deaths the information is so indefinite both as to age and cause of death as not to permit of tabulation and analysis. It can not be too strongly urged upon labor organizations maintaining mortuary funds that they insist in all cases upon official standard death certificates and give the resulting information in detail in their monthly or annual reports. The organizations do not seem to realize the great practical value of this information, especially when it extends over a long period of years.

17. An attempt was made to ascertain the extent of occupational skin disease among printers, but the results were inconclusive for the purpose. It is quite probable that such affections are fairly common in certain highly specialized occupations of the printing trades and it may be possible to go further into this matter in the future. In any event the affliction is not one of very serious significance in its bearing upon the general health of printing plant employees. According to an investigation by the United States Public Health Service preventive measures should be easily applicable to conditions under which the affliction may arise.

18. The foregoing observations indicate in a general way a satisfactory state of health in the printing trades, suggestive of very material progress in sanitary conditions in those trades and the control of conditions likely to give rise to objectionable features bearing upon health and longevity. But at best such an investigation is largely a cross section, the value of which becomes apparent only when comparison is made with more recent data which should be collected and brought together in a similar manner. In other words, if such a survey were continuous, it would reveal the trend or the tendency toward better or worse, as the case might prove to be, with reasonable accuracy. It is, therefore, to be hoped that further investigations will be authorized by the various interests concerned so that the printing trades and the labor organizations affected may be in full possession of current facts useful for current purposes.

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APPENDIXES

APPENDIX A.—QUESTIONNAIRES USED IN THIS SURVEY

U. S. DEPARTMENT OF LABOR

BUREAU OF LABOR STATISTICS

IN COOPERATION WITH THE

INTERNATIONAL JOINT CONFERENCE COUNCIL OF THE PRINTING INDUSTRY

HYGIENE OF THE PRINTING TRADES

EMPLOYER'S QUESTIONNAIRE

1. Name of firm.....
2. Location ..... (No. and Street.) (City.) (State.)
3. Person furnishing data.....
4. Kind of printing done.....
5. Wage earners in mechanical department on....., 1922. (Date.)

Occupation.	Wage earners actually working this date.	Regular wage earners absent on this date on account of—			Total regular wage earners working and absent.	Wage earners aged 60 years or over.
		Sickness.	Vacation.	Other reasons.		
Hand compositors						
Linotype operators						
Monotype operators						
Monotype casters						
Makers-up and stone hands						
Proof readers						
Electrotypers						
Stereotypers						
Photo-engravers						
Plate printers						
Lithographers						
Pressmen						
Press feeders and assistants						
Other machinery employees						
Bookbinders						
Apprentices						
Other employees						

(OVER)

6. Regular working hours per day:

(a) Day work—Mon. ....., Tu. ....., Wed. ....., Th. ....., Fri. ....., Sat. ....., Sun. .....

(b) Night work—Mon. ....., Tu. ....., Wed. ....., Th. ....., Fri. ....., Sat. ....., Sun. .....

(c) If hours vary in the several trades, please report.....

.....

.....

.....

7. Explain provision for regular lay off one day (or more or less) per week, for each trade.....

.....

.....

.....

.....

.....

8. Name and describe ventilating devices in use in your plant.....

.....

.....

9. How many wage-earning employees have been ill (to the extent of losing any time) in the past year—

(a) From lead poisoning? .....

(b) From tuberculosis? .....

(c) From eye trouble? .....

10. How many times in the past year has your plant been inspected—

(a) By factory inspector? .....

(b) By State or local health authority? .....

11. Specify the accidents (causing loss of any time) that have occurred in plant to wage earners during the past year, stating character of injury and cause:

.....

.....

.....

.....

.....

12. Do you carry compensation insurance? .....

13. Do you carry group insurance? .....

14. Do your wage-earning employees have a sick or accident fund? .....

NOTE.—This investigation of the health conditions in the Printing Industry is being undertaken in cooperation with the International Joint Conference Council of the Printing Industry, which represents both employer and employee organizations as follows: *Employer Organizations:* Closed Shop Branch of the United Typothetæ of America, International Association of Employing Electrotypers, *Employee Organizations:* International Typographical Union, International Printing Pressmen's and Assistants' Union, International Brotherhood of Bookbinders, International Stereotypers and Electrotypers Union. The International Photo-Engravers Union though not a member of the International Joint Conference, is also cooperating.

