U. S. DEPARTMENT OF LABOR
JAMES J. DAVIS, Secretary
CHILDREN'S BUREAU
GRACE ABBOTT, Chief

INDUSTRIAL ACCIDENTS TO EMPLOYED MINORS IN WISCONSIN, MASSACHUSETTS, AND NEW JERSEY

By

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LETTER OF TRANSMITTAL

U. S. DEPARTMENT OF LABOR,
CHILDREN'S BUREAU,
Washington, August 10, 1925.

SIR: There is transmitted herewith a report on industrial accidents to employed minors in Wisconsin, Massachusetts, and New Jersey, based on a study of records on file with the industrial-accident boards of those States. The statistical material was assembled and analyzed, and the report written, by Edith S. Gray, of the statistical division of the Children's Bureau, under the general direction of Dr. Robert M. Woodbury, then director of that division.

The Children's Bureau acknowledges with appreciation the interest and cooperation of the officials of the Industrial Commission of Wisconsin, the Department of Industrial Accidents of Massachusetts, and the Workmen's Compensation Bureau of New Jersey, who allowed access to their files.

Respectfully submitted.

GRACE ABBOTT, *Chief.*

Hon. JAMES J. DAVIS,
Secretary of Labor.

INDUSTRIAL ACCIDENTS TO EMPLOYED MINORS IN WISCONSIN, MASSACHUSETTS, AND NEW JERSEY

INTRODUCTION

This report presents the results of a study of industrial injuries to employed minors in Wisconsin, Massachusetts, and New Jersey, with especial reference to the causes of such injuries and to their economic and social effects.

These three States give their young workers a considerable degree of special protection. Each has a minimum age limit for the employment of children, prohibits their employment under specified ages in certain dangerous occupations, and does educational work looking toward the prevention of accidents through continuation schools which young workers are required to attend. Moreover their minors benefit equally with their adult workers from the protection afforded through laws regulating the safety and sanitation of work places, and from the stimulus which workmen's compensation legislation, in these States as in many others, has given to efforts to reduce the risk of industrial injury.

Yet the records covering a 12 months' period in each State [1] show a total of 7,478 industrial accidents to employed minors, resulting in 38 deaths, 920 cases of partial disablement for life, and 6,520 cases of temporary disablement. These 7,478 cases, moreover, represent only the minors who were entitled to compensation under the law, and concerning whose injuries, therefore, complete records were made. Still other employed minors were injured, for the laws required compensation to be paid only to those workers whose injury caused disability lasting beyond the waiting period of a specified number of days—in Wisconsin 7 days, in Massachusetts and New Jersey 10 days.[2] The total number of injured therefore was much larger than the number who received compensation.[3] Moreover, not all employments are covered by the compensation laws,[4] nor are all employers compelled to come under their operation.[5]

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[1] The period covered by the study in Wisconsin and New Jersey was the year July 1, 1919, to June 30, 1920; in Massachusetts it was the year July 1, 1921, to June 30, 1922.

[2] Wisconsin, Stat. 1923, sec. 102.09, subsec. (2); Massachusetts, Gen. Laws 1921, ch. 152, sec. 29; New Jersey, Laws of 1911, ch. 95, Sec. II, subsec. 13, as amended by Laws of 1919, ch. 93, sec. 3. Since the date of this study the waiting period has been diminished to 7 days by statutory amendment in the latter two States (Massachusetts, Laws of 1923, ch. 163; New Jersey, Laws of 1925, ch. 163).

[3] In Massachusetts, of all the industrial injuries resulting in disability beyond the day, turn, or shift on which the accident occurred, one-third caused disability of not more than 7 days and two-fifths disability of not more than 10 days. (Mass., Annual Report of the Department of Industrial Accidents, 1922, Table X, p. 92.) Comparable figures on noncompensable injuries were not available for the other States covered by this study.

[4] It has been estimated that 75 per cent of the employees in Wisconsin, 87 per cent of the employees in Massachusetts, and 99 per cent of the employees in New Jersey are in employments covered by the act. See Comparison of Compensation Laws of the United States and Canada up to Jan. 1, 1920, p. 31 (U. S. Bureau of Labor Statistics Bulletin No. 275, Washington, 1920).

[5] In all three States the compensation act is elective, that is, the employer has the option of either accepting or rejecting it. In Massachusetts and Wisconsin, however, the employer who rejects is deprived of the customary common-law defenses in case of a suit for damages, i. e., assumed risk, fellow service, and contributory negligence, and in New Jersey the abrogation of these defenses is absolute and does not depend upon rejection of the act. In Wisconsin and New Jersey the defense of contributory negligence is not abrogated if the negligence was willful; in Massachusetts this defense is abrogated unqualifiedly. The employee also has the right to accept or reject the act. See Wisconsin, Stat. 1923, sec. 102.01, subsec. (1); Massachusetts, Gen. Laws 1921, ch. 152, sec. 66; New Jersey, Laws of 1911, ch. 95, Sec. I, subsec. 2.

The obligation of the State to protect all young workers is well stated by the chairman of the Wisconsin Industrial Commission:[6]

Objection to the child labor law usually arises out of the fact that the child is not permitted to work at the particular kind of work he has selected. These prohibitions arise because of the danger of the occupation. There are industries of such proven hazard that no child should be permitted to enter them. The accident or other dangerous conditions that made such prohibitions necessary have been demonstrated by years of experience. No promise of supervision by strangers can justify the certification of a child into a work place from the hazards of which adults find difficulty in protecting themselves. Children are children, and they may not be depended upon to appreciate or guard against grave industrial dangers. The moral obligation of the State, knowing these hazards, is to prohibit employment of children in them. That is the safe and sane course. There are many employments open to them which are comparatively safe. If they are to enter industry their job should be in safe surroundings. Hazardous employment should be left to the employee who has reached or at least approaches the age of discretion.

[6] Wilcox, Fred M. (chairman, Industrial Commission of Wisconsin): "The industrial commission and its functions" (to be published in The History of Wisconsin). (In manuscript.)

STATE RECORDS OF INDUSTRIAL ACCIDENTS TO EMPLOYED MINORS

The records upon which this discussion is based were obtained from the files of the State boards charged with the enforcement of the workmen's compensation laws [1]—in Wisconsin the Industrial Commission, in Massachusetts the Department of Industrial Accidents, and in New Jersey the Workmen's Compensation Bureau. These three States were chosen for study because they are industrial States employing large numbers of minors, because they have good laws for the protection of their young workers, and because their records were so filed and indexed that the accidents to minors could readily be located. Because the three States differ in their industries, the occupations in which minors are employed, the kinds of work prohibited to minors by their child labor laws, and the provisions of their compensation laws, the data in regard to each State are presented separately.

In the analyses of these accidents to minors emphasis has been placed upon their causes, since an accurate knowledge of these causes constitutes the only adequate basis for further preventive measures. The classification of causes of injury used is that recommended by a special committee of the International Association of Industrial Accident Boards and Commissions,[2] with slight modifications made necessary by the varying conditions in each State. In accordance with the committee's recommendation, also, the accidents have been assigned to the proximate or immediate cause, defined as follows: "That the accident should be charged to that condition or circumstance the absence of which would have prevented the accident; but if there be more than one such condition or circumstance, then to the one most easily prevented." An illustration given by the committee to make clear the meaning of the rule is that of a workman passing through an aisle who "stumbles upon a defective floor and throws his hand into an open gear which mashes off two of his fingers. Under the rule adopted this accident is to be charged to the gear and not to stumbling. Had the gear been properly covered the workman might still have been injured by his fall, but the injury which did occur, namely, the loss of two fingers, would not have happened."

[1] The records of such State boards constitute practically the only general source of statistics of industrial accidents to minors. Comparatively little of this information, however, is available in published reports. See Appendix C, p. 110, for an annotated list of references on industrial accidents to employed minors in the United States.

[2] Standardization of Industrial Accident Statistics, pp. 32-51. Reports of the Committee on Statistics and Compensation Insurance Cost of the International Association of Industrial Accident Boards and Commissions. U. S. Bureau of Labor Statistics Bulletin No. 276. Washington, 1920.

WISCONSIN

INDUSTRIES OPEN TO MINORS

The Federal census of 1920 shows that in Wisconsin 34.1 per cent (339,811) of the gainfully occupied persons of 10 years and over were engaged in manufacturing and mechanical industries and 30.9 per cent (308,050) in agriculture, forestry, and animal husbandry. The metal industries employed over one-third of all wage earners engaged in manufacturing industries, with lumber and furniture (16.1 per cent), food (8.5 per cent), and paper and wood pulp (4.8 per cent) ranking next. Textiles, chiefly knit goods, were fifth in number of wage earners employed. The 10 manufacturing industries employing the largest number of wage earners were lumber and timber products, foundry and machine-shop products, engines (steam, gas, and water), paper and wood pulp, car and railroad shops, furniture, automobiles, knit goods, boots and shoes, and leather.[1]

The child labor law prohibited the employment of children under 14 years of age [2] and required minors under 17 to obtain labor permits in order to be employed legally; the employment of minors under 16 in certain dangerous occupations and the employment of those under 18 in certain others was also prohibited.[3]

Of the total number of persons employed under 20 years of age,[4] namely, 114,094 (as of January 1, 1920), 35.7 per cent were engaged in manufacturing and mechanical industries, 28.4 per cent in agriculture, forestry, and animal husbandry. A slightly larger proportion of the working minors under 20 than of the workers 20 years of age and over was evidently engaged in manufacturing and mechanical industries, as seen by comparison with the figures for the total of occupied persons 10 years of age and over given above; and a slightly smaller proportion of the younger group than of the older was to be found in agricultural pursuits.

EXTENT OF DISABILITY FROM INDUSTRIAL INJURY

The 2,282 compensable injuries to minors under 21 years of age during the period under consideration resulted in 12 deaths, 259 cases of permanent partial disability, and 2,011 cases of temporary disability. The duration of nearly half (49.4 per cent) the cases of temporary disability was but two weeks or less, only 18 per cent lasting longer than four weeks. The duration of disability was in general somewhat longer for the younger workers than for the older ones. Three-fourths (74.3 per cent) of the temporary disabilities of the group of workers 14 and 15 years old terminated in four weeks or less, as com-

[1] Fourteenth Census of the United States, 1920, Vol. IV, Population, pp. 1042, 1045; Vol. IX, Manufactures, pp. 1612, 1613. Washington, 1923.

[2] Except that the employment of children between 12 and 14 years of age in certain occupations (but not in manufacturing or mechanical establishments) was permitted during school vacations. Agricultural pursuits were exempted from the operation of the law.

[3] Wisconsin, Stat. 1923, sec. 103.05, subsec. 4. See also Appendix B, p. 105.

[4] The number of persons employed under 21 years of age is not available because the census includes those 20 years of age in the group of persons 20 to 24 years of age.

pared with over four-fifths of the temporary disabilities to the groups of workers 16 and 17 years old, and those between 18 and 21 years of age (83.7 per cent and 81.8 per cent respectively). Disability continuing from four weeks to two months constituted 21.9 per cent of the temporary injuries to workers 14 and 15 years old, 14.1 per cent to those 16 and 17 years old, and 14.8 per cent of those to the group between 18 and 21 years of age.

Extent of disability varied but slightly with sex and with age. A slightly higher proportion of the injuries to girls was followed by death or permanent partial disability than of the injuries to boys. The percentage of permanent partial disability resulting from injuries to minors 16 and 17 years old (9.6 per cent) was somewhat lower than that of such disability resulting from injuries to minors under 16 years or to those of 18 years and over (11.8 per cent in each group).

Table 1 shows the extent of disability from industrial injuries to minors, by sex of the injured. Table 2 shows the extent of disability from industrial injuries to minors, by age of the injured.

TABLE 1.—*Extent of disability from industrial injuries to minors, by sex of injured: Wisconsin*

Extent of disability	Industrial injuries to minors					
	Total		Boys		Girls	
	Number	Per cent distribution	Number	Per cent distribution	Number	Per cent distribution
Total	2,282	100.0	2,009	100.0	273	100.0
Death	12	.5	9	.4	3	1.1
Permanent partial	259	11.3	225	11.2	34	12.5
Temporary	2,011	88.1	1,775	88.4	236	86.4

TABLE 2.—*Extent of disability from industrial injuries to minors, by age of injured: Wisconsin*

Age of injured	Industrial injuries to minors						
	Total	Extent of disability					
		Death		Permanent partial		Temporary	
		Number	Per cent [1]	Number	Per cent [1]	Number	Per cent [1]
Total	[2] 2,282	12	0.5	[2] 259	11.3	2,011	88.1
14 years	26	----	----	4	----	22	----
15 years	93	----	----	10	10.8	83	89.2
16 years	[3] 216	----	----	17	7.9	199	92.1
17 years	292	1	.3	32	11.0	259	88.7
18 years	544	3	.6	66	12.1	475	87.3
19 years	587	5	.9	72	12.3	510	86.9
20 years	523	3	.6	57	10.9	463	88.3

[1] Not shown where base is less than 50.
[2] Includes 1 injury to a minor whose age was not reported.
[3] Includes 6 injuries to minors under 17 years, age not otherwise specified.

The Wisconsin accident reports showed slight differences between minors under 21 and workers of all ages in the extent of disability. The total number of compensable injuries reported in 1920 was 16,246. There were 171 fatal accidents, 15 permanent total disabilities, 1,620 permanent partial disabilities, and 14,440 temporary injuries. Of the total industrial accidents 1.1 per cent caused death; of those to minors 0.5 per cent caused death. The proportion of permanent partial disability among accidents to minors was higher than among accidents to all workers (11.3 per cent for minors, 10 per cent for the total). The percentage of temporary disability was practically the same for the two groups (88.1 per cent for minors, 88.9 per cent for the total), but 49.4 per cent of the cases of temporary disability affecting minors lasted two weeks or less as compared with 36.6 per cent of all cases of temporary disability.

LOCATION OF INJURY

Injuries to the head numbered 142, nearly one-half of which involved the eyes, impaired vision or loss of an eye resulting in 12 cases. There was one case of complete deafness in one ear. Four head injuries resulted in death.[5] Of the 142 injuries to the trunk, 7 caused death. Thirty-four of the injuries were hernias.

Two-thirds of the injuries were to the upper extremities. These consisted chiefly of injuries to the hands (1,219), causing 227 cases of permanent partial disability. There were 264 injuries to the elbow or lower arm, causing dismemberment in 4 cases and partial loss of use in 8 cases. There were 25 injuries of the shoulder and upper arm, resulting in 2 cases of permanent impairment of use.

One-fifth of the injuries were to the lower extremities. These consisted chiefly of injuries to the foot (259) and to the knee and lower leg (205). In only 20 cases was the injury to the leg above the knee. In 3 cases toes were amputated, in 2 there was permanent impairment of use of the leg; the other injuries to the lower extremities caused only temporary disability.

Table 3 shows the location of industrial injuries to Wisconsin minors. (See also Appendix A, Table II.)

TABLE 3.—*Location of industrial injuries to minors: Wisconsin*

Location of injury	Industrial injuries to minors		Location of injury	Industrial injuries to minors	
	Number	Per cent distribution		Number	Per cent distribution
Total	2,282	100.0	Upper extremities	1,508	66.1
			Lower extremities	484	21.2
Head	142	6.2	Not reported	6	.3
Trunk	142	6.2			

[5] Injuries to the face and neck were not classified apart from other head injuries in Wisconsin as they were in the other two States studied.

NATURE OF INJURY

Cuts caused three-fourths of the cases of permanent partial disability. The upper extremities suffered most of the cuts (four-fifths), as would be expected from the data given in the foregoing paragraph, and three-fourths of this number were on the hands. The lower extremities received one-fourth of the cuts, and the head one-twelfth. Bruises were chiefly on the upper and lower extremities, one-twentieth being on the head. The lacerations or abrasions, which caused 7.7 per cent of the cases of permanent partial disability, were chiefly on the hands; less than one-tenth were on the lower extremities. Over one-half of the fractures (causing 4.6 per cent of the cases of permanent partial disability) were of the upper extremities (one-third of the elbow and lower arm, one-fifth of the hands) and one-third of the lower extremities. Crushings (causing 7.7 per cent of the cases of permanent partial disability) were chiefly of the hands (85.2 per cent). Not quite one-half of the sprains and strains were of the upper extremities, while one-third were of the lower extremities and nearly one-fifth were of the trunk (including 34 cases of hernia). More burns affected the lower extremities than the upper ones. Nearly one-fifth were on the head, half of them involving the eyes. One-half of the dislocations were of the elbow and lower arm.

Table 4 shows the nature of injuries sustained by employed minors in Wisconsin.