GOVERNMENT PRINTING OFFICE

U. S. DEPARTMENT OF LABOR

BUREAU OF LABOR STATISTICS

IN COOPERATION WITH THE

INTERNATIONAL JOINT CONFERENCE COUNCIL OF THE PRINTING INDUSTRY

HYGIENE OF THE PRINTING TRADES

LABOR ORGANIZATION'S QUESTIONNAIRE

1. Name of organization .....
2. Date when organized.....
3. Number of members October 1, 1922.....
4. Number of members out of employment October 1, 1922 .....
5. Number of members on sick pay.....
6. Number of members receiving old-age pensions.....
7. Number of members less than five years in the trade.....
8. Number of members five and less than ten years in the trade .....
9. Number of members ten and less than fifteen years in the trade .....
10. Number of members fifteen years and longer in the trade.....
11. Number of members sixty years of age and over.....
12. Have you a sick-benefit fund? .....
13. Have you a mortuary benefit or insurance fund? .....
14. Have you a pension fund and system? .....
15. Number of deaths among your members during 1921.....
16. Number of deaths from pulmonary tuberculosis during 1921.....
17. Number of deaths from other respiratory diseases during 1921.....
18. Number of cases of lead poisoning during 1921 .....
19. Number of serious accidents during 1921.....
20. Have you any specific complaint to make regarding health conditions in the printing plants of your locality? .....

Signature.....

Address.....

Date.....

NOTE.—This investigation of the health conditions in the Printing Industry is being undertaken in cooperation with the International Joint Conference Council of the Printing Industry, which represents both employer and employee organizations as follows: *Employer Organizations:* Closed Shop Branch of the United Typothetæ of America, International Association of Employing Electrotypers; *Employee Organizations:* International Typographical Union, International Printing Pressmen's and Assistants' Union, International Brotherhood of Bookbinders, International Stereotypers and Electrotypers Union. The International Photo-Engravers Union, though not a member of the International Joint Conference, is also cooperating.

U. S. DEPARTMENT OF LABOR

BUREAU OF LABOR STATISTICS

IN COOPERATION WITH THE

INTERNATIONAL JOINT CONFERENCE COUNCIL OF THE PRINTING INDUSTRY

[Form prepared and used by the Health Department of the District of Columbia in the sanitary inspection of printing establishments.]

INSTRUCTIONS TO THE INSPECTOR.—The inspector will devote so much time to the filling in of this schedule as the circumstances of the case require. His work should be done with the least possible interference with the work of the establishment. It is not expected that he will in any case be able to fill in this schedule at a single visit. The inspector will ask instructions from the Health Officer, the Assistant Health Officer, and the Chief Sanitary Inspector from time to time as his work progresses, whenever he deems it desirable

Establishment named .....

Located at .....

Owned by .....

Managed by .....

I. BUILDING.

Structure: Frame ..... Brick, stone, or concrete ..... Kind of floors .....

Stories high .....

Fire protection:

Automatic sprinkler system .....

Fire hose ..... Where located .....

Fire extinguishers: Kind ..... Number .....

Where located .....

Fire alarm system: Kind .....

Are stairways walled against fire? .....

Fire escapes .....

To what use is the portion of building put which is not used for this printing establishment? .....

.....

Is it clean and in a generally satisfactory condition? .....

.....

Remarks .....

.....

.....

2

II. COMPOSING ROOM

Where located? .....

What varieties of work are done in this room? .....

.....

	Material.	Structural condition.	Cleaning.		Condition as to cleanliness.
			Method.	Frequency.	
Walls					
Floors					
Ceilings					

Floor area.....square feet.

Height of ceiling .....feet.

Air space .....cubic feet.

Ventilation:

	Number.	Location.	Total area.
Windows			
Total			

	Number.	Location.	Total area.
Doors			
Total			

Artificial ventilation: Yes ..... No. .....

	Number of fans.	Diameters.
Plenum system		
Exhaust system		

Other mechanical contrivances .....

Nature and extent of odors.....

Does room seem adequately ventilated? .....

.....

Remarks.....

.....

.....

3

Lighting:

Windows and doors. (See also *Ventilation.*)

Condition of windows as to cleanliness .....

Are window shades provided? .....

Are awnings provided? .....

Does natural light seem adequate? .....

Time of inspection.		Condition of atmosphere.			Remarks.
Day.	Hour.	Bright.	Dull.	Dark.	

(Report should cover at least three inspections, avoiding the same hour and day of same type.)

Artificial light:

Kind { Gas: ..... Open flame? ..... Mantle? .....
Electricity: Arc? ..... Carbon filament? ..... Tungsten? ..... Nitrogen? .....

Number of burners or globes? .....

Location of lights? .....

Total candle power .....

What is done to obtain proper distribution of light? .....

.....

What is done to prevent glare? .....

Does artificial light satisfactorily make up for deficiencies of natural lighting? .....

To what extent is night work done? .....

Remarks.....

.....

Heating:

Hot air? ..... Hot water? ..... Steam: Direct ....., indirect, ..., combined .....

Are facilities for heating adequate? .....

Are facilities for carrying off surplus heat from machines, etc., adequate? .....

Are thermometers in use for regulating temperature? .....

Is automatic heat regulation in use? .....

Remarks.....

.....

4

III. EQUIPMENT.

	Piped to carry off heat and gases.		Not piped.	Total.
	Number satisfactory.	Number unsatisfactory.		
Linotype machines				
Monotype machines				
Casters				
Remelting furnace				

Is remelting furnace in composing room? .....

Can linotype pots be closed? ..... Were they found closed at times of inspections? .....

How are linotype pots heated: Gas? ..... Electricity? .....

How are linotype plungers cleaned? .....

.....

Was scrap lead found on floor about machines at times of inspections? .....

.....

Keyboards: Number ..... Kind .....

Cases: Number ..... Kind .....

Are bottoms of cases set flush with floor? .....

On sanitary leg base? ..... If not, how high is bottom of case above floor? .....

How are cases cleaned? .....

.....

Condition as to cleanliness at times of inspections? .....

.....

Was space under cases clean at times of inspections? .....

How are type cleaned: Potash? ..... Benzine? .....

Remarks .....

.....

.....

.....

.....

5

IV. SANITARY PROVISIONS FOR EMPLOYEES.

Toilet accommodations:

For males:

Location.....

	Number.	Structural conditions.	Condition as to cleanliness.
Water-closets			
Urinals			

Spigots for washing hands, etc.:

Location.....

Number ..... Hot water?..... Cold water?.....

Shower baths? .....

Towels:

Number ..... Kind ..... Frequency of changing .....

Condition as to cleanliness?.....

Spittoons:

Number ..... Kind ..... How cared for .....

For females:

Location.....

	Number.	Structural conditions.	Condition as to cleanliness.
Water-closets			

Spigots for washing hands, etc.:

Location.....

Number ..... Hot water?..... Cold water?.....

Shower baths? .....

Towels:

Number ..... Kind ..... Frequency of changing .....

Condition as to cleanliness?.....

Are toilet accommodations adequate?.....

Are toilet accommodations in good condition?.....

Remarks.....

.....

.....

.....

6

IV. SANITARY PROVISIONS FOR EMPLOYEES—Concluded.

Is a dressing room provided—

For males? ..... For females? .....

Are lockers provided:

Number ..... Kind .....

Location ..... Condition as to cleanliness .....

Is a lunch room provided? .....

Location .....

Is it screened? .....

Nature of accommodations? .....

Drinking water—How secured:

Bubbling fountains? ..... Number .....

Ice coolers? ..... Number ..... Kind? .....

How cleaned? .....

How frequently cleaned? .....

Common drinking cups ..... Number ..... Kind? .....

How cleaned? .....

How frequently cleaned? .....

Individual drinking cups? .....

Remarks .....

Is washing of hands compulsory? ..... Of face? .....