TABLE 4.—*Nature of industrial injuries to minors: Wisconsin*

Nature of injury	Industrial injuries to minors		Nature of injury	Industrial injuries to minors	
	Number	Per cent distribution		Number	Per cent distribution
Total	2,282	100.0	Crushing	230	10.1
			Sprains and strains	181	7.9
Cuts and punctures	784	34.4	Burns	118	5.2
Bruises	418	18.3	Dislocations	18	.8
Lacerations and abrasions	264	11.6	Concussions and shocks	2	.1
Fractures	236	10.3	Not reported	31	1.4

Infection occurred in one-tenth of the cases of injury and caused 10 cases of permanent partial disability. It took place in one-fifth (19.3 per cent) of the cuts causing disability of a compensable duration. So large a percentage of infections shows that it is still necessary to emphasize the importance of maintaining first-aid stations and of training workers to go there promptly to have even minor injuries properly treated.

COMPENSATION FOR INJURY

Compensation for injuries consisted in Wisconsin of weekly payments during temporary disability, or for a fixed period in case of death or permanent disability, of an amount equal to 65 per cent of

the average weekly wage,[6] this amount, however, being limited by a fixed maximum and minimum. On this basis the weekly payments could not be less than $6.83 nor more than $14.63 (65 per cent of a weekly wage of $10.50 to $22.50).[7] Because of the low maximum, only 55.6 per cent of the injured children received weekly compensation equal to 65 per cent of their actual wages. Although 5.8 per cent received more than this percentage, as many as 37.7 per cent received less.

Increased compensation must be paid by the Wisconsin employer under certain conditions. If a minor is injured while employed without the labor permit required by law or while employed in a prohibited occupation, treble compensation must be paid.[8] If an injury to any worker is caused by failure of the employer to comply with the law or with an order of the industrial commission, compensation is increased 15 per cent. But if the injury is caused by failure of the employee to comply with a safety order, his compensation is reduced 15 per cent.[9] In 135 cases of injuries to minors during the year of the study, increased compensation was paid—in 51 cases because the injured minor had no labor permit, in 16 because the minor was at work in a prohibited employment, and in 68 instances because the employer had not obeyed the safety orders of the commission. On the other hand, one minor had his compensation decreased 15 per cent because the injury was caused by his disobedience of a safety order.

Violation cases constituted 17.6 per cent of the injuries to workers of 14 and 15 years; 11.8 per cent of the injuries to minors of 16 and 17 years; 3.3 per cent of the injuries to minors 18 years of age and over. Those under 18 years of age received the increased compensation in most instances because of employment without permits or in prohibited occupations, but in 15 cases the employer had violated a safety order. All violations in the cases of minors 18 years of age and over were of safety orders.

In four-fifths of the cases where the injured minor was employed without a labor permit temporary disablement resulted, in one-fifth permanent partial disability, and in one case death resulted. One-third of the injuries to minors employed in prohibited occupations caused permanent partial disability. One-half of the injuries occurring through violation of safety orders caused permanent partial disability, and one death resulted.

The violation cases cost industry in compensation payments $27,000 in regular compensation and $23,000 in increased compensation, besides $5,000 in medical aid—a total of more than $50,000. The cost to the injured in terms of physical injury alone was an average

[6] Wisconsin, Stat. 1923, sec. 102.09, subsec. (2), subdivs. (a), (b), (c); Acts of 1919, ch. 692, sec. 3. A maximum of four years' earnings was fixed in case of payments for temporary disability. Certain provisions were also made for reasonable medical and hospital services, etc. If disability continued until the 28th day (until the 22d by amendment passed since the period of the study) compensation must be paid for the first 7 days (Stat. 1923, sec. 102.09, subsec. (2), subdiv. (d)).

[7] Since the period of the study the maximum weekly wage upon which the compensation is based has been increased from $22.50 to $28. See Wisconsin Stat. 1923, sec. 102.11, subsec. (1).

[8] The provision for treble compensation applies only to minors "of permit age or over"; the permit age is between 14 (12 in certain occupations during vacation) and 17 years of age. Children under permit age are not included under the compensation law. (Wisconsin Stat. 1923, sec. 103.05, subsec. (4); sec. 102.07.) Since the period of this study the law has been amended to require only double compensation in case the injured minor is employed without a permit, provided he is not employed in a prohibited occupation or in an occupation for which the industrial commission has declared no permit shall be issued. In the latter cases treble compensation is still exacted. (Wisconsin, Acts of 1925, ch. 384.)

[9] The employer, and not the insurance carrier, is primarily liable for the increased compensation, and can not insure himself against this liability. Wisconsin, Stat. 1923, sec. 102.09, subsecs. (7), (8); subsec. (5), subdivisions (h), (i), (j).

of 27 days' disability in 84 cases, permanent disability in 50, and death in 2. The much higher proportion of severe injuries among the violation cases—two-fifths of these in contrast to one-tenth of the compensated injuries which were not violation cases resulting in death or permanent disability—emphasizes the need of legal protection for young workers.

CAUSES OF INJURY

Machinery was the most frequent cause of injury to minors, being responsible for nearly two-fifths of their injuries. Handling objects was the next most frequent cause of injury, being responsible for one-fifth of all injuries. Then in order of frequency came hand tools, falls of persons, vehicles, stepping on or striking against objects, each of these groups being responsible for 6 or 7 per cent of the injuries.

Three-fourths of all the injuries resulting in permanent partial disability were due to machinery. Over one-fifth of all machine injuries caused death or permanent partial disability, whereas less than one-tenth of the injuries due to any other cause resulted in anything more serious than temporary disability.

Table 5 shows the causes of industrial injuries to minors in Wisconsin. (For full list of causes of injury, with data concerning the injuries, see Appendix A, Tables III and IV.)

TABLE 5.—*Cause of industrial injuries to minors: Wisconsin*

Cause of injury	Industrial injuries to minors		Cause of injury	Industrial injuries to minors	
	Number	Per cent distribution		Number	Per cent distribution
Total	2,282	100.0	Falling objects	101	4.4
			Hot and corrosive substances	88	3.9
Machinery	864	37.9	Explosions, electricity	20	.9
Handling objects	491	21.5	Rafting, river driving	19	.8
Hand tools	166	7.3	Occupational diseases and harmful conditions	11	.5
Falls of persons	159	7.0	All other and not reported	70	3.1
Vehicles	147	6.4			
Stepping on or striking against objects	146	6.4			

MACHINERY

Machinery was the cause of 864 compensable injuries to minors in Wisconsin. It was responsible for 32.8 per cent of the injuries to minors under 16 years of age, 46.4 per cent to those of 16 or 17 years, and 35.5 per cent to those of 18 years and over. The percentage of the injuries to all workers caused by machinery was only one-half as high as the corresponding percentage of injuries to minors.

Motors and transmission apparatus caused 28 injuries, 15 were caused by machines other than power-driven machinery, including fans, blowers, and pumps, and 49 by hoisting machinery. The great majority of injuries (772) were due to power-driven machines, three kinds of which—metal-working, woodworking, and paper and paper products making—caused nearly four-fifths (79.7 per cent) of the injuries due to power-driven machinery and over one-fourth of all the injuries. There are striking differences among the age groups,

however. Sixteen per cent of the accidents to children under 16 years were due to these three classes of machines, as compared with 32 per cent of the accidents to workers 16 and 17 years of age, and 26 per cent of those to minors of 18 years and over.

Power-driven machinery.

The great majority (73.3 per cent) of injuries due to power-driven machinery occurred in the actual operation of the machine, less than 10 per cent taking place while the machine or work was being adjusted, and only 4 per cent occurring while the machine was being cleaned or oiled. In a still larger proportion of the cases (88.7 per cent) the injury took place at the working point of the machine and was not due to the worker's being caught by gears, fly wheels, set screws, or belts. Mechanical safeguards to prevent operators from being caught in such apparatus and the regulations forbidding children to clean and oil machinery in motion seem to have reduced to a comparatively small proportion the injuries due to such causes.

Metal-working machinery.—Metal-working machinery caused 285 accidents—one-eighth of the total number. None was fatal, but 79, or 28 per cent, resulted in permanent partial disability. Temporary total disability for varying periods followed 206 accidents; 108 of the injured returned to work within two weeks, 77 in from two to four weeks, and 21 were disabled more than four weeks. The law prohibited children under 16 from employment on certain dangerous metal-working machines, for instance, punches, drills, emery wheels, shears, wire and iron straightening machines, and stamping machines. Six children 15 years of age were injured (three on lathes, one on a punch press, one on a riveting machine, one on a press on which he was making small parts), and one child 14 years of age was injured while working on a reamer. The operation of few metal-working machines was specifically prohibited for minors of 16 and 17 years, and machines of this type caused 13 per cent of the accidents to minors of these ages, in contrast to 5.9 per cent of the accidents to minors under 16 years of age. Among the accidents to minors of 18 years and over, 12.8 per cent were caused by metal-working machinery.

Punch presses caused not only more but also graver injuries than any other metal-working machine, being responsible for 39 of the 79 cases of permanent partial disability among minors caused by these machines. The importance of metal-working industries in Wisconsin might suggest the possibility of a large number of accidents on such machinery, and in 1920 the Wisconsin Industrial Commission issued a special bulletin [10] giving suggestions for guarding the presses more adequately, and saying, "There are too many punch-press accidents in Wisconsin. They are becoming more numerous and are causing injuries that are growing more severe." [11] In that year 397 accidents in the total of 16,246 were due to metal punch presses. In 1923, 349 injuries in a larger total (20,941) were due to them. This was a reduction of nearly one-third in the proportion of punch-press accidents to the total number of accidents. The commission's bulletin does not show how many minors were injured by punch presses

[10] Metal-working Press Accidents in Wisconsin. Wisconsin Industrial Commission Bulletin, Madison, Wis., 1920.

[11] The prohibition of the employment of all minors under 18 years of age on metal-cutting or stamping machines is recommended by the New York State Industrial Commission in connection with a study of industrial accidents to minors in that State. See Appendix C, p. 115.

in 1923, but a table [12] showing causes of injuries to 2,251 minors whose cases were settled during that fiscal year shows that in three years the number of compensable injuries due to all metal-working machinery decreased from 285 to 174, or from 12.5 per cent of all the injuries to minors to 7.7 per cent. How much of the decrease was due to more adequate guarding of punch presses is not shown.

Table 6 shows the kinds of metal-working machinery causing injuries to minors of different ages.

TABLE 6.—*Kinds of metal-working machinery causing injuries to minors, by age of injured: Wisconsin*

Kind of metal-working machinery causing injury	Industrial injuries to minors due to metal-working machinery			
	Total	Age of injured		
		Under 16 years	16–17 years	18–20 years
Total	285	7	66	212
Presses	119	2	25	92
Punch	91	1	17	73
Draw-forming	8		1	7
Other presses	20	1	7	12
Lathes	32	3	6	23
Turret	10	1	2	7
Other lathes	22	2	4	16
Milling machines	16		3	13
Facing	13		3	10
Gear-cutting	3			3
Drills	20		5	15
Emery wheels, abrasive	27		5	22
Shears	11		5	6
Boring machines	5		1	4
Planers and shapers	4			4
Reamers	3	1		2
All other	48	1	16	31

Woodworking machinery.—The percentage of permanent partial disability resulting from accidents due to woodworking machinery was practically the same as that for accidents due to metal-working machinery. That is, 58, or 27.3 per cent, of the 212 injuries caused by woodworking machinery resulted in permanent partial disability, and 1 death occurred. Saws of various sorts were responsible for one-half of all the accidents attributable to woodworking machinery.

Employment on certain dangerous woodworking machines was prohibited to minors under 16 years. (See Appendix B, p. 106). If the law had been complied with, only three of the nine woodworking-machine accidents to children of this age group would have occurred. The six employed in prohibited occupations were two 14-year-old boys injured while working on cut-off saws, three children 15 years old working on circular saws, and another 15 years old working on a glue spreader. The two children 14 years of age and one of 15 years were

[12] Wisconsin Labor Statistics, Vol. 1, No. 10, p. 8, October, 1923.

only temporarily disabled, but the three of 15 years injured on circular saws suffered permanent disability. (For example of such injury see case No. 25, p. 80).

Minors 16 and 17 years of age, for whom work on woodworking machines was not specifically prohibited, suffered 70 accidents from machines of this type—13.8 per cent of all the accidents to minors of these ages; in contrast, only 7.6 per cent of the accidents to workers under 16, and only 8 per cent of those to workers between 18 and 21 years of age, were caused by these machines. Permanent partial disability was caused by 17 of the 70 accidents. Nearly one-half of the injuries which woodworking machines caused to workers 16 and 17 years of age were due to saws. Two of the four minors who were injured on circular saws and permanently disabled by them received an additional 15 per cent compensation because their machines had not been guarded as the safety code required.

Table 7 shows the woodworking machines causing injuries to minors, by age of the injured.

TABLE 7.—*Kinds of woodworking machinery causing injuries to minors, by age of injured: Wisconsin*

Kind of woodworking machinery causing injury	Industrial injuries to minors due to woodworking machinery			
	Total	Age of injured		
		Under 16 years	16–17 years	18–20 years
Total	212	9	70	133
Saws	123	7	34	82
Circular	79	3	20	56
Trim, cut-off	24	[1]3	8	13
Band	7	----	2	5
Other	13	1	4	8
Jointers	14	----	7	7
Matchers	12	----	4	8
Press-box nailers	8	1	4	3
Veneer clippers, cutters, and splicers	8	----	4	4
Planers	6	----	4	2
Live rolls	5	----	1	4
Stickers	5	----	1	4
Edgers	4	----	----	4
Sanders	4	----	3	1
Saw carriages	4	----	----	4
Glue spreaders	3	1	----	2
Tenoners	3	----	2	1
All other	13	----	6	7

[1] One of these 3 children was walking past the cut-off saw and was caught by it.

Paper and paper products making machinery.—None of the 118 accidents in connection with machines for making paper and paper products resulted fatally, but 15 caused permanent partial disability. This proportion of permanent disability (12.7 per cent) is lower than that for accidents due to either metal-working or woodworking machines (28 and 27 per cent, respectively). Accidents occurred to 3 children 15 years of age, one of whom was cleaning a paper-box corner-staying machine, one operating a corner-creasing machine, and the third operating a paper-cutting machine. One had a finger nail torn

off, and in the other cases infection developed, causing disability of 7 weeks for each child. As with metal-working and woodworking machines, the proportion of accidents due to paper and paper products making machines was greater among the workers of 16 years (12 injured) and 17 years (16 injured) than among those under 16 (5.5 per cent as compared with 2.5 per cent). There were 4 cases of permanent partial disability. Table 8 gives further data on the injuries of minors (by age groups) from paper or paper products making machinery.

TABLE 8.—*Kinds of paper and paper products making machinery causing injuries to minors, by age of injured: Wisconsin*

Kind of paper and paper products making machinery	Industrial injuries to minors due to paper making and paper products making machinery			
	Total	Age of injured		
		Under 16 years	16–17 years	18–20 years
Total	118	3	28	87
Paper-making machinery	68		12	56
Rolls and winders	30		5	25
Calendars	16		5	11
Slitters	4		1	3
Other	18		1	17
Paper products making machinery	50	3	16	31
Lacers	6		1	5
Corner stayers	5	1	1	3
Cutters	5	1	2	2
Corner creasers	4	1		3
Wire stitchers	4		2	2
Other	26		10	16

Other kinds of power-driven machinery.—Tanning machines caused 11 injuries, and leather-working machinery (especially cutters, heelers, punches, presses), 38. Of these 49 injuries 3 occurred to children under 16 years of age, 13 to minors of 16 and 17 years, the remainder to minors of 18 years and over. Permanent partial disability resulted in 14 cases. Food, beverage, and tobacco-working machines caused 24 injuries—baking and confectionery machines 12, meat choppers or slicers 4, and canning machines 4. Only 2 of the injured were under 16 years of age, 10 were 16 or 17 years old, and 12 were 18 years of age and over. Permanent partial disability resulted in 5 cases. Textile machinery (chiefly knitting and braiding machines, sewing machines, cutters, looms, cards) caused 36 injuries. Four of the injured were under 16 years of age, 11 were 16 or 17 years old. Permanent partial disability resulted in 5 cases. (For example of such injury see case No. 15, p. 74.)

Hoisting machinery.

Hoisting machinery caused 49 accidents, 21 of them due to elevators, 28 to cranes and derricks. The injuries most frequently resulted from the worker's being caught between the platform and floor of the elevator, to his being caught by some part of the crane or derrick,

or to his being struck by the load on the crane or derrick. One of the children injured was under 16 years of age, and 11 were 16 or 17 years old. One death resulted, when a girl was caught between the elevator platform and the floor. Each of 3 boys lost a finger, and 1 boy had a finger broken.

HANDLING OBJECTS

The group of injuries next largest after that caused by machinery was that due to handling objects, which included over one-fifth of the injuries. A larger number of injuries were due to handling heavy objects than to handling sharp or rough ones, using hand trucks, or loading or unloading objects. Heavy lifting produced 26 of the 34 cases of hernia recorded among minors and over two-thirds of the 54 sprains and strains attributed to handling objects. Infection followed many wounds, especially those caused by sharp or rough objects. There were 101 cases of infection in 163 instances of injury from sharp or rough objects causing compensable disability. Permanent partial disability followed the injury in 26 cases of handling objects, 23 of these involving amputation or loss of use of a finger, 1 the loss of the use of the wrist, 1 the loss of two fingers, and 1 the loss of a toe. The percentage of the injuries to minors in each of the three age groups due to handling objects was nearly the same, but the percentage of these injuries caused by different types of objects varied for the three groups. Sharp or rough objects caused over one-half of the injuries from this cause to children under 16 years, over two-fifths of those to workers of 16 and 17 years, and less than one-third to those of 18, 19, or 20 years, whereas the percentage caused by heavy objects increased in the older groups.