Are rules posted for sanitary guidance of employees? .....

If so, how enforced? .....

If not, are recommendations posted? .....

Obtain a copy of any such regulations or recommendations, if practicable.

Are medical examinations of employees required? .....

If so, how are they provided for? .....

Is there any professional supervision over sanitary conditions of the establishment? .....

If so, what? .....

Remarks .....

.....

.....

7

V. EMPLOYEES.

	Hand composition.	Machine composition.	Other work.	Total.
Number of males				
Number of females				
TOTAL				

State, per employee:

Floor space ..... square feet. Air space ..... cubic feet. Window area ..... square feet.

Lockers ..... Drinking cups ..... Towels .....

Water-closets for males, per male employee ..... Urinals, per male employee .....

Water-closets for females, per female employee .....

Number of tuberculous employees, known to the manager as such? .....

Precautions taken against the spread of the disease .....

.....

Remarks .....

.....

.....

VI. RECOMMENDATIONS.

(NOTE.—Embody each recommendation in a separate paragraph and number the paragraphs serially.)

.....

.....

.....

.....

.....

.....

.....

.....

.....

Sanitary Inspector.

Date .....

GOVERNMENT PRINTING OFFICE

16056°—27——10

U. S. DEPARTMENT OF LABOR

BUREAU OF LABOR STATISTICS

IN COOPERATION WITH THE

INTERNATIONAL JOINT CONFERENCE COUNCIL OF THE PRINTING INDUSTRY

QUESTIONNAIRE FOR PHOTO-ENGRAVING PLANTS

Name of firm .....

Located at ..... (Number and street) ..... (City) ..... (State)

Person furnishing data .....

I. BUILDING

Structure: Frame ..... Brick, stone, or concrete ..... Kind of floors .....

Stories high .....

Floor or floors on which establishment is located .....

.....

Fire protection:

Automatic sprinkler system .....

Fire hose ..... Where located .....

Fire extinguishers: Kind ..... Number .....

Where located .....

Fire alarm system: Kind .....

Are stairways walled against fire? .....

Fire escapes .....

To what use is the portion of building put which is not used for photo-engraving establishment? .....

.....

Is it clean and in a generally satisfactory condition? .....

.....

2

Do surrounding buildings obstruct light or ventilation?.....

.....

.....

II. SEPARATION OF DEPARTMENTS

Extent of separation? .....

.....

.....

What varieties of work are done in each room, if several departments are together? .....

.....

.....

.....

	Material	Structural condition	Cleaning		Condition as to cleanliness
			Method	Frequency	
Walls.....					
Floors.....					
Ceilings.....					

Floor area.....square feet.

Height of ceiling.....feet.

Air space.....cubic feet.

Ventilation:

	Number	Location	Total area
Windows.....			
Total.....			

	Number	Location	Total area
Doors.....			
Total.....			

3

Describe method of artificial ventilation in:

Galleries .....

Dark rooms .....

Chemical mixing rooms .....

Printing rooms .....

Glass washing rooms .....

Twirler rooms .....

Zinc etching rooms .....

Copper etching rooms .....

Finishing rooms .....

Blocking rooms .....

Proving rooms .....

Are windows opened regularly to air shop? ..... If so, state when .....

.....

Describe style of special heat exhausts or fume exhausts, if any, on:

Arc lamps .....

Silver baths .....

Hot plates .....

Drying cabinets .....

Twirlers .....

Etching machines .....

Etching tubs .....

Sinks .....

Are dark rooms located by outside walls or in center of rooms? .....

.....

Are gas masks provided, and used, for any part of work? If so, state where .....

.....

Nature and extent of odors .....

.....

4

Do rooms seem adequately ventilated? .....

.....

Lighting:

Windows and doors. (See also *Ventilation.*)

Condition of windows as to cleanliness.....

Are window shades provided? .....

Are awnings provided?.....

Does natural light seem adequate? .....

Time of inspection		Condition of atmosphere			Remarks
Day	Hour	Bright	Dull	Dark	

(Report should cover at least three inspections, avoiding the same hour and day of same type.)

Artificial light:

Kind { Gas: ..... Open flame? ..... Mantle? .....
Electricity: Arc? ..... Carbon filament? ..... Tungsten? ..... Nitrogen? .....

Number of burners or globes? .....

Location of lights?.....

Total candlepower.....

What is done to obtain proper distribution of light? .....

.....

What is done to prevent glare? .....

Does artificial light satisfactorily make up for deficiencies of natural lighting? .....

To what extent is night work done? .....

Heating:

Hot air? ..... Hot water? ..... Steam: Direct ....., indirect ....., combined .....

Are facilities for heating adequate?.....

5

Heating—*Concluded.*

Is equipment such as silver baths, hot plates, drying cabinets, and twirlers heated by electricity or gas?

.....

.....

Are facilities for carrying off surplus heat from machines, etc., adequate? .....

Are thermometers in use for regulating temperature? .....

Is automatic heat regulation in use? .....

III. SANITARY PROVISIONS

How is dragon's blood kept and handled for use? .....

.....

Describe equipment used to prevent scattering, if any .....

.....

Describe equipment used for taking care of dust from machinery in routing and blocking rooms .....

.....

.....

.....

Are sinks properly flushed at all times? .....

Are footboards provided by sinks? .....

Toilet accommodations:

Location .....

Source of ventilation .....

	Number	Structural conditions	Condition as to cleanliness
Water-closets			
Urinals			

Spigots for washing hands, etc.:

Location .....

Number ..... Hot water? ..... Cold water? .....

6

Toilet accommodations—*Concluded.*

Shower baths? .....

Towels:

Number ..... Kind ..... Frequency of changing .....

Condition as to cleanliness? .....

Spittoons:

Number ..... Kind ..... How cared for .....

.....

Are toilet accommodations adequate? .....

Are toilet accommodations in good condition? .....

Is a dressing room provided? .....

Are lockers provided:

Number ..... Kind .....

Location ..... Condition as to cleanliness .....

Is a lunch room provided? .....

Location .....

Is it screened? .....

Nature of accommodations? .....

Drinking water:

How secured? .....

Bubbling fountains? ..... Number .....

Ice coolers? ..... Number ..... Kind .....

How cleaned? .....

How frequently cleaned? .....

Common drinking cups? ..... Number ..... Kind .....

How cleaned? .....

How frequently cleaned? .....

Individual drinking cups? .....

7

Drinking water—*Concluded.*

Remarks .....

.....

.....

Is washing of hands compulsory? ..... Of face? .....

Are employees permitted to eat in workrooms? ..... Is rule enforced? .....

Are employees permitted to smoke in workrooms? ..... Is rule enforced? .....

Are rules posted for sanitary guidance of employees? .....

If so, how enforced? .....

If not, are recommendations posted? .....

(Furnish a copy of any such regulations or recommendations, if practicable.)

Are medical examinations of employees required? .....

If so, how are they provided for? .....

Explain any professional supervision over sanitary conditions of the establishment? .....

.....

.....

IV. EMPLOYEES

Sex	Photographers and strippers	Halftone etchers and printers	Line etchers and printers	Engravers	Routers and blockers	Color artists	Proofers	Offset and photogravure	Others	Total
Number of males										
Number of females										
TOTAL										

V. GENERAL HEALTH

Is cyanide work performed in dark rooms or by sinks outside of these? .....

.....

Are rubber gloves provided, and used, for any part of work? If so, state where .....

Have there been any cases of cyanide poisoning in plant during past 5 years? .....

Have there been any cases of bichromate poisoning in plant during the past 5 years? .....

Have there been any cases of tuberculosis in plant during past 5 years? .....

8

Have there been any cases of other occupational diseases in plant during past 5 years? .....

Describe accidents in plant during past 5 years, if any .....

.....

.....

How is acid drawn from carboys? .....

Are carboys kept on stands? .....

Is mouth of carboy closed after drawing acid? .....

Are proper remedies on hand in case a carboy of acid is broken, and are all employees instructed how to proceed in such event? .....

.....

How are benzine and other inflammable rags kept? .....

.....

Date .....