Table 9 shows the industrial injuries caused to minors by handling objects.

TABLE 9.—*Manner of occurrence of industrial injuries to minors due to handling objects: Wisconsin*

Manner of occurrence of injury, and kind of object handled	Industrial injuries to minors due to handling objects		Manner of occurrence of injury, and kind of object handled	Industrial injuries to minors due to handling objects	
	Number	Per cent distribution		Number	Per cent distribution
Total	491	100.0	Sharp or rough objects	163	33.2
Heavy objects	279	56.8	Slivers	42	8.6
Dropped	61	12.4	Glass	13	2.6
Catching worker	25	5.1	Protruding wires or nails	16	3.3
Catching worker against other object	47	9.6	Other	92	18.7
Causing strain in handling	10	2.0	Hand trucks	49	10.0
Falling while being loaded	48	9.8	Striking worker	19	3.9
Falling while being piled	11	2.2	Object falling from	14	2.9
Other	77	15.7	Other	16	3.3

HAND TOOLS

Hand tools caused 7.3 per cent of all the accidents to minors. By far the greatest number (103) of the 166 injuries from hand tools resulted from the glancing of the implement.[13] The injuries were cuts or punctures, bruises, and lacerations in 90 per cent of the cases, with 4 cases of fracture and 5 of sprain or strain. There were no deaths and only a few cases of permanent disability, nearly one-half of the injured recovering within two weeks and only 24 (14.5 per cent) being disabled longer than four weeks. Of the 10 cases of permanent disability, 5 were injuries to the eye caused by the flying particles set in motion by the tool (for example of such injury see case No. 24, p. 79), and in 3 cases a finger was cut off. Twelve of the injured minors were under 16 years of age, 36 were 16 or 17 years old, and 118 were 18 years of age and over. The percentage of their injuries due to hand tools was highest for workers under 16, although the variation in the three age groups was slight.

Table 10 shows the manner of occurrence of injury from hand tools.

TABLE 10.—*Manner of occurrence of industrial injuries to minors due to hand tools: Wisconsin*

Manner of occurrence of injury from hand tools	Industrial injuries to minors due to hand tools	
	Number	Per cent distribution
Total	166	100.0
Tool in hands of injured worker	160	96.4
Glancing or slipping of tool in use	119	71.7
Flying particles set in motion by tool	15	9.0
Other	26	15.7
Tool in hands of fellow worker	6	3.6

FALLS OF PERSONS

Injuries due to falls of persons constituted 7 per cent of the total number of injuries to employed minors. Of the 159 injuries attributed to falls, 49 resulted from slipping. These with 19 falls from stairways and 18 instances of stumbling accounted for over one-half of such injuries. Two accidents resulted fatally; one boy fell from a scaffold as the supporting cable gave way, another boy was caught by a log on a rollway and carried with it to the bottom of the pile.

There were two cases of permanent partial disability. A boy of 20 years, who was holder-on for a riveter, fell to the bottom of the boat under construction when the plank on which he was standing broke. Since the safety order for scaffold planks had been disobeyed this boy received an additional 15 per cent compensation for the partial loss of use of two fingers which he suffered. The other boy who was permanently injured was only 16 years old. Employed as a helper in putting up electric wires, he fell from a pole with consequent fractures of skull, jaw, and both arms (see case No. 14, p. 73).

[13] In Wisconsin the glancing or slipping of the tool was the most frequent cause of injury from hand tools over a three-year period (Wisconsin Labor Statistics, Vol. I, Nos. 11 and 12 (November and December), 1923, p. 3).

Since over one-half of the falls produced fractures, sprains, or strains, the duration of disability was comparatively long—22.6 per cent of the minors thus injured being disabled more than four weeks. Falls caused 8.4 per cent of the accidents to children under 16 years of age, 5.7 per cent of those to workers of 16 and 17 years, and 7.3 per cent of those to minors of 18 years and over.

Table 11 shows the manner of occurrence of falls injuring employed minors.

TABLE 11.—*Manner of occurrence of industrial injuries to minors due to falls of persons: Wisconsin*

Manner of occurrence of injury	Industrial injuries to minors due to falls of persons		Manner of occurrence of injury	Industrial injuries to minors due to falls of persons	
	Number	Per cent distribution		Number	Per cent distribution
Total	159	100.0	Falling on level	69	43.4
Falling from elevations	55	34.6	Slipping	49	30.8
Stairs	19	11.9	Stumbling over loose objects	2	1.3
Ladders	6	3.8	Stumbling over fixed objects	18	11.3
Scaffolds and staging	6	3.8	Other	27	17.0
Benches, boxes, chairs, tables	8	5.0			
Other	16	10.1			
Falling into excavations, pits, and shafts	8	5.0			
Bins or vats	4	2.5			
Floor openings	2	1.3			
Other	2	1.3			

VEHICLES

Vehicles caused 6 per cent of all the injuries to minors. Automobiles or motorcycles were involved in over half of these 147 accidents, and the immediate cause of 56 of the 86 motor-vehicle accidents was the process of cranking.

Death resulted in two cases; one when a boy of 17 was struck by a train, the other when a boy of 18 was caught under an overturning automobile. There were five cases of permanent partial disability. A boy of 16 fell as he was getting out of a wagon and sustained a compound fracture of the elbow, which caused 60 per cent loss of use. Because he had been employed without a permit he received treble compensation. A 17-year-old boy was caught under a load of ties which overturned on top of him, so that his shoulder was broken, he was badly bruised, and the use of his shoulder was impaired. A street-car conductor, aged 19, put his head out of the door on the wrong side of the car and was struck by a passing car. The hearing of one ear was almost entirely destroyed. Another 19-year-old boy lost his thumb at the distal joint by getting it caught between the wheel and the box of a dump cart, and a third of the same age lost three fingers which were injured by catching them in the chain of a motor cycle.

Since over one-half of the injuries were fractures, sprains, or strains, disablement due to vehicular accidents was comparatively long

Two-fifths of the injured workers were disabled longer than four weeks, and only one-fourth recovered within two weeks.

A somewhat smaller proportion of the injuries to workers under 16 years were due to vehicles than of the injuries to workers in higher age groups. The figures are 5 per cent for workers under 16, 5.7 per cent for those 16 and 17 years old, and 6.8 per cent for those 18 years of age and over.

Table 12 shows the manner of occurrence of industrial injury caused by vehicles.

TABLE 12.—*Manner of occurrence of industrial injuries to minors due to vehicles: Wisconsin*

Manner of occurrence of injury and kind of vehicle	Industrial injuries to minors due to vehicles		Manner of occurrence of injury and kind of vehicle	Industrial injuries to minors due to vehicles	
	Number	Per cent distribution		Number	Per cent distribution
Total	147	100.0	Automobiles and motorcycles	86	58.5
Cars and engines	16	10.9	Cranking	56	38.1
Struck by or caught between	7	4.8	Collisions	9	6.1
Falls from or in	5	3.4	Overturning	2	1.4
Other	4	2.7	Other	19	12.9
Mines and quarry cars	9	6.1	Animal-drawn vehicles	36	24.5
Collisions and derailments	2	1.4	Struck by or run over by	7	4.8
Struck by or caught between	2	1.4	Falls from	15	10.2
Lifting or pushing cars	2	1.4	Other	14	9.5
Other	3	2.0			

STEPPING ON OR STRIKING AGAINST OBJECTS

Although 146 injuries were due to objects struck or stepped on by employed minors only 3 of these were serious. Striking against machines, protruding nails or wires, or other objects caused 126 injuries, and stepping on sharp objects (mostly nails) caused 20 injuries. Of the minors temporarily disabled 60 per cent recovered within two weeks, and only 15 per cent were disabled longer than four weeks. There were 3 cases of permanent partial disability, 1 worker losing the sight of one eye and 2 others losing the use of a finger joint. One-half of the injuries were cuts or punctures, and infection resulted in one-fifth of the cases. Many workers ignored the cut or laceration at the time, not reporting it nor securing medical attention until the appearance of infection several days after the accident. This may be one reason why the percentage of injuries to workers under 16 years of age due to striking against objects or stepping on them was nearly twice as high as the percentage from this cause occurring to minors of more mature years.

FALLING OBJECTS

Falling objects caused 101 compensable injuries. Objects dropping from machines and workbenches caused 27 of these, objects tipping over caused 15. There were 9 cases of collapse of piles and 14 of

objects falling off piles upon the workers below. Falling rocks and trees caused 10 injuries. There were 2 deaths (of 19-year-old boys), 1 caused by a falling tree, 1 by a falling rock. The falling of such objects as sheets of iron, rock, a piece of timber, a piece of iron, a metal pattern, caused 5 cases of permanent partial disablement. The nature of such injury was impaired use of the legs, toes, or fingers. Although the injuries were chiefly cuts, bruises, and crushing, 26 fractures occurred. One-half (49.5 per cent) of the workers suffering temporary disability recovered within two weeks, and only one-tenth were disabled longer than four weeks. A smaller proportion of the minors under 16 were injured by falling objects than were those of 16 and over, only 1.7 per cent of the accidents to the younger group being due to this cause. Of the accidents to minors of 16 and 17 years 3.3 per cent were due to falling objects, and minors of 18 years and over received 5 per cent of their injuries from falling objects.

Table 13 shows the manner of occurrence of injuries due to falling objects.

TABLE 13.—*Manner of occurrence of industrial injuries to minors due to falling objects: Wisconsin*

Manner of occurrence of injury	Industrial injuries to minors due to falling objects	
	Number	Per cent distribution
Total	101	100.0
Collapse of	10	9.9
Piles	9	8.9
Other	1	1.0
Objects falling from elevations	65	64.4
Machines or workbenches	27	26.7
Piles	14	13.9
Other	24	23.8
Objects tipping over	15	14.9
Falling trees	6	5.9
Other	5	5.0

OTHER CAUSES OF INJURY

Of the 208 remaining injuries to Wisconsin minors (9.1 per cent), 87 causing temporary disability and 1 causing permanent disability, were due to hot or corrosive substances. These substances were molten metal in 24 cases, other hot liquids in 21 cases, flames and chemicals each in 7 cases, and steam in 6 cases. Explosions—of furnaces, molten metal, bottles, and (in 2 fatal cases) of a dust collector—caused 13 injuries. Electricity caused 7 injuries (1 fatal), 19 occurred in connection with rafting or river driving, and 11 were occupational diseases or were due to harmful conditions of work. Draft animals injured 13 minors who fell off, were kicked or stepped on, or hurt in runaways. Flying particles caused 17 injuries. (For further data on the injuries due to these causes see Appendix A, Tables III and IV.)

OCCUPATIONAL RISK

An estimate of occupational risk has been made based upon the number of minors under 20 years of age[14] reported by the Federal census[15] as employed in Wisconsin on January 1, 1920 (the mid-point of the period studied). The exact hours of exposure to risk of injury can not be computed because the precise number of minors employed day by day through the year, and the number of hours they worked, can not be ascertained. The three groups exempted by the act (agricultural laborers, employees in interstate commerce, and Federal employees) were omitted.[16] Any minors reported engaged in occupations which include only employers and independent producers (to whom, of course, the act does not apply) were also omitted. But all minors engaged in occupations which might include both independent producers and employees were considered employees on the ground that few minors under 20 years of age are independent producers. No attempt was made to omit those excluded from compensation by operation of the numerical exemption feature of the law or those whose employers refused to accept the act.[17]

Other possible errors are involved in the assumption that the number employed January 1, 1920, is equal to the average number employed throughout the year. If the actual number employed January 1, 1920, was greater than the average the rates tend to be understated, and if it was less than the average the rates tend to be overstated. The procedure assumes that the conditions of employment and of industry in January were about average. So far as comparisons between occupations and industries are concerned, furthermore, the accuracy of comparison is of course lessened by the fact that no allowance can be made for variations in average hours per day or per week, for variations in relative volume of employment, or for variations in seasonal industries. Nevertheless, while such variations might easily cause difference in rates amounting to 10 or even 20 per cent, the differences in rates far exceed these variations in many cases. Consequently, though not too much emphasis should be placed upon the actual injury rates shown, it is believed that in cases of important differences in risk they indicate that such differences do actually exist and that certain occupations are subject to a much greater hazard than others. It must be remembered that the injuries reported were only the compensable ones, that is, the injuries to the employees who were covered by the compensation act and whose disability lasted longer than the waiting period of one week.

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[14] The number of persons employed under 21 years of age is not available because the census includes those 20 years of age in the group of persons 20 to 24 years of age.

[15] From no other source was it possible to obtain, for so large a group of minors, figures showing both the average number of minors, by age groups, employed in the year covered by the study, and also the occupations in which they were engaged. Records of employment certificates, for instance, could not be used, as the age groups and the certificate provisions of the State child labor laws are different for the three States. Moreover, available tabulations of certificate data give the total number of certificates issued during the year, and not the number of children holding certificates at any one time, and they do not include children illegally employed. Nor were the essential data obtainable from the industrial statistics collected by the State labor bureaus.

[16] A farmer might elect to be subject to the act, and if he so elected his agricultural laborers were thereby covered (Wisconsin, Stat. 1923, sec. 102.05, subsec. (2); sec. 102.08).

[17] See footnote 5, p. 1. Employers (other than farmers) having three or more employees in a common employment were deemed to have elected to accept the act unless they filed notice of withdrawal of election. An employer having less than three employees in a common employment was not subject to the act, but he might elect to come under it. If he did not so elect, however, his defense of assumed risk was abrogated (Wisconsin, Stat. 1923, sec. 102.01; sec. 102.05, subsecs. (1), (2)).

The injury rates computed by this method are estimates only, but in the absence of full data on the numbers at risk are the best available. There is no doubt that the estimated number of employees covered by compensation is somewhat larger than the actual number so covered; but this procedure gives a conservative result since it tends to understate the injury risk.

So much difference appears in the occupations of boys and girls under 20 years of age that the sexes are best treated separately. Nearly two-thirds of the boys (62.1 per cent) were in manufacturing and mechanical occupations, but only a little more than one-third of the girls were thus employed. Nearly one-fourth of the girls were in personal and domestic service, and one-fifth in clerical work; but only 2.4 per cent of the boys were in personal and domestic service and 13.5 per cent in clerical positions. The injury rate per 1,000 minors employed was 37 for boys, but only 6 for girls.

INJURY RATES FOR BOYS

Different risks appear even in the general occupation groups, and still greater differences appear when the occupations within the general groups are considered. The injuries per 1,000 boys employed varied from none in a few occupations to several hundred in others; and although the number employed in some occupations was too small to afford a base for an injury rate, the high risk in many others was clearly evidenced.

The greatest risk was in some of the manufacturing and mechanical occupations. The metal, lumber and furniture, and paper and pulp industries were the most dangerous. The injuries per 1,000 boys employed were 89 for iron and brass molders, founders, and casters, and 112 for buffers, polishers, and metal grinders. Injuries to semiskilled workers in iron and steel industries were 110 per 1,000, rising to 124 in agricultural-implement factories, 164 in automobile factories, and 202 in ship and boat building. The rates for the laborers in the same industries were 29, 39, 16, and 22, respectively. In tinware and enamelware factories the boys in semiskilled occupations had an injury rate of 329, the laborers a rate of 54. The injuries to the semiskilled in brass and other metal mills were 126 per 1,000 employed. The lumber and furniture industries were as a group more dangerous than iron and steel industries, causing 137 injuries per 1,000 boys in semiskilled occupations and 35 per 1,000 laborers. Boys in semiskilled work in furniture factories had an injury rate of 80 per 1,000, in saw and planing mills of 153 per 1,000, in other woodworking industries of 204 per 1,000. For the laborers the rates were lower (10, 47, and 28, respectively). In paper and pulp mills the rate for semiskilled workers was 198; for laborers, 27. In general, a semiskilled operative was more liable to injury than a laborer—90 injuries occurring to every 1,000 boys in semiskilled occupations and 24 to every 1,000 laborers.

For the other manufacturing and mechanical occupations the liability to injury was somewhat less. In the food industries the injury rate to the semiskilled boys was 68 (29 in butter, cheese, and condensed-milk factories, 86 in candy factories, 55 in slaughter and packing houses). Among the boys employed as laborers in food industries 29 per 1,000 were injured (17 per 1,000 in butter, cheese,

and condensed-milk factories, 28 in slaughter and packing houses). In printing and publishing industries the boys in semiskilled occupations had an injury rate of 102. In rubber factories the rate was 76, in tanneries 66, in the electrical-supply factories 107. The injury rate in the textile industries was lower, being 22 for the semiskilled and 18 for the laborers. For tinsmiths and sheet-metal workers there were 53 injuries for every 1,000 boys employed, for metal pattern and model makers 22, for stationary engineers 38, for electricians 22.

In transportation the injury rate was 30 per 1,000 boys employed. The highest rate was 109 for telegraph and telephone linemen. For chauffeurs it was 54; for draymen, teamsters, and expressmen, 31. Among laborers in transportation the injury rate was 25, and for the small group of street-car conductors it was 38 per 1,000.

Occupations in trade offered fewer risks as a whole, the rate falling to 21 per 1,000. The highest rate of injury was 84 for laborers, porters, and helpers in stores. Deliverymen had an injury rate of 33, but the rate for clerks in stores was only 10, and for salesmen in stores 4.

In other occupations the rate of injuries was comparatively low. Boys in personal and domestic service suffered only 12 injuries per 1,000 employed, although among those classed as "servants" the number of injuries was 23 per 1,000. Boys in public service suffered 15 injuries per 1,000 employed, those in professional service 3, and those in clerical service 7. In the last-named group the bundle, cash, messenger,[18] and office boys received 9 injuries per 1,000 employed.

Table 14 shows the number of industrial injuries to boys under 20 years of age and the rate per 1,000 employed in the various occupation groups.

TABLE 14.—*Number of industrial injuries to boys under 20 years of age, and rate per 1,000 employed, by occupation groups: Wisconsin*

Occupation group	Boys under 20 years employed [1]	Industrial injuries to boys under 20 years	
		Number	Per 1,000 employed
Total	41,294	[2] 1,527	37.0
Forestry	1,511	68	45.0
Extraction of minerals	188	16	85.1
Manufacturing and mechanical industries	25,638	1,212	47.3
Transportation	2,956	90	30.4
Trade	3,625	75	20.7
Public service	197	3	15.2
Professional service	600	2	3.3
Personal and domestic service	992	12	12.1
Clerical occupations	5,587	38	6.8

[1] Estimated number covered by compensation law.
[2] Includes 11 injuries from agricultural pursuits which are not covered by compensation law (see Wisconsin, Stat. 1923, sec. 102.05, subsec. (2)).

AGE AND OCCUPATIONAL RISK FOR BOYS

In each age group the proportion employed in each of the main occupation groups was approximately the same, although more of the boys of 18 and 19 years than of the younger boys were skilled workers

[18] Except telegraph messengers, who are classified under "transportation."

in manufacturing and mechanical occupations. In forestry, mining, manufacturing and mechanical occupations, transportation, and trade the boys of 18 and 19 years had the highest injury rate. In public service, professional service, and domestic and personal service the boys 16 and 17 years old had the highest rate. Clerical service was the only group in which the rate for the youngest boys was the highest, though even for these boys at 14 and 15 years the rate reached only 8 per 1,000. In all the occupation groups except in forestry, transportation, and clerical work the rate was higher for boys of 16 and 17 than for the youngest group.

Three-fifths of the boys of each age group were employed in manufacturing and mechanical industries, but their injury rates varied, being 59 per 1,000 for the boys of 18 and 19 years, 37 for those of 16 and 17, and 26 for those under 16. Among apprentices the rate was four times as high for boys of 18 and 19 as for those under 18 years, among laborers and semiskilled operatives it was twice as high, but in skilled occupations it was only one-half that of the younger boys. However, only 4.2 per cent of the older boys were apprentices, 39.8 per cent were laborers, 28.3 per cent were semiskilled, and 27.7 per cent were skilled workers, whereas for boys under 18 years the percentages were 16.6, 43, 36.9, and 3.5, respectively.

A comparison of the injury rates for the employed children under 16 years of age and those of 16 and 17 years of age was possible in only a few occupations, because for many occupations the census gave only the total employed under 18 years, and also because in some occupations the number of persons in these two age groups was too small to afford a base for computing an injury rate. In all but two of the occupations for which a comparison was possible, the injury rates for the boys of 16 and 17 years were higher than for those under 16. The two exceptions were laborers in furniture factories and laborers in sawmills and planing mills. In those occupations the boys under 16 years had a higher rate of injury than those of the next group, although even then it was lower than that of the boys of 18 and 19 years.

In some occupations the highest injury rate was incurred by boys of 16 and 17 years. In tinware and enamelware factories the rate for laborers of this age (100 per 1,000) was more than twice as high as for those of 18 and 19 years, and six times as high as for those under 16. In the textile industries in which boys of 16 and 17 were employed as laborers they had more than twice as many injuries as the older boys, while no injuries at all occurred to the youngest group of boys in these industries. In rubber factories both laborers and semiskilled workers of 16 and 17 had higher injury rates than had those in the other age groups.

These differences in injury rates among the age groups are doubtless to be attributed in part to the variations in legislative protection afforded the three groups. All minors under 18 were prohibited from employment in certain dangerous occupations, but in addition minors under 16 were prohibited from working at many other occupations—particularly the operation of many kinds of machines—permitted to minors of 16 and 17 years. For those 18 years of age and over there were no specific prohibitions of this type, although the law prohibited in general terms the employment of all minors in occupations dangerous or prejudicial to their life or health. The occupations with the

highest injury rates for the boys of 16 and 17 years were semiskilled work in metal, lumber and furniture, and paper and pulp industries, where a large proportion of the accidents occurred in the operation of machines. Among the injuries to boys of 14 and 15 years in the more dangerous industries a smaller proportion was due to machines, and a larger proportion to other causes, than was the case for boys 16 and 17 years of age.

Table 15 shows the injury rates per 1,000 boys under 20 years of age employed in the various occupation groups, by age groups.

TABLE 15.—*Industrial-injury rates per 1,000 boys under 20 years of age, by occupation groups and age: Wisconsin*

Occupation group	Industrial-injury rates per 1,000 boys under 20 years				
	Total	18–19 years	Under 18 years		
			Total	16–17 years	Under 16 years
Total	37.0	46.5	26.5	29.1	19.4
Forestry [1]	45.0	66.7	17.9	16.1	28.6
Extraction of minerals	85.1	114.5	17.5	17.5	----
Manufacturing and mechanical industries	47.3	59.3	34.1	36.8	25.9
Transportation	30.4	35.8	21.6	21.3	24.5
Trade	20.7	23.7	17.9	22.5	2.3
Public service	15.2	14.8	16.1	17.2	----
Professional service	3.3	2.1	7.5	9.6	----
Personal and domestic service	12.1	6.3	17.4	21.5	8.8
Clerical occupations	6.8	7.3	6.4	5.7	8.2

[1] Agricultural laborers are excluded by the law (Wisconsin, Stat. 1923, sec. 102.05, subsec. (2)).

INJURY RATES FOR GIRLS

As has been stated, the injury rate for the girls was much lower than that for the boys. Proportionately only half as many of the girls as of the boys were in manufacturing and mechanical occupations where the liability to accident is greatest, and a larger proportion were in personal and domestic service and in clerical occupations. In every one of the main occupation groups the rate for girls was lower than for boys.

Much of the difference is, of course, due to the different occupations of girls and boys. In transportation, for example, 95 per cent of the girls were telephone operators (for whom the injuries were only 3 per 1,000 employed); but the boys were employed at more hazardous work, as, for instance, telegraph and telephone linemen, chauffeurs, draymen, teamsters, and street and railroad laborers. In trade 95 per cent of the girls were clerks or saleswomen in stores, receiving a negligible number of injuries; but over one-third of the boys were deliverymen or laborers (whose injury rates ran high) rather than clerks or salesmen, and the boys in trade had a much higher injury rate than did the girls. In clerical work the injury rate for messenger, errand, and office boys and girls was practically the same for both sexes. Four-fifths of the girls in professional service were teachers. This general occupation group received no injuries at all. The boys in professional service were chiefly draftsmen, reporters, and teachers. Only two injuries were reported among these.

In manufacturing and mechanical occupations the injuries to girls were similarly fewer than those to boys, the rate per 1,000 being 13 for girls, 47 for boys. This seems to be due to the fact that many of the girls were in industries in which the number of accidents to minors was comparatively small. One-half of the girls but only one-sixth of the boys in semiskilled occupations were in food, clothing, and textile industries; and in these the injury rates for both boys and girls were lower than in the metal and in the lumber and furniture industries. Only 11 per cent of the girls but 38 per cent of the boys in semiskilled work were in metal and lumber and furniture industries; yet even in the same industries the girls suffered fewer injuries than did the boys. For example, the rates in clothing industries were 44 for boys, 7 for girls; in food industries they were 68 for boys, 13 for girls; in textiles they were 22 for boys, 7 for girls; in iron and steel industries they were 110 for boys, 22 for girls; and in lumber and furniture industries they were 137 for boys, 35 for girls. The census classification is not detailed enough to show whether the boys and girls in the same group were actually doing the same kinds of work, but it may be doubted whether girls, especially the younger ones, were doing as heavy or dangerous work as the boys were doing.

Table 16 shows the number of industrial injuries to girls under 20 years of age, and rates per 1,000 employed in the various occupation groups.

TABLE 16.—*Number of industrial injuries to girls under 20 years of age, and rate per 1,000 employed, by occupation groups: Wisconsin*

Occupation group	Girls under 20 years employed [1]	Industrial injuries to girls under 20 years	
		Number	Per 1,000 employed
Total	40,163	231	5.8
Extraction of minerals	1		
Manufacturing and mechanical industries	15,112	202	13.4
Transportation	1,665	5	3.0
Trade	3,480	4	1.1
Public service	3		
Professional service	2,759		
Personal and domestic service	9,332	14	1.5
Clerical occupations	7,811	6	(2)

[1] Estimated number covered by the compensation law. [2] Less than 1 per 1,000.

AGE AND OCCUPATIONAL RISK FOR GIRLS

Only among the girls employed in manufacturing and mechanical industries were there any significant variations in injury rates with age. In nearly every occupation in this group the injury rate rose with the age, as might be expected from the fact that certain dangerous occupations were prohibited to minors under 18 years, and still further limitations existed for those under 16 years. Among the few exceptions were the semiskilled workers in paper and pulp mills, printing and publishing establishments, rubber factories, and electrical-supply factories. Here the rate of injuries was highest among the girls of 16 and 17 years. In clothing and textile industries the highest rate was among girls 14 and 15 years of age.

For girls as well as for boys the most dangerous occupations in mechanical and manufacturing industries were semiskilled work in metal and woodworking industries. One-half of the injuries to girls of 18 and 19 years and all injuries to those of 16 and 17 years doing semiskilled work in the metal industries were due to machines. Over one-half of the injuries in woodworking occurred in the operation of machines. As with the boys, most of the injuries occurred on presses, drills, power saws, jointers, and matchers.

Table 17 shows the injury rates per 1,000 girls under 20 years of age employed in the various occupation groups, by age groups.

TABLE 17.—*Industrial-injury rates per 1,000 girls under 20 years of age, by occupation groups and age: Wisconsin*

Occupation group [1]	Industrial-injury rates per 1,000 girls under 20 years				
	Total	18–19 years	Under 18 years		
			Total	16–17 years	Under 16 years
Total	5.8	5.7	5.8	5.7	6.3
Manufacturing and mechanical industries	13.4	15.7	11.7	12.3	9.7
Transportation	3.0	3.2	2.7	3.0	----------
Trade	1.1	1.5	.7	.8	----------
Personal and domestic service	1.5	2.2	.9	.8	1.0
Clerical occupations	(2)	(2)	1.1	(2)	3.0

[1] No injuries were sustained by girls employed in agriculture, extraction of minerals, or public or professional service.

[2] Less than 1 per 1,000.

AVERAGE TIME LOSS [19]

The average number of days lost through disability due to industrial accidents in Wisconsin bears out the facts shown by the injury rates. The average time loss per person employed was higher for boys than for girls, for minors 18 and 19 years of age than for those under 18, and for minors of 16 and 17 years than for the more fully protected group under 16 years of age. The greatest time loss occurred among the employees in manufacturing and mechanical industries, especially those in metal industries, in lumber and furniture factories, and in electrical-supply factories. In both number of accidents and length of the resulting disability these industries offered the greatest hazard.

[19] The lack of data on exposure to risk made it impossible to work severity rates; but the average number of days lost by the minors under 20 reported by the Federal census as employed in each occupation was computed. In computing time loss for the cases of temporary disability, the duration of disability was used. For the cases of permanent partial disability and for death the time loss was rated in accordance with the recommendations of a special committee of the International Association of Industrial Accident Boards and Commissions.

MASSACHUSETTS

INDUSTRIES OPEN TO MINORS

The Federal census of 1920 shows that over one-half of the gainfully occupied persons 10 years of age and over in Massachusetts were engaged in manufacturing and mechanical occupations. Five industries—textiles, metals, boots and shoes, food, and clothing—employed two-thirds of all the wage earners in manufactures. Three-fifths of the employed minors under 20 years of age were engaged in manufacturing and mechanical occupations, about one-fifth in clerical pursuits, and not quite one-tenth in trade.[1]

The child labor law prohibited the employment of children under 14 years of age [2] and required children under 16 years of age to have employment certificates in order to be employed legally. Employment in certain dangerous occupations was forbidden to minors under 18 years of age, and employment in specified additional occupations to minors under 16.[3]

EXTENT OF DISABILITY FROM INDUSTRIAL INJURY

The Massachusetts law required the reporting of all industrial injuries,[4] but only those injuries were compensable which disabled the worker for longer than the 10-day waiting period. During the year covered by the study there were 3,177 compensable injuries [5] to minors, of which 12 were fatal, 159 resulted in permanent partial disability, and 3,006 in temporary disability. Four-fifths were to boys, one-fifth to girls. Of the permanent partial disabilities, 149 involved the hands or arms. The duration of the temporary disabilities varied from less than two weeks to more than a year. In 18 per cent of the cases the duration of the disability was two weeks or less; in 41.8 per cent, from two to four weeks; in 27.5 per cent, from four weeks to two months.

Of the compensable injuries 268 were to minors under 16 years of age, 848 to those of 16 and 17 years, and 2,061 to those of 18 years and over. The extent of injury varied but slightly for the age groups. Injuries causing temporary disability formed 94.8 per cent of the injuries to minors under 16 years of age, 95.5 per cent of those to minors 16 and 17 years old, and 94.2 per cent of those to minors of 18, 19, and 20 years. The variation in duration of temporary disability

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[1] Fourteenth Census of the United States, 1920, Vol. IV, Population, pp. 941, ff.; Vol. IX, Manufactures, p. 591.

[2] The 14-year minimum age applied to any work during school hours, and to a large number of employments (including work in manufacturing, mechanical, and mercantile establishments, messenger service, etc.) at any time.

[3] Massachusetts, Gen. Laws 1921, ch. 149, sec. 60. See also Appendix B, p. 107.

[4] Massachusetts, Gen. Laws 1921, ch. 152, sec. 19.

[5] During the year covered by the study, the number of injuries to minors causing disability longer than the remainder of the day, turn, or shift on which the injury was incurred was 6,440. Injuries causing this extent of duration of disability are designated in the reports of the Massachusetts Department of Industrial Accidents and in this report as "tabulatable injuries" (in accordance with the definition recommended by the committee on statistics and compensation insurance cost of the International Association of Industrial Accident Boards and Commissions). These are the only reported accidents concerning which detailed statistics are available. Annual Report of the Massachusetts Department of Industrial Accidents, 1922, Table V, p. 45.

was as slight. Permanent partial disability followed 5.2 per cent of the injuries to minors under 16 years and to those of 18 years and over, and 4.4 per cent of those to minors of 16 and 17 years. Only 1 fatal injury occurred in the group of minors 16 and 17 years old, and 11 to those 18 years and over. In the year of the study there were in Massachusetts 29,496 compensable industrial injuries [6] to workers of all ages. Death followed 1 per cent of the injuries, permanent partial disability 4.2 per cent, temporary disability 94.8 per cent. The duration of temporary disability was slightly longer for the total group than for the minors alone.

Tables 18 and 19 show the extent of disability from industrial injuries to minors, by age and by sex of injured. (See also Appendix A, Table V.)

TABLE 18.—*Extent of disability from industrial injuries to minors, by sex of injured: Massachusetts*

Extent of disability	Industrial injuries to minors					
	Total		Boys		Girls	
	Number	Per cent distribution	Number	Per cent distribution	Number	Per cent distribution
Total	3,177	100.0	2,527	100.0	650	100.0
Death	12	.4	12	.5		
Permanent partial	159	5.0	133	5.3	26	4.0
Temporary	3,006	94.6	2,382	94.3	624	96.0

TABLE 19.—*Extent of disability from industrial injuries to minors, by age of injured: Massachusetts*

Age of injured	Industrial injuries to minors						
	Total	Extent of disability					
		Death		Permanent partial		Temporary	
		Number	Per cent	Number	Per cent	Number	Per cent
Total	3,177	12	0.4	159	5.0	3,006	94.6
14 years	[1] 68			6	8.8	62	91.2
15 years	200			8	4.0	192	96.0
16 years	357	1	.3	13	3.6	343	96.1
17 years	491			24	4.9	467	95.1
8 years	670			29	4.3	641	95.7
19 years	682	5	.7	38	5.6	639	93.7
20 years	709	6	.8	41	5.8	662	93.4

[1] Includes 1 injury to a boy 12 years of age.

LOCATION OF INJURY

Of 90 injuries to the head 6 resulted fatally. The eyes were the seat of injury in 39 of the cases, permanent partial disability (loss of one eye) resulting in 5 instances and temporary disability in the

[6] That is, injuries which disabled the worker beyond the 10-day waiting period fixed by the compensation act. See p. 26 and footnote 5.

rest. There were 287 injuries to the trunk. The back was involved in 103 of these (1 being fatal), and 73 caused hernia. Injuries of the upper extremities were by far the most frequent (2,097). There were 31 to the shoulder, 47 to the upper arm and elbow, 248 to the lower arm, and 1,671 to the hand. No injuries to the upper extremities caused death, but 149 resulted in permanent partial disability. Injuries to the lower extremities did not occur so frequently as to the upper extremities. Yet there were 579 of these, 278 involving the foot, 95 involving the ankle, and 73 involving the knee.

Injuries to the upper extremities were more frequent among injuries to minors than among the tabulatable [7] injuries to workers of all ages occurring in the same year. They were 66 per cent of the injuries to minors and 45.5 per cent of the total tabulatable injuries. The proportion of injuries to the other parts of the body was smaller for minors than among the total tabulatable injuries.

Table 20 shows the location of industrial injuries to minors in Massachusetts. (See also Appendix A, Table VI.)

TABLE 20.—*Location of industrial injuries to minors: Massachusetts*

Location of injury	Industrial injuries to minors		Location of injury	Industrial injuries to minors	
	Number	Per cent distribution		Number	Per cent distribution
Total	3,177	100.0	Trunk	287	9.0
			Upper extremities	2,097	66.0
Head	90	2.8	Lower extremities	579	18.2
Face and neck	67	2.1	Body and constitutional	57	1.8

NATURE OF INJURY

Two-fifths of all the injuries to minors were cuts, punctures, and lacerations; a little less than one-fifth were abrasions, contusions, and bruises. Fractures caused 6 of the 12 deaths, cuts and punctures caused 2 deaths, burns and electric shocks each caused 1 death. The nature of the injuries causing the remaining 2 deaths was not recorded.

Over one-half (57.7 per cent) of the abrasions, contusions, and bruises were to the upper extremities, nearly one-third (31.3 per cent) to the lower extremities, 4.8 per cent to the trunk, and only 1.9 per cent to the head. The burns affected not only the upper extremities (53.7 per cent) and the lower extremities (22.1 per cent), but also the face and neck (12.5 per cent) and the head (4.4 per cent). Five of the head burns involved the eyes. Of the cuts, punctures, and lacerations 83.7 per cent were on the upper extremities, 11.1 per cent on the lower extremities. Of the fractures 5 per cent were of the trunk and almost all of these cases (14 out of 16) involved the ribs. There were 6 fractures of the skull, all fatal. The largest group of sprains and strains (45.9 per cent) were of the trunk, including 87 sprains of the back and 73 cases of hernia. The next largest group of sprains and strains were of the lower extremities (27.4 per cent),

[7] See footnote 5, p. 26.

involving the ankles in 17.2 per cent of the cases. Only 25.2 per cent of the sprains affected the upper extremities. Amputation or loss of use [8] involved the eyes in 5 cases, the toes in 5 cases, and the upper extremities (usually only 1 finger) in the remaining cases.

Employed minors suffered proportionately fewer abrasions and bruises and fewer sprains and strains than occurred among the tabulatable injuries to workers of all ages, and on the other hand they suffered proportionately more cuts, punctures, and lacerations, more fractures, and more amputations and cases of loss of use of members (that is, more permanent partial disabilities) than occurred to the whole group. But although the whole group of workers suffered infection in but 9.4 per cent of their injuries, the minors suffered infection in 16.7 per cent of the cases.[9]

Table 21 shows the nature of industrial injuries to minors in Massachusetts.

TABLE 21.—*Nature of industrial injuries to minors: Massachusetts*

Nature of injury	Industrial injuries to minors		Nature of injury	Industrial injuries to minors	
	Number	Per cent distribution		Number	Per cent distribution
Total	3,177	100.0	Amputations and loss of use	159	5.0
Cuts, punctures, lacerations	1,292	40.7	Burns	136	4.3
Abrasions, contusions, bruises	584	18.4	Occupational diseases	24	.8
Sprains and strains	453	14.3	Dislocations	15	.5
Fractures	316	9.9	All other and not reported	198	6.2

COMPENSATION FOR INJURY

Among the minors receiving the 3,177 injuries causing disability of more than 10 days, only those whose employers had accepted the operation of the law were entitled to compensation. In 3,027, or 95 per cent of the cases, compensation was paid under the law, but in the remaining 150 cases the injured employee had no redress except to bring a suit for damages in the courts.[10] The indemnity to be paid during total disability [11] or for a fixed period in case of permanent partial disability or death, was placed at two-thirds of the worker's average weekly wage. It was limited, however, by fixed maxima and minima, so that the weekly payments could not be more than $16 or less than $7 during total disability, or more than $10 or less than $4 in case of death or permanent partial disability.[12] The result of the maximum and minimum limitations was that in 1.9 per cent of the cases of permanent partial disability the weekly payment was larger than two-thirds of the minor's wage, in 45.9 per cent it equaled

[8] Under this heading are classified all injuries resulting in amputation or loss of use of a member, regardless of their original nature.

[9] Annual Report of the Massachusetts Department of Industrial Accidents, 1922, pp. 17–19.

[10] The employer, however, who did not accept the act was deprived of his usual common-law defenses in case of such a suit. See footnote 5, p. 1.

[11] But not for more than a specified number of weeks—300 in case of temporary and 400 in case of permanent disability.

[12] Mass., Gen. Laws 1921, ch. 152, secs. 31, 34. Certain provisions were also made for reasonable medical and hospital services, etc. While the incapacity for work resulting from the injury was partial, the weekly compensation was to be two-thirds of the difference between the average weekly wage before the injury and that which could be earned thereafter, but not more than $16 a week (ibid., sec. 35).

two-thirds, and in over half—50.9 per cent—it was less. The corresponding percentages in the cases of temporary disability were 16.3, 70.7, and 8.1. In 1.3 per cent of the permanent partial disabilities and in 4.8 per cent of the temporary disabilities no compensation payments were made, because the employer had not accepted the act.

Of the noncompensated injuries—150 in number—five were fatal, but in these cases the minor left no dependents to whom compensation would have been paid even had the employer been subject to the act.[13] Two others resulted in permanent partial disability, a boy of 15 years losing the first and second fingers of his right hand and a boy of 19 losing his index finger. The remaining 143 cases were of temporary disability varying from 11 days to 180 days. In one-fourth of the cases the disability terminated in two weeks or less, in seven-tenths in four weeks or less, and in over nine-tenths in two months or less.

CAUSES OF INJURY

More injuries to minors were due to machinery than to any other cause. It was responsible for nearly one-third of the injuries, 3 resulting fatally. Handling of objects, falls of persons, and the use of hand tools were the next most frequent causes of injury; falls of persons caused 4 of the 12 deaths due to industrial injuries.

More cases (85.5 per cent) of permanent partial disability were due to machinery than to any other cause. Only 7.5 per cent of the cases of permanent partial disability were due to handling objects, 3.1 per cent to hand tools, and a very small percentage to any other cause. (See Appendix A, Table VII.)

The child labor law prohibited boys and girls under 16 years of age from operating many of the dangerous machines permitted to those of 16 and 17, and the effect of these prohibitions is seen in the much smaller percentage of the injuries to minors under 16 which were due to power-driven machinery—particularly woodworking, metal-working, and paper and paper products making machines—than of the injuries to minors 16 and 17 years of age (see Appendix B, p. 107). Machinery caused 29.5 per cent of the injuries to the workers of 18, 19, and 20 years, 37.9 per cent of those to workers of 16 and 17 years, and 36.6 per cent of those to workers under 16 years. Minors of 18 years and over suffered most of their injuries in handling objects (28.1 per cent), in operating machines (29.5 per cent), in falls of persons (11.6 per cent), and from vehicles (6.9 per cent). The two younger groups received more of their injuries from machinery than from any other cause. For workers of 16 and 17 years handling objects, falls, stepping on objects or striking against them, and the use of hand tools came next in frequency as causes of injuries; for those under 16 years falls caused the second largest group of injuries, and handling objects came next, but caused only 16.4 per cent of their injuries in comparison with 24.2 per cent of those to minors of 16 and 17, and 28.1 per cent of those to minors of 18 years and over. Stepping on or striking against objects was a frequent

[13] Beneficiaries under the act must be actually dependent, wholly or partially, upon the deceased employee, except in case of certain relationships where dependency is conclusively presumed.

cause of injury to children under 16 years, and vehicles also caused a number of the accidents to this group.

Among the tabulatable injuries to employed persons of all ages in Massachusetts, in the period covered by the study, the most frequent cause of injury was handling objects—29.2 per cent. Machinery caused only 16.6 per cent of the tabulatable injuries, falls of persons 15.5 per cent; vehicles, hand tools, and striking against objects or stepping on them each caused between 7 and 8 per cent. When from these injuries are subtracted those occurring to minors and those whose duration did not exceed the 10-day waiting period, leaving only compensable injuries to adults,[14] it is found that the proportion of machine injuries to adults was only half as high as to minors. On the other hand, the proportion due to handling objects was somewhat less for minors, 26.1 per cent, as against 29.5 per cent for adults. The proportions due to striking against objects or stepping on them and the use of hand tools were practically the same, and every other cause played a smaller part in the injuries to minors than in those to adults. These comparisons emphasize the danger of machinery to minors.

Table 22 shows the causes of industrial injury to Massachusetts minors. (See also Appendix A, Tables VII, VIII, and IX.)

TABLE 22.—*Cause of industrial injuries to minors: Massachusetts*

Cause of injury	Industrial injuries to minors		Cause of injury	Industrial injuries to minors	
	Number	Per cent distribution		Number	Per cent distribution
Total	3,177	100.0	Vehicles	190	6.0
			Falling objects	98	3.1
Machinery	1,028	32.4	Hot and corrosive objects	90	2.8
Handling objects	829	26.1	Occupational disease	23	.7
Falls of persons	382	12.0	Animals	20	.6
Hand tools	212	6.7	Explosions	15	.5
Stepping on or striking against objects	209	6.6	Electricity	10	.3
			All other and not reported	71	2.2

MACHINERY

Machinery was the cause of 1,028 compensable injuries to Massachusetts minors. It was responsible for over four-fifths of the cases of permanent partial disability and for 3 of the 12 deaths.

Hoisting machinery caused 71 injuries; motors and transmission apparatus caused 7; and 11 were caused by machines other than power-driven machinery, including fans, blowers, and pumps. But the great majority of machine injuries (90 per cent) were due to power-driven machinery.

Power-driven machinery.

Power-driven machinery caused 939 compensable injuries to minors. Most of the accidents (62.3 per cent) occurred in connection with starting, stopping, or operating the machines. Only 13.7 per cent occurred in adjusting the machine, tool, or work, and 13.4 per cent

[14] Hereafter in this section, whenever industrial injuries to adults (i. e., persons 21 years of age and over) are compared with those to minors, the injuries referred to are the compensable injuries, that is, the injuries causing disability for longer than the waiting period of 10 days.

in connection with cleaning or oiling machines. Somewhat smaller percentages of the tabulatable machine injuries to workers of all ages occurred in starting, stopping, or operating the machines (53.5 per cent), in adjusting the machine, tool, or work (10 per cent), and in cleaning or oiling machines (11 per cent), and a much greater percentage was due to flying objects (11 per cent of machine injuries to all workers, 2.4 per cent of those to minors).[15]

The point of operation was the part of the machine involved in four-fifths of the power-driven machine injuries to minors. In 8.9 per cent it was the gears, and in 2.9 per cent it was the belts. On all except textile machines the injury occurred at the point of operation in more than four-fifths of the cases. On the textile machines, on the other hand, less than two-thirds of the injuries occurred at the point of operation, and in over one-fifth of the cases the gears were the part involved. The percentage among the tabulatable machine injuries to workers of all ages was but slightly different. In 78.4 per cent of the cases the injury occurred at the point of operation; in 4.9 per cent the belts and in 4.5 per cent the gears were the part of the machine causing the injury.

On all except textile machines the majority of injuries to minors, varying from two-thirds to four-fifths with the kind of machine, occurred in starting, stopping, or operating the machine. On textile machines only a little over one-third (35.7 per cent) of the injuries occurred while starting, stopping, or operating the machine. One-third occurred while the minor injured was cleaning or oiling the machine. This high proportion was one of the striking facts about the textile-machine injuries. On none of the other main classes of machines did the proportion of injuries occurring during the cleaning or oiling of the machine rise above one-twelfth.

Table 23 shows the manner of occurrence of power-driven machine injuries to employed minors in Massachusetts.

Table 24 shows the parts of power-driven machinery at which the injury occurred.

TABLE 23.—*Kinds of power-driven machinery causing injuries to minors, by manner of occurrence: Massachusetts*

Kind of power-driven machine causing injury	Industrial injuries due to power-driven machinery						
	Total	Manner of occurrence					
		Starting, stopping, or operating machine or adjusting machine or work		Cleaning or oiling machine		All other	
		Number	Per cent	Number	Per cent	Number	Per cent
Total	939	714	76.0	126	13.4	99	10.5
Textile	294	155	52.7	97	33.0	42	14.3
Metal-working	183	158	86.3	4	2.2	21	11.5
Leather-working	122	110	90.2	6	4.9	6	4.9
Woodworking	87	72	82.8	2	2.3	13	14.9
Paper and paper products making	65	55	84.6	5	7.7	5	7.7
All other	188	164	87.2	12	6.4	12	6.4

[15] Annual Report of the Massachusetts Department of Industrial Accidents, 1922, p. 22. The injuries for workers of all ages are all machine injuries, not merely power-machine injuries.

TABLE 24.—*Kinds of power-driven machinery causing injuries to minors, by part of machine inflicting injury: Massachusetts*

Kind of power-driven machinery causing injury	Industrial injuries due to power-driven machinery						
	Total	Part of machine at which injury occurred					
		Point of operation		Gears		Other	
		Number	Per cent	Number	Per cent	Number	Per cent
Total	939	756	80.5	84	8.9	99	10.5
Textile	294	178	60.5	64	21.8	52	17.7
Metal-working	183	166	90.7	8	4.4	9	4.9
Leather-working	122	111	91.0	3	2.5	8	6.6
Woodworking	87	81	93.1	1	1.1	5	5.7
Paper and paper products making	65	57	87.7	4	6.2	4	6.2
All other	188	163	86.7	4	2.1	21	11.2

Textile machinery.—The Massachusetts child labor law contains certain general prohibitions relating to cleaning and oiling machinery, adjusting belts, or working in proximity to dangerous machinery, but does not specifically prohibit the employment of minors on any textile machines except pickers, which workers under 16 are forbidden to operate or assist in operating. Textile machinery caused 41 injuries to minors under 16, 87 to those of 16 and 17, and 166 to those 18 years of age and over. Although this class of machinery caused no deaths it was found to be responsible for 35 cases of permanent partial disability, a percentage (11.9 per cent) which was, however, lower than that for any of the other main classes of machine injuries. The textile machines on which the greatest number of injuries took place were looms, spinning frames, jacks and mules, speeders, and carding machines. More than one-half (56 per cent) of the injuries received from carding and combing machines were received while cleaning or oiling the machines, 30 per cent in starting, stopping, or operating the machines, and 8 per cent while adjusting the machine or work. Over one-third of the injuries from weaving machines were received during the cleaning or oiling of the machine, 23.2 per cent during the starting, stopping, or operating of the machine, and 19.6 per cent in the adjusting of the machine, tool, or work. Spinning machines were the only ones on which more injuries occurred in starting, stopping, or operating the machines (40 per cent) than in cleaning or oiling them (30.1 per cent). Adjusting the spinning machines or the work caused 14.3 per cent of the injuries. Cleaning or oiling the machines caused 18 injuries to children under 16 years of age. Three children of this age group suffered permanent partial disability, each of two boys losing part of one finger, and a third boy losing three fingers.

Cleaning and oiling the machines caused 25 injuries to boys and girls of 16 and 17 years. Among minors of this age group there were 11 cases of permanent partial disability caused by textile machinery, four to boys, seven to girls. Two of the boys were loom cleaners whose fingers were caught in the gears while they were cleaning the machines. One girl, a speeder tender, lost part of her right thumb in the same way. The right index finger of another girl was caught in the gears of her loom and amputated at the first joint. Another

was cleaning the rolls of her finishing machine when her right hand was caught (see case No. 21, p. 77). The flesh was stripped from her fingers, so that the first, third, and fourth fingers had to be amputated, and the second remained stiff and useless. Another girl was feeding blankets into a cutting machine when the machine blade dropped, cutting off the ends of the four fingers on her right hand (see case No. 18, p. 75). Injuries causing permanent partial disability occurred to 21 minors 18 years of age and over.

Table 25 shows the kinds of textile machinery injuring employed minors, by age, in Massachusetts.

TABLE 25.—*Kinds of textile machinery causing injuries to minors, by age of injured: Massachusetts*

Kind of textile machinery causing injury	Industrial injuries to minors, due to textile machinery			
	Total	Age of injured		
		Under 16 years	16–17 years	18–20 years
Total	294	41	87	166
Carding and combing machines	50	5	11	34
Cards	18	1	4	13
Combs	5		1	4
Speeders	25	4	5	16
Other	2		1	1
Dyeing, finishing, and printing machines	20	3	6	11
Opening and cleaning machines	12		2	10
Pickers	10	(1)	2	8
Openers	2			2
Spinning machines	91	23	30	38
Jacks and mules	19	11	4	4
Spinning frames	41	7	18	16
Drawing frames	11	1	5	5
Spoolers	10	3	2	5
Twisting machines	10	1	1	8
Weaving machines	56	4	20	32
Winders, doublers, and quillers	13	3	3	7
Folding machines	7	1	3	3
All other textile machines and not reported	45	2	12	31

[1] Minors under 16 were prohibited from employment on pickers. See Appendix B, p. 107.

Metal-working machinery.—One-fifth (19.5 per cent) of all injuries to minors from power machinery were due to metal-working machines. Although there were no deaths there were 32 cases of permanent partial disability, a higher proportion (17.5 per cent) than resulted from any other cause. Three-fourths of the accidents occurred in starting, stopping, or operating the machine and one-tenth in adjusting the work. Nine of the injuries were to minors under 16 years of age, causing temporary disability. Employment on a number of metal-working machines was prohibited for children under this age (see Appendix B, p. 107). There were 46 injuries to minors of 16 and 17 years. Permanent partial disability resulted for nine boys of 17 years of age and one boy of 16 years, one being blinded in one eye, the others losing one or more fingers (see case No. 19, p. 76; case No. 29, p. 82). The proportion of injuries on metal-working machines

resulting in permanent disability was higher for this age group than for either the oldest or the youngest age group. There were 22 instances of permanent partial disability among the injured minors 18 years of age and over.

Table 26 shows the kinds of metal-working machinery causing injury to Massachusetts minors.

TABLE 26.—*Kinds of metal-working machinery causing injuries to minors, by age of injured: Massachusetts*

Kind of metal-working machinery causing injury	Industrial injuries to minors due to metal-working machinery			
	Total	Age of injured		
		Under 16 years [1]	16–17 years	18–20 years
Total	183	9	46	128
Punch presses	79	5	18	56
Power	20	1	7	12
Foot and hand	59	4	11	44
Abrasive wheels	19	2	4	13
Lathes and automatic screw machines	17		2	15
Milling and gear-cutting	15	1	7	7
Drills	10		2	8
Hammers and forging machines	4			4
All other and not reported	[2] 39	1	[2] 13	25

[1] For list of machines whose use was prohibited to minors under 16 see Appendix B, p. 107.
[2] Includes 3 injuries caused by polishers and wire-working machines.

Leather-working machinery.—Leather-working machinery caused 140 injuries, 17, or 12.1 per cent, of which resulted in permanent partial disability. This is not so high a proportion as among metal-working, woodworking, or paper and paper products making machinery but is slightly higher than among the injuries due to textile machinery. Almost all the injuries occurred while the machine was in operation, starting, or stopping, or while the machine or work was being adjusted. Three of the 15 injuries to children under 16 years of age resulted in permanent partial disability. The most serious injury was sustained by a 14-year-old boy whose task was to catch pieces coming through a splitting machine which was being fed by some one else. He tried to feed the machine while standing behind it, and his right hand was caught and cut off. A second 14-year-old boy who was operating a shank-cutting machine cut his left forefinger so that it had to be amputated at the first joint. A girl of 15 had her right middle finger caught when she was adjusting the work in a leather-stamping machine—one of the machines which children under 16 are forbidden by law to operate. (See Appendix B, p. 107.) The finger was so crushed and burned that she lost the use of the last joint. There were 48 injuries to minors 16 and 17 years of age, but there were only three cases of permanent partial disability—a much smaller proportion than among the younger workers. The right hand of a 16-year-old boy was caught in a stamping machine and so injured that his whole forefinger had to be amputated. The left hand of a girl of the same age who was operat-

ing a glazing machine in the manufacture of glazed kid was caught in the machine and her thumb so badly crushed that amputation was necessary. A boy of 17 years who was feeding skins into a wringing machine had his right hand drawn into the rolls and so crushed and cut that he lost the use of his third finger (see case No. 27, p. 8). The injuries to minors of 18 years and over caused 11 cases of permanent partial disability.

Table 27 shows the kinds of leather-working machinery causing injuries to Massachusetts minors.

TABLE 27.—*Kinds of leather-working machinery causing injuries to minors, by age of injured: Massachusetts*

Kind of leather-working machinery causing injury	Industrial injuries due to leather-working machinery			
	Total	Age of injured		
		Under 16 years	16–17 years	18–20 years
Total	140	15	48	77
Leather-products machinery	122	14	38	70
Skiving	12	----------	4	8
Cutting	11	2	1	8
Heeling	11	----------	4	7
Punching and pressing	9	----------	4	5
Dinking	7	----------	----------	7
Grading and sorting	5	1	2	2
Trimmer	4	----------	1	3
Embossing	4	----------	2	2
Buffing and scouring	3	----------	1	2
Sewing	3	----------	1	2
Lacing	3	1	1	1
Stamping	3	1	1	1
Eyeletting	3	1	----------	2
Nailers and tackers	3	1	----------	2
Miscellaneous leather and shoemaking	41	7	16	18
Tanning machines	18	1	10	7
Splitting	3	1	1	1
Fur-working	3	----------	3	----------
Buffing and other drums	2	----------	----------	2
All other	10	----------	6	4

Woodworking machinery.—The 87 injuries due to woodworking machinery caused 14 cases of permanent partial disability and two deaths—the only deaths due to power-driven machinery. The proportion of cases of permanent partial disability resulting from woodworking machine injuries was higher than among those resulting from any other power-driven machinery except metal working. Two children under 16 years of age were injured—both by circular-saw machines, the operation of which, with certain other woodworking machines (see Appendix B, p. 107), was prohibited for minors under that age. The law contained no specific prohibition against the employment of minors of 16 and 17 years in the operation of any types of woodworking machinery. Among workers of these ages there were 26 injuries, of which three resulted in permanent partial disability. Two of these occurred on power saws, one 17-year-old boy losing two joints of his right forefinger, another all four fingers of his right hand (see case No. 26, p. 80). The third,

also a boy of 17 years, was using a sticker when his hand slipped upon the knife and he lost one phalange of his left second finger.

Eleven of the 59 injured workers of 18, 19, and 20 years of age were permanently disabled. The two minors killed were 19-year-old boys. One of them was struck on the head by a board which flew from a saw, the other fell upon a saw machine.

Table 28 shows the kinds of woodworking machinery causing injury to minors in Massachusetts.

TABLE 28.—*Kinds of woodworking machinery causing injuries to minors, by age of injured: Massachusetts*

Kind of woodworking machinery causing injury	Industrial injuries to minors due to woodworking machinery			
	Total	Age of injured		
		Under 16 years	16–17 years	18–20 years
Total	87	2	26	59
Saws	45	2	14	29
Band	3		1	2
Circular	18	2	5	11
Other	24		8	16
Planers	13		5	8
Broom and brush making machines	6		2	4
Boring machines and drills	5		1	4
Jointers and matchers	3			3
Molders	2			2
Stickers	1		1	
All other and not reported	12		3	9

Paper and paper products making machinery.—No fatal injuries were due to paper making and paper products making machines, but nine accidents resulted in permanent partial disability (a percentage of 13.8). Two-thirds of the injuries were received while the machines were being started, stopped, or operated, and nearly one-fifth while the machine or work was being adjusted.

The employment of children under 16 years of age to operate or assist in operating certain paper and paper products making machines was prohibited by the child labor law. (See Appendix B, p. 107.) Only one child under that age was injured, a 14-year-old boy who was working on an automatic box-making machine and was temporarily disabled. There were 24 injuries to minors of the next age group, including two cases of permanent partial disablement to 17-year-old boys working on paper-cutting machines, the operation of which was forbidden to minors under 16. One of these two boys lost the last joint of his left middle finger when his hand slipped into the machine; the other sustained a compound fracture and dislocation of the little finger of his right hand, resulting in the loss of its use, from the same sort of accident. The 40 injuries to minors 18 years of age and over resulted in 7 cases of permanent partial disability, the most serious being a 20-year-old boy's loss of use of the right hand.

Table 29 shows the kinds of paper and paper products making machinery causing injuries to minors in Massachusetts.

TABLE 29.—*Kinds of paper or paper products making machinery causing injuries to minors, by age of injured: Massachusetts*

Kind of paper or paper products making machinery causing injury	Industrial injuries due to paper and paper products making machinery			
	Total	Age of injured		
		Under 16 years [1]	16–17 years	18–20 years
Total	65	1	24	40
Paper-making machinery	17			17
Calenders	7			7
Digestors	2			2
Drivers	2			2
Other	6			6
Paper products making machinery	48	1	24	23
Cutting and punching machines	12		7	5
Paper cutters	7		4	3
Punch presses	4		2	2
Saws	1		1	
Automatic box making	8	1	3	4
Corner staying	6		4	2
Bag and envelope making	5		1	4
Paper-cup making	4		2	2
Folding presses	3		1	2
All other	10		6	4

[1] For list of paper and paper products making machines whose use was prohibited to minors under 16 see Appendix B, p. 107.

Other kinds of power-driven machinery.—Printing and bookbinding machines were responsible for 46 injuries, printing presses causing over half of them. In 10 cases permanent partial disability resulted. Minors under 16 years of age were forbidden to work on job or cylinder printing presses operated by power other than foot power (see Appendix B, p. 107). One 15-year-old child working on a job platen press was injured. Eighteen workers 16 and 17 years of age were injured, including 9 injured by printing presses and 4 injured by job platen presses. Two 16-year-old boys whose hands were caught in the printing presses which they were operating suffered permanent disability, each losing one finger while in one case the remaining fingers of the hand were left stiff. A girl of 16 operating a bookbinding machine lost the first phalange of the second and third fingers of her left hand when it was caught in the machine. Permanent partial disability resulted from 7 of the 27 injuries to minors 18 years of age and over.

Various food, beverage, and tobacco-working machines (chiefly cutting machines and milling and grinding machinery) caused 49 injuries, including 6 to minors under 16 years of age. There were 18 injuries to minors 16 and 17 years of age, and 25 to minors of 18 years and over. Permanent partial disability resulted in 8 cases. Two of these were children of 14 years whose hands were caught in the machines while they were packing ice in ice-cream freezers (see case No. 28, p. 8). Two others were children of 15 whose hands were caught in milling and grinding machines.

Rubber and composition machinery caused 22 injuries, 1 to a 15-year-old boy, 7 to minors 16 or 17 years of age, 14 to minors of 18

years and over. Permanent partial disability resulted from two of these injuries, both to 20-year-old minors.

Clothing machinery was involved in 29 cases of injuries (14 in the operation of sewing machines, most of the others in the operation of such machines as button-sewing, snap-sewing, buttonhole, and eyelet-making machines). One minor 20 years of age was injured while operating a cutting machine. Six of the injured were 15 years old, 11 were 16 and 17 years of age. There were no cases of permanent disability.

Hoisting machinery.

Hoisting machinery caused 71 injuries, 60 of them due to elevators, 11 to cranes, derricks, and conveyors. In the larger number of cases the injured person was caught between the car and the floor or between the car and the gates.

Minors under 18 years of age were forbidden to operate or manage hoisting machines, and operators of either freight or passenger elevators had to obtain a license [16] which could not legally be granted to a minor less than 18 years of age. Minors under 16 years of age were forbidden to operate, clean, or repair freight elevators. Most of the 13 children under 16 years who were injured were caught between the car and the floor or gates. In 11 cases this disability was temporary, but one 15-year-old boy lost the great toe of his right foot, and another lost the great toe and part of the second toe of his right foot. Temporary disability resulted from the 21 injuries to minors of 16 and 17 years, the majority of whom were caught by the cars or gates. The one fatal accident occurred to a boy of 20 who fell into an elevator shaft.

HANDLING OBJECTS

Handling objects caused 26.1 per cent of the injuries to minors, including 12 cases of permanent partial disability. Heavy objects caused most of the more serious injuries. In four cases the object was dropped on a hand or foot, causing consequent amputation or loss of use of fingers or toes. In three cases the fingers of the injured worker were caught between the heavy object and something else and so injured that amputation or loss of use of one finger resulted. In one case metal tire rims fell from a pile, catching a boy's finger so as to cause a compound fracture which necessitated amputation. The remaining four injuries were cuts or scratches made by sharp or rough objects, causing wounds which became so infected that amputation of the injured digit was necessary.

Handling objects was a more frequent cause of the injuries to the older boys and girls than to the younger ones and caused the largest number of the injuries to adults. Injuries due to handling objects were 16.4 per cent of the injuries to minors under 16 years, 24.2 per cent of those to minors of 16 and 17 years, 28.1 per cent of those to minors of 18, 19, and 20 years, and 29.2 per cent of those to adults. For all ages the class of objects causing the largest number of these injuries was heavy objects; and for this class too there was a steady increase in frequency from the youngest group to the adults. The widest difference was in the percentage of injuries from strain in

[16] With certain specified exceptions, chiefly for automatic elevators, etc. Department of Public Safety. Elevator and Escalator Regulations, taking effect June 19, 1914, including alterations and amendments, taking effect Dec. 26, 1923, framed by the Board of Elevator Regulations, p. 38. Boston.

handling heavy objects, the percentage among workers under 16 being much lower than among workers of 16 and 17. Only two minors under 16 years were injured in this way, in contrast to 45 who were 16 and 17 years old. A high proportion of hernia resulted from strains. Sharp or rough objects caused proportionately more of the injuries among minors than among adults, and more of the injuries to the minors under 18 than to those 18 years of age and over. Hand trucks, carts, and wheelbarrows caused a slightly lower proportion of the injuries of this group among minors than among adults, but the proportion decreased, instead of increased, from the youngest to the oldest age groups among the minors.

Table 30 shows the manner of occurrence of injuries to Massachusetts minors due to handling objects.

TABLE 30.—*Manner of occurrence of industrial injuries to minors due to handling objects: Massachusetts*

Manner of occurrence of injury and kind of object handled	Industrial injuries to minors due to handling objects		Manner of occurrence of injury and kind of object handled	Industrial injuries to minors due to handling objects	
	Number	Per cent distribution		Number	Per cent distribution
Total	829	100.0	Sharp or rough objects—Con.		
Heavy objects	529	63.8	Protruding wires or nails	49	5.9
Causing strain in handling	195	23.5	Glass	36	4.3
Dropped	103	12.4	Sheet metal and sheet-metal objects	26	3.1
Catching worker against other object	66	8.0	Bones	3	.4
Falling while being loaded	20	2.4	Other	50	6.0
Falling while being piled	11	1.3	Hand trucks, carts, wheelbarrows	56	6.8
Thrown	16	1.9	Striking worker	20	2.4
Other	118	14.2	Catching worker against other object	17	2.1
Sharp or rough objects	244	29.4	Object falling from	7	.8
Wood or metal slivers	80	9.7	Other	12	1.4

FALLS OF PERSONS

Death resulted from 4 of the 382 falls of persons. These fatal falls were one from a loading platform, another with a falling staging, the third into a floor opening, the fourth into a stepping pit. The workers killed were all boys, one of them 16 years of age, the others 20 years of age. Falls also caused 2 cases of permanent partial disability. A boy of 15 slipped and fell against a heel-skiving machine, cutting three fingers. The first phalange of the right forefinger had to be amputated. Of the injuries of temporary duration one-fifth terminated within two weeks, over one-half within four weeks, and one-tenth lasted longer than two months (see case No. 31, p. 83).

Falls caused 12 per cent of the injuries to minors (but 17.2 per cent of the injuries to adults). The proportion of falls among the injuries to minors of 16 and 17 years, and of those to minors of 18 years and over was the same—between 11 and 12 per cent. The proportion was highest for those under 16 years (17.2 per cent). More than one-half of the falls of minors took place on level surfaces

and were due chiefly to slipping. Of the 46 falls of children under 16 years, 21 were due to slipping and 10 others were from stairways. Minors of 16 and 17 years sustained 97 falls, 38 due to slipping and 21 others from stairways. Only 1 worker under 16 fell from a ladder and 1 from a scaffolding, but 9 minors of 16 and 17 years fell from ladders or scaffolding. Minors under 16 were prohibited by law from working on scaffolding, and the boy injured had stepped up to pass a water pail to the men working there. He fell about 4 or 5 feet, striking a concrete buggy. His right side was bruised and strained and a kidney was ruptured, finally having to be removed.

Table 31 shows the manner of occurrence of industrial injuries to Massachusetts minors due to falls of persons.

TABLE 31.—*Manner of occurrence of industrial injuries to minors due to falls of persons: Massachusetts*

Manner of occurrence of injury	Industrial injuries to minors due to falls of persons		Manner of occurrence of injury	Industrial injuries to minors due to falls of persons	
	Number	Per cent distribution		Number	Per cent distribution
Total	382	100.0	Falling on level	196	51.3
Falling from elevation	170	44.5	Slipping	136	35.6
Stairs and steps	72	18.8	Stumbling over loose objects	30	7.9
Ladders	23	6.0	Stumbling on fixed objects	9	2.4
Benches, boxes, chairs, tables	20	5.2	Other	21	5.5
Scaffolding and staging	14	3.7			
Other	41	10.7			
Falling into excavations	16	4.2			
Floor openings	9	2.4			
Other excavations	7	1.8			

TABLE 32.—*Manner of occurrence of industrial injuries to minors due to hand tools: Massachusetts*

Manner of occurrence of injury	Industrial injuries to minors due to hand tools		Manner of occurrence of injury	Industrial injuries to minors due to hand tools	
	Number	Per cent distribution		Number	Per cent distribution
Total	212	100.0	Tool in hands of fellow worker	13	6.1
Tool in hands of injured worker	199	93.9	Glancing or slipping of tool in use	9	4.2
Glancing or slipping of tool in use	159	75.0	Other	4	1.9
Other	40	18.9			

HAND TOOLS

Hand tools were a frequent cause of injury, their glancing or slipping while in use being responsible for four-fifths of the accidents due to this cause. They injured 10 minors under 16 years of age, 54 of 16 or 17 years, and 148 of 18 years and over. Such injuries constituted

3.7 per cent of those to minors under 16 years, and from 6 to 7 per cent to the two older groups of minors and to adults. Among boys of 18 years and over there were five cases of permanent partial disability. Three occurred because of the glancing or slipping of tools and one because the tool caught. The resulting cuts caused the loss of a finger in two cases, a thumb in another, and two toes in the fourth. The fifth boy lost the use of his left eye, injured by a chip of stone set flying by his tool.

Table 32 shows the manner of occurrence of industrial injuries to Massachusetts minors due to hand tools.

STEPPING ON OR STRIKING AGAINST OBJECTS

Three-fourths of the 209 injuries due to stepping on or striking against objects were caused by striking against nails, sharp projections from walls or structures, or other fixed objects, and one-fourth were caused by stepping on sharp objects, usually nails. One case of permanent partial disability resulted, consisting of the loss of the middle finger of the right hand through development of infection in a puncture made by a nail. The other injuries caused temporary disability. One-fifth terminated within two weeks or less, one-half in from two to four weeks, one-fifth in from four weeks to two months, and all within three months. Age, with its greater experience and better muscular coordination, apparently decreased slightly the likelihood of injuries from this group of causes. They formed 10.4 per cent of the injuries to minors under 16 years of age, 7.9 per cent to those of 16 and 17 years, 5.5 per cent to those of 18 years and over, and 6.6 per cent of all the injuries to minors. They caused 6 per cent of the injuries to adults.

VEHICLES

Vehicles were the cause of 190 injuries to minors. Two of the injured died, the rest suffered only temporary disability. The frequency of injuries due to vehicles varied in the different age groups. Among the minors under 16 years vehicles caused 6.3 per cent of all injuries; among those of 16 and 17 years they caused 3.7 per cent; among those of 18 years and over they caused 6.9 per cent. For all under 21 years the percentage was 6; for adults, 8.5. The possibility of injuries to children was lessened by the clause of the child labor law forbidding the employment of any minor under 18 years of age to operate motor vehicles of any description (see Appendix B, p. 107). The manner in which the injuries due to vehicles occurred shows why this prohibition apparently effected only a slight decrease in the number of injuries to minors. Automobiles and other power vehicles caused 150 injuries, 75 of which were sustained in cranking automobiles, 17 in collisions, 16 by being struck by the vehicle, and 11 by falls from the vehicle. Animal-drawn vehicles were involved in 29 injuries, 16 accidents being due to falls from them and 4 to being struck by them. Eight injuries were due to cars and engines. Four, among them 2 fatal injuries, were due to being struck by the car or engine, 3 to falls from them, and the other to being struck by an object falling from them. Children under 16 years sustained 17 injuries from vehicles, among which were 9 incurred in cranking automobiles, and 6 caused by bicycles. There were 31 injuries to minors of 16 and 17 years, among them 10 from cranking automobiles,

4 to falls from them, 4 from being struck by them, and 2 from collisions.

More than one-third (36.8 per cent) of the injuries from vehicles were fractures, 18.4 per cent were sprains and strains, 21.6 per cent abrasions, contusions, and bruises, and 14.2 per cent punctures and lacerations. Cranking automobiles resulted in 52 fractures, 11 sprains and strains, 7 lacerations, 1 dislocation, and 4 other injuries.

Table 33 shows the manner of occurrence of industrial injuries to Massachusetts minors from vehicles.

TABLE 33.—*Manner of occurrence of industrial injuries to minors due to vehicles: Massachusetts*

Manner of occurrence of injury and kind of vehicle	Industrial injuries due to vehicles		Manner of occurrence of injury and kind of vehicle	Industrial injuries due to vehicle	
	Number	Per cent distribution		Number	Per cent distribution
Total	190	100.0	Automobiles and other power vehicles	150	78.9
Cars and engines and plant trucks on tracks	9	4.7	Cranking	75	39.5
			Collisions	17	8.9
Falls from or in	3	1.6	Struck by	16	8.4
Struck by or caught between	4	2.1	Other	42	22.1
Other	2	1.0	Animal-drawn vehicles	29	15.2
			Water craft	2	1.0

FALLING OBJECTS

Falling objects (accounting for 3.1 per cent of all the injuries to minors) caused 2.6 per cent of the injuries to minors under 16 years, 2.4 per cent to those of 16 or 17 years, and 3.4 per cent to those of 18 years and over, in contrast to 5.6 per cent of the injuries to adults.

One death occurred when a 19-year-old telephone lineman had his skull fractured by a brace that slipped down a pole. A case of permanent partial disability resulted when several rocks in a quarry became loose and fell, carrying with them an 18-year-old boy who was barring them down. His right arm was broken and the muscles so torn that amputation at the elbow was necessary.

Table 34 shows the manner of occurrence of industrial accidents to Massachusetts minors due to falling objects.

TABLE 34.—*Manner of occurrence of industrial injuries to minors due to falling objects: Massachusetts*

Manner of occurrence of injury	Industrial injuries to minors due to falling objects		Manner of occurrence of injury	Industrial injuries to minors due to falling objects	
	Number	Per cent distribution		Number	Per cent distribution
Total	98	100.0	Objects tipping over	12	12.2
			Falling trees	2	2.0
Collapse of piles	2	2.0	Other and not reported	3	3.1
Objects falling from elevations	79	80.6			
Machines or work benches	26	26.5			
Piles	4	4.1			
Other	49	50.0			

OTHER CAUSES OF INJURY

Of the 229 remaining injuries to employed minors in Massachusetts 90 were caused by hot and corrosive substances. Most of these (65) occurred to minors 18 years of age and over, but 19 occurred to minors of 16 or 17 years and 6 to those under 16. Molten metal caused 16 injuries, flames 11, hot water 9, other hot liquids 13. Acids caused 14 injuries, asphalt, pitch and tar 9, contact with hot surfaces 10.

There were 23 cases of occupational disease which caused compensable temporary disability, 2 among minors under 16 years of age, 4 among those of 16 and 17 years, and 17 among those of 18 years and over. The diseases included 2 cases of lead poisoning, 2 of mica poisoning, 1 of nickel itch, 1 of chrome poisoning, 1 of anthrax, and 1 of cocobola poisoning.

Infections not otherwise diagnosed on the accident reports were received from handling skins in a tannery, from cleaning shoe linings, from using stain on shoes, from scraping the inside of a boiler, from handling chemicals in a dye factory, from picking tobacco, from making rubber water bottles. A plumber's helper became affected with dermatitis; a laundress in a hospital developed an infection in both hands; and a boy subjected to continual kneeling to put bands on frames in the spinning room of a cotton factory suffered a serious affection of one knee.

Animals caused 20 injuries, 5 to minors 16 and 17 years of age, 15 to minors of 18 years and over. Horses were responsible in 16 instances, including 7 runaways, 7 cases where the worker was kicked or stepped on, 1 accident due to sudden starting while being hitched, and 1 due to crowding the boy against a partition. There were 3 injuries caused by cattle, and 1 caused by a dog (which bit the boy who was holding it for a veterinary surgeon). Among the injuries there were 6 fractures, 5 cuts, punctures, or lacerations, 5 abrasions, contusions, or bruises, and 1 multiple injury. Explosions of steam, gasoline, alcohol, and other materials caused 15 injuries (1 fatal). Of the minors thus injured 3 were under 16 years of age, 5 were 16 or 17 years, 7 were 18 years and over. Electricity caused 10 injuries (1 fatal), 9 to minors 18 years of age and over, 1 to a 17-year-old boy who was using a damp extension cord and received a shock which stunned him, disabling him for 19 days. Of the remaining 71 injuries 31 were caused by doors, gates, windows, and covers, and 3 were due to wrestling and horseplay.[17]

[17] No estimate of occupational risk has been made for Massachusetts because the necessary occupation statistics were not available for the year in which the accidents occurred (July 1, 1921, to June 30, 1922) whereas in Wisconsin and New Jersey the midpoint of the year covered by the study (July 1, 1919, to June 30, 1920) coincided with the date of the Federal census. See pp. 19, 58.

NEW JERSEY

INDUSTRIES OPEN TO MINORS

The Federal census of 1920 shows that 48 per cent of the persons engaged in gainful occupations in New Jersey were engaged in manufacturing and mechanical occupations. One-third of those in manufactures were in the metal industries, one-sixth in the textile industries, and one-tenth in clothing, food, and chemical industries. The 10 principal manufacturing industries in order of the number of wage earners employed were shipbuilding, silk goods, electrical supplies and machinery, foundry and machine shop products, dyeing and finishing textiles, iron and steel works and rolling mills, worsted goods, chemicals, rubber goods, and phonographs.[1]

The child labor law prohibited the employment of children under 14 years of age and required children under 16 to obtain work permits ("age and schooling certificates"), in order to be employed legally. The employment of children under 16 in certain dangerous occupations was prohibited.[2]

EXTENT OF DISABILITY FROM INDUSTRIAL INJURY

During the period covered by the study, 2,019 compensable injuries occurred to New Jersey minors, of which 14 were fatal, 502 resulted in permanent partial disability, and 1,503 in temporary disability lasting longer than the 10-day waiting period (see p. 1).

The percentage of the injuries classed as causing permanent partial disability was much higher in New Jersey than in either Wisconsin or Massachusetts (24.9 per cent as compared with 11.3 per cent and 5 per cent, respectively). As the waiting period was shorter in Wisconsin (7 days; see p. 1) than in New Jersey, one would expect the Wisconsin percentage of injuries causing permanent partial disability to be lower because its total number of compensable injuries would include a greater percentage of injuries which caused merely temporary disablement. But as the waiting period in Massachusetts was the same (see p. 1) as in New Jersey during the periods studied, the difference between the Massachusetts percentage of injuries classed as causing permanent partial disability and that of New Jersey must be due to some other cause. It is evidently attributable in part to the fact that under the New Jersey law a number of partial disablements were classified as entitling the injured worker to compensation as permanently disabled, whereas in Massachusetts the same injuries would have been classified as requiring compensation for only temporary disablement. Measured by the Massachusetts standard, the percentage of the New Jersey injuries causing permanent partial

[1] Fourteenth Census of the United States, 1920, Vol. IV, Population, pp. 972 ff.; Vol. IX, Manufactures, pp. 891–892.

[2] Agricultural pursuits were exempted from the operation of the child labor law, and provision was made for certain exemptions relating to the work of children outside school hours. New Jersey, Comp. Stat. 1910, Vol. 3, Labor, secs. 16 (as amended by Laws of 1914, chs. 60, 236, and 252), 18 (as amended by Laws of 1914, ch. 252); Laws of 1911, ch. 136, secs. 1 (as amended by Laws of 1918, ch. 204), 2 (as amended by Laws of 1919, ch. 37), 15 (as amended by Laws of 1918, ch. 204); Laws of 1914, ch. 23. See also Appendix B, p. 108.

disability would have been 13.1 per cent instead of 24.9 per cent.[3] Yet even this is higher than the corresponding percentage of the Massachusetts accidents. It may be that the injuries sustained by New Jersey minors really had more serious results; or that proportionately fewer of the less serious injuries were reported to the compensation board of New Jersey than to those of the other two States.[4]

In 267 of the 1,503 cases of injury causing temporary disability the disablement terminated within two weeks, in 635 cases it terminated in from two to four weeks. In 441 cases it lasted from four weeks to two months, in 116 from two to three months, and in 41 cases longer than three months. That is, about one-sixth of the temporary disabilities (17.8 per cent) lasted two weeks or less, three-fifths (60 per cent) lasted four weeks or less, and one-tenth (10.4 per cent) exceeded two months in duration.

Approximately four-fifths of the injuries were to boys, one-fifth to girls. The percentage of injuries causing death or permanent partial disability was 26.9 for girls, 25.3 for boys. Among the injuries causing temporary disability 69.8 per cent of those to girls caused disability of four weeks or less, and 30.2 per cent caused disability of more than four weeks. For boys the percentages were 58.1 and 41.7, respectively.

Children under 16 suffered 109 of the injuries, workers of 16 and 17 suffered 682 of them, and 1,228 injuries occurred to those 18 years of age and over. In these three age groups the percentage of the injuries causing death or permanent partial disability was 22.9 per cent for the youngest group, 27.1 per cent for minors of 16 and 17 years and 24.9 per cent for the oldest group—a somewhat larger percentage for minors of 16 and 17 than for the workers in either the younger or the older group—and proportionately a few more of the injuries causing temporary disability terminated in 4 weeks or less for minors under 16 years and those 18 years and over, than for the 16 and 17 year old group.

Tables 35 and 36 show the extent of disability to New Jersey minors, by sex and age of the injured.

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[3] Of the 502 injuries which were classified in New Jersey as causing permanent disability 237 would not have been so classified under the Massachusetts law. Under both classifications a high percentage of permanent partial disabilities is found among the injuries due to certain types of power-driven machinery. By the New Jersey classification permanent partial disability resulted from 47.9 per cent of the woodworking-machine injuries, from 48.5 per cent of the metal-working machine injuries, and from 56.3 per cent of the injuries due to paper and paper products making machines. Under the Massachusetts classification the corresponding percentages, though somewhat lower, are still relatively high—35.4 per cent of the woodworking-machine injuries, 29.1 per cent of the metal-working machine injuries, and 34.4 per cent of the injuries due to paper and paper products making machines. On the other hand, only 22 of the 42 injuries due to handling objects which under the New Jersey law were classified as causing permanent partial disability (see p. 54), and only 1 of the 8 injuries due to hoisting machines so classified (see p. 103) would have been compensated as permanent partial disabilities under the Massachusetts classification. Hoisting machines and the handling of objects, however, caused only 1.6 and 8.4 per cent, respectively, of the 502 injuries resulting in permanent partial disability to New Jersey minors, whereas power machinery caused 66.3 per cent of them.

[4] In Massachusetts and Wisconsin all reports of accidents were made by the employer direct to the State board having charge of the administration of the compensation law, but in New Jersey at the time of this study the employer's first report of an industrial accident was not made direct to the compensation bureau, but was transmitted to that bureau through the insurance carrier. Since the date of the study a law has been passed requiring all reports of accidents to be made by the employer directly to the compensation bureau (see New Jersey, Laws of 1924, ch. 187).

TABLE 35.—*Extent of disability incurred by minors from industrial injuries, by sex of injured: New Jersey*

Extent of disability	Industrial injuries to minors					
	Total		Boys		Girls	
	Number	Per cent distribution	Number	Per cent distribution	Number	Per cent distribution
Total	2,019	100.0	1,684	100.0	335	100.0
Death	14	.7	13	.8	1	.3
Permanent partial	502	24.9	413	24.5	89	26.6
Temporary	1,503	74.4	1,258	74.6	245	73.1

TABLE 36.—*Extent of disability incurred by minors from industrial injuries, by age of injured: New Jersey*

Age of injured	Industrial injuries to minors						
	Total	Extent of disability					
		Death		Permanent partial		Temporary	
		Number	Per cent [1]	Number	Per cent [1]	Number	Per cent [1]
Total	2,019	14	0.7	502	24.9	1,503	74.4
10–13 years	5	----------	----------	1	----------	4	----------
14 years	48	1	----------	11	----------	36	----------
15 years	56	1	1.8	11	19.6	44	78.6
16 years	280	2	.7	74	26.4	204	72.9
17 years	402	1	.2	108	26.9	293	72.9
18 years	442	4	.9	106	24.0	332	75.1
19 years	414	2	.5	106	25.6	306	73.9
20 years	372	3	.8	85	22.8	284	76.3

[1] Not shown where base is less than 50.

LOCATION OF INJURY

Most of the injuries were to the upper extremities, and the great majority of these were to the hands. More of the injuries to the upper extremities (especially the hands) caused permanent partial disability than of those to any other part of the body, except in the case of injuries to the face and neck. Nearly one-half of the injuries to the lower extremities were to the foot, the next largest numbers involving the ankle, lower leg, and knee. One-half of the head injuries were to the eyes, nearly half of these causing some reduction of vision. One-fourth of the injuries to the trunk (one fatal) were to the back.

Table 37 shows the location of industrial injuries received by New Jersey minors. (For further details in regard to the location of injuries see Appendix A, Table XI.)

TABLE 37.—*Location of industrial injuries to minors: New Jersey*

Location of injury	Industrial injuries to minors		Location of injury	Industrial injuries to minors	
	Number	Per cent distribution		Number	Per cent distribution
Total	2,019	100.0	Trunk	80	4.0
Head	80	4.0	Upper extremities	1,381	68.4
Face and neck	54	2.7	Lower extremities	382	18.9
			Body, general	42	2.1

NATURE OF INJURY

Two-fifths of the injuries were cuts, punctures, and lacerations; nearly one-sixth were fractures, one-eighth abrasions, contusions, and bruises, and one-tenth amputations. [5]

Four-fifths of the cuts and punctures were on the upper extremities. One-tenth were on the lower extremities, and most of the rest on the head, face, and neck. Some degree of permanent partial disability resulted from 181 of them. Even more of the amputations were of the upper extremities (91.9 per cent). Thus 125 minors lost a part or all of one finger, 35 lost two fingers, 5 lost three fingers, 4 lost four fingers (see case No. 6, p. 67), and 17 lost all or part of a thumb. Of the injuries causing permanent partial disability, 209 resulted in amputations, 293 in loss of use of a member. Two-thirds of the fractures were of the upper extremities, 121 of the lower arm or wrist, 56 of fingers or thumbs, 15 of the shoulder or upper arm. There were 80 fractures of the lower extremities, including 25 fractures of the leg below the knee, 15 of the ankle, 30 of the foot (19 involving toes), 6 of the leg above the knee, 2 of the knee, 1 of the hip, and 1 whose location on the leg was not definitely specified by the accident report. Fractures caused 3 deaths and 53 cases of partial loss of use of the injured member. There were 6 cases of fractured ribs and 1 of fractured sternum. The abrasions, contusions, and bruises were on the upper extremities in one-half of the cases, on the lower extremities in a little more than one-third of the cases. Twelve were on the head (7 involving the eyes), 16 were on the trunk, and 9 to the body in general. Abrasions, contusions, and bruises caused 22 cases of permanent partial disability. More burns were on the lower extremities (35.3 per cent) than on the upper (31 per cent), the eye was affected in 7 cases, the face and neck in 14 cases, the trunk in 2, and the body in general in 14 cases. Burns caused 2 deaths and 7 cases of permanent partial disability. Sprains and strains were chiefly of the ankle (30 cases), the lower arm and wrist (24 cases), and the trunk (31 cases), and there were 15 cases of hernia and 6 cases of strained or sprained backs. Sprains and strains caused 4 cases of permanent partial disability.

Infection developed in 168 (8.3 per cent) of the cases (137 injuries to the hand and 10 to the foot), producing permanent partial disability in 19 instances.

[5] Under this heading are classified all injuries resulting in amputation of a member, regardless of their original nature.

Table 38 shows the nature of the injuries to employed minors in New Jersey.

TABLE 38.—*Nature of industrial injuries to minors: New Jersey*

Nature of injury	Industrial injuries to minors		Nature of injury	Industrial injuries to minors	
	Number	Per cent distribution		Number	Per cent distribution
Total	2,019	100.0	Amputations	209	10.4
			Sprains and strains	128	6.3
Cuts, punctures, lacerations	809	40.1	Burns	116	5.7
Fractures	308	15.3	Dislocations	21	1.0
Abrasions, contusions, bruises	270	13.4	All other and not reported	158	7.8

COMPENSATION FOR INJURY

Under the New Jersey law compensation consisted of weekly payments of an amount equal to two-thirds of the worker's average weekly wage, to be paid during total disability [6] and for specified periods in case of death or permanent partial disability. The weekly payments, however, were limited to a maximum amount of $12 and a minimum of $6 or the actual wage if less than $6.[7] On this basis 3.7 per cent of the injured minors received compensation amounting to more than two-thirds of their wages, 45.3 per cent received two-thirds, and 50.2 per cent received less. In 17 cases wages were not reported.

CAUSES OF INJURY [8]

Machinery alone caused two-fifths of the injuries. Handling objects caused one-sixth, falls of persons approximately one-eighth, vehicles one-tenth. Furthermore, machinery caused 69.3 per cent of the injuries producing permanent partial disability; handling objects, only 8.4 per cent; injuries due to falls of persons, 6 per cent; vehicles, 5.2 per cent; and hand tools, 3.4 per cent. Over 40 per cent of the injuries due to machinery caused permanent partial disability, in contrast to 18.7 per cent of those due to hand tools, and 13 per cent of those due to handling objects, falls of persons, and vehicles. Permanent partial disability resulted from less than 10 per cent of the injuries due to any other cause.

Injuries caused by machinery constituted 44.7 per cent of the injuries to minors of 16 and 17 years, 43.1 per cent of those to minors under 16 years, 37.6 per cent of those to minors of 18 years and over.

[6] But not for more than a specified number of weeks—300 in case of temporary and 400 in case of permanent disability.

[7] New Jersey, Laws of 1911, ch. 95, Sec. II, subsec. 11, as amended by Laws of 1919, ch. 93, sec. 1. Certain provisions were also made for reasonable medical and hospital service, etc. Since the period of the study the maximum and minimum weekly payments have been raised from $12 and $6, respectively, to $17 and $8, and compensation has been granted for the first 10 days after the injury, provided the disability extends over seven weeks (ibid., as amended by Laws of 1923, ch. 49). It has also been provided that if a minor under 14 is injured while employed in violation of the labor law, or if a minor between 14 and 16 is injured while employed without the required work certificate or at an illegal occupation, he shall receive double compensation (Laws of 1924, ch. 159).

[8] At the time of the study the New Jersey compensation law did not cover occupational diseases, but since that date the following have been made compensable: Anthrax, lead poisoning, mercury poisoning, arsenic poisoning, phosphorus poisoning, poisoning from benzine and its homologues and derivatives, wood-alcohol poisoning, chrome poisoning, caisson disease (New Jersey, Laws of 1911, ch. 95, Sec. II, subsec. 22, as added by Laws of 1924, ch. 124).

Table 39 shows the causes of industrial injury to New Jersey minors. (See also Appendix A, Tables XII, XIII.)

TABLE 39.—*Cause of industrial injuries sustained by minors: New Jersey*

Cause of injury	Industrial injuries to minors		Cause of injury	Industrial injuries to minors	
	Number	Per cent distribution		Number	Per cent distribution
Total	2,019	100.0	Hot and corrosive substances	84	4.2
Machinery	814	40.3	Stepping on or striking against objects	60	3.0
Handling objects	323	16.0	Explosions	18	.9
Falls of persons	238	11.8	Draft animals	18	.9
Vehicles	206	10.2	Electricity	8	.4
Hand tools	91	4.5	All other and not reported	70	3.5
Falling objects	89	4.4			

MACHINERY

Machinery caused 814 compensable injuries, or over 40 per cent of the total injuries to employed minors, the greater part of these (over 90 per cent) being due to power-driven machinery. Hoisting apparatus caused 54 of the remaining injuries; motors and transmission apparatus caused 20 (see case No. 9, p. 69); and machines other than power-driven machines, such as fans, blowers, and pumps, caused 6.

Power-driven machinery.

Power-driven machinery, to which were due 734 of the 814 injuries caused by all kinds of machinery, caused 35.8 per cent of the injuries to boys and girls under 16 years, 41.3 per cent of those to minors of 16 and 17 years of age, and 33.6 per cent to those of 18 years and over. Nearly one-half (45.6 per cent) of the injuries due to power-driven machinery caused death or permanent partial disability. Almost three-fourths of these accidents occurred while the workers were starting, stopping, or operating the machine or while they were adjusting the machine or work. The point of operation was the part of the machine involved in seven-eighths of the injuries, except in the case of textile machines. The three classes of power-driven machinery causing the largest number of injuries to minors were metal-working, rubber and composition working, and textile machines.

Metal-working machinery.—Of the 734 injuries due to power-driven machinery, 344 were due to metal-working machinery (punch presses in nearly one-half of the cases). The percentage of severe injuries among those caused by metal-working machines (48.5 per cent resulting in permanent partial disability) was higher than among those due to any other cause.

Employment in the operation of certain dangerous metal-working machines was prohibited for minors under 16 (see Appendix B, p. 108), but no such prohibition existed for older workers. Thirteen of those injured were less than 16 years old. Permanent partial disability of varying degrees of loss of use or due to amputation of one or more fingers resulted from 6 of those injuries. Metal-working machines injured 118 minors of 16 and 17 years, causing 54 cases of permanent

partial disability. Punch presses (see case No. 20, p. 77), hand and foot presses, lathes, shears, abrasive wheels (see case No. 2, p. 64), milling and gear-cutting machines, drills, and saws caused the largest numbers of their injuries. Permanent partial disability followed 19 of the injuries received on punch presses and 8 of those due to hand and foot presses. Drills caused 3 cases of permanent partial disability, milling and gear-cutting machines 3, abrasive wheels, planers, and hydraulic presses each 2, and shears 4. Minors of 18 years and over suffered 213 injuries on metal-working machines, 107 of which produced permanent partial disability.

Table 40 shows the kinds of metal-working machinery injuring New Jersey minors, by age groups.

TABLE 40.—*Kinds of metal-working machinery causing injuries to minors, by age of injured: New Jersey*

Kind of metal-working machinery causing injury	Industrial injuries to minors due to metal-working machinery			
	Total	Age of injured		
		Under 16 years [1]	16–17 years	18–20 years
Total	344	13	118	213
Punch presses	162	7	60	95
Power punches and presses	105	2	33	70
Foot and hand presses	54	4	25	25
Other presses	3	1	2	----
Abrasive wheels	19	----	5	14
Lathes and automatic screw machines	17	1	6	10
Milling and gear-cutting machines	16	----	4	12
Shears	14	2	6	6
Drill presses	12	----	3	9
Saw machines	8	----	3	5
Hammers and forging machines	7	----	1	6
Planers and shapers	6	----	2	4
Portable power tools	6	----	3	3
Reamers	5	1	----	4
Bolt and nut, pipe cutting, and threading machines	5	----	2	3
All other and not reported	67	2	23	42

[1] For list of machines whose use was prohibited to minors under 16 see Appendix B, p. 108.

Rubber and composition working machinery.—Rubber and composition working machinery was involved in a smaller number of injuries than was metal-working machinery, but the proportion of severe injuries was nearly as high. Permanent partial disability followed in 39 of the 83 cases—a proportion of 47 per cent. Work on calender rolls or mixing rolls in rubber manufacture was prohibited for children under 16 years of age (see Appendix B, p. 108).

Table 41 shows the kinds of rubber and composition working machinery causing injury to New Jersey minors, by age of the injured.

TABLE 41.—*Kinds of rubber and composition machinery causing injuries to minors, by age of injured: New Jersey*

Kind of rubber and composition machinery causing injury	Industrial injuries to minors due to rubber and composition machinery			
	Total	Age of injured		
		Under 16 years [1]	16–17 years	18–20 years
Total	83	2	42	39
Presses	37	----	21	16
Foot and hand operated	31	----	17	14
Power	6	----	4	2
Grinding, washing, and milling machines	4	----	2	2
Cutting and slitting machines	3	----	2	1
Cutting and punching machines	2	----	1	1
Rubber-band choppers and cutters	2	----	1	1
Tire and tube making machines	2	----	1	1
All other and not reported	33	[2] 2	14	17

[1] For list of machines whose use was prohibited to children under 16 see Appendix B, p. 108.
[2] No data obtained other than that these two minors were machine operators.

Textile machinery.—Textile machines—most frequently spinning and weaving machines, winders, doublers, and quillers—injured 67 minors, causing death to a boy of 18 years and producing 18 cases of permanent partial disability (see case No. 1, p. 63). Of the injured 17.9 per cent were hurt while cleaning or oiling the machines and 14.9 per cent were caught in the gears. These two percentages are higher than those for the injuries due to any other class of power-driven machines.

Table 42 shows the kinds of textile machinery causing injury to New Jersey minors, by age of the injured.

TABLE 42.—*Kinds of textile machinery causing injuries to minors, by age of injured: New Jersey*

Kind of textile machinery causing injury	Industrial injuries to minors due to textile machinery			
	Total	Age of injured		
		Under 16 years	16–17 years	18–20 years
Total	67	8	29	30
Weaving machines	14	1	3	10
Looms	13	----	3	10
Warpers	1	1	----	----
Spinning machines	10	3	4	3
Spinning frames	6	1	3	2
Other	4	2	1	1
Winders, doublers, and quillers	8	----	6	2
Carding and combing machines	5	----	2	3
Dyeing, finishing, and printing machines	5	----	4	1
Opening and cleaning machines	2	1	----	1
All other and not reported	23	3	10	10

Other kinds of power-driven machinery.—Woodworking machinery—especially saws, jointers, and planers—caused 48 injuries, 23 of which resulted in permanent partial disability (see case No. 3, p. 65 case No. 10, p. 70). Employment on certain dangerous woodworking machines was prohibited for minors under 16 (see Appendix B, p. 108), and only two children under this age were injured. There were 17 injuries to workers of 16 and 17 years (for whom no such prohibition existed).

Table 43 shows the kinds of woodworking machinery causing industrial injuries to New Jersey minors, by age of the injured.

TABLE 43.—*Kinds of woodworking machinery causing injuries to minors, by age of injured: New Jersey*

Kind of woodworking machinery causing injury	Industrial injuries to minors due to woodworking machinery			
	Total	Age of injured		
		Under 16 years [1]	16–17 years	18–20 years
Total	48	2	17	29
Saws	22	1	6	15
Band	2			2
Circular	5		2	3
Other	15	1	4	10
Planers and shapers	4		2	2
Jointers	3			3
Presses	4		1	3
Boring machines and drills	4	1		3
All other and not reported	11		8	3

[1] For list of machines whose use was prohibited to minors under 16 see Appendix B, p. 108.

Food, beverage, and tobacco-working machines injured 40 minors. Tobacco machines were responsible for 12 of the injuries, cutting machines for 5, milling and grinding machines for 3. Four of these 40 minors were under 16 years of age, 15 were 16 or 17 years old. There were 17 cases of permanent partial disability.

Paper and paper products making machinery caused 32 injuries (see case No. 7, p. 67). Employment on certain dangerous machines of this type was prohibited for children under 16 (see Appendix B, p. 108), and only 3 of the injured were under this age. But 12 workers 16 and 17 years of age, and 17 of 18 years and over were injured by them. Over one-half of the injuries resulted in permanent partial disability.

Table 44 shows the kinds of paper or paper products making machinery causing injury to New Jersey minors, by age of the injured.

TABLE 44.—*Kinds of paper or paper products making machinery causing injuries to minors, by age of injured: New Jersey*

Kind of paper or paper products making machinery causing injury	Industrial injuries to minors due to paper and paper products making machinery			
	Total	Age of injured		
		Under 16 years[1]	16–17 years	18–20 years
Total	32	3	12	17
Paper-making machinery	11		2	9
Calenders	4		1	3
Other	7		1	6
Paper products making machinery	21	3	10	8
Automatic box-making machines	4	1	2	1
Die cutters	3			3
Punch presses	2		2	
Ending machines	2			2
Other	10	2	6	2

[1] For list of machines whose use was prohibited to minors under 16 see Appendix B, p. 108.

Printing and bookbinding machines caused 29 injuries, 14 of which resulted in permanent partial disability. Printing presses caused 18 of the injuries. Employment on certain dangerous machinery of this type was prohibited for children under 16 (see Appendix B, p. 108). Only 2 of the injured were under this age, but there were 14 injuries among the minors 16 and 17 years of age, and 13 among those of 18 and over.

Clothing machines (one-half of which were sewing machines) injured 24 minors. Various chemical-making machines injured 17; and clay, glass, and stone-working machines injured 13.

Hoisting machinery.

Hoisting machinery caused 54 accidents (26 due to elevators, 28 to cranes or derricks), 2 of which were fatal. In most of the elevator accidents the worker was caught by the gates or between the floor and the car, but there were four cases of injury from falling into the shafts. The injuries due to cranes or other conveyors resulted usually from the worker's being struck by the cable or load. Thirty-four of the minors injured by hoisting machinery were 18 years of age and over, 14 were 16 and 17 years old, and 6 were under 16.

HANDLING