U. S. DEPARTMENT OF LABOR

BUREAU OF LABOR STATISTICS

IN COOPERATION WITH THE

INTERNATIONAL JOINT CONFERENCE COUNCIL OF THE PRINTING INDUSTRY

HYGIENE OF THE PRINTING TRADES

QUESTIONNAIRE FOR AGED PRINTERS

1. Name .....

2. Address .....

3. Year of birth.....

4. Place of birth.....

5. Years in the printing trade .....

6. Specific occupation now followed.....

7. Present condition of health.....

8. Record of past cases of sickness.....

9. If formerly or now afflicted with tuberculosis, state details .....

.....

.....

.....

10. If any sickness attributable to the trade, state details.....

.....

.....

.....

11. Present condition of eyesight.....

12. Ever suffered from lead or other industrial poisoning? .....

NOTE.—This investigation of the health conditions in the Printing Industry is being undertaken in cooperation with the International Joint Conference Council of the Printing Industry, which represents both employer and employee organizations as follows: *Employer Organizations:* Closed Shop Branch of the United Typothetæ of America, International Association of Employing Electrotypers; *Employee Organizations:* International Typographical Union, International Printing Pressmen's and Assistants' Union, International Brotherhood of Bookbinders, International Stereotypers and Electrotypers Union. The International Photo-Engravers Union, though not a member of the International Joint Conference, is also cooperating.

GOVERNMENT PRINTING OFFICE

APPENDIX B.—PRECAUTIONS NECESSARY TO SAFEGUARD THE HEALTH OF PRINTERS

The New York City department of health, through its division of industrial hygiene, issued a placard prepared to show the precautions for printers necessary to safeguard the health. The placard was generally distributed to all union printing shops in New York City by the printers' organizations. The placard is here reproduced in full:

PRECAUTIONS FOR PRINTERS

Hoods must be placed over linotype metal pots and have pipes connecting.

Remember, pig lead used in linotyping is softer than lead of type. Handle it as little as possible.

Drop pig lead carefully into melting pot. Splashings of molten lead dry later and become lead dust.

Do not shake crucible in order to blend molten lead better. It will blend of itself.

Plungers on linotype machines should never be cleaned in the workroom. Clean them in boxes in the open air. Avoid inhaling the dust.

Graphite used for lubricating is not poisonous, but all dust is irritating to the lungs.

Avoid lead dust as much as possible when trimming and mitering, or when sawing.

Remove lead dust from type cases in the open air, or by means of a vacuum cleaner.

Never put type into the mouth, or moisten fingers to get better hold of type.

Benzine and lye are skin irritants. Use them with care.

Insist upon having good ventilation in the office or factory, and insist that floors should not be swept during working hours.

Suggest to your employer that walls and ceilings of workroom, if not of smooth, washable surface, should be limewashed once a year; that close-fitting floors which can be cleaned by moist methods are desirable; and that type cases should fit closely on the floor or have legs high enough to brush under.

Eat a good breakfast before beginning work. Food in the stomach, especially milk, helps to prevent lead poisoning.

Do not eat food, or use tobacco, while at work unless your hands are first carefully washed, because of the danger of getting lead into the mouth. Do not use a "common" drinking cup; such a cup may be employed by a tuberculous or otherwise infected person. Wash hands thoroughly with warm water and soap. Have your own towel and soap. Rinse the mouth and clean the finger nails before eating.

Don't spit on the floor. Use cuspidors and see that they are cleaned daily.

Eat your lunch outside the workroom.

Do not wear working clothes too long without change.

Hang street clothes where they will not be exposed to the dust of the workroom.

Gas and electric lights should be shaded to prevent a glare. The eyes should be examined from time to time by a competent physician. Avoid ruining your sight by giving early attention to eyestrain. Headaches, blurred vision, red and inflamed eyes, dancing spots before the eyes, twitching of the eyelids, are some of the first signs of eyestrain.

Insufficient light may impair the general health.

Bathe frequently, and brush the teeth each night.

Avoid alcohol. It increases the danger of lead poisoning.

Have a good bowel movement each day.

Exercise in the fresh air as much as possible.

Be examined by a doctor occasionally to protect yourself against the effects of your trade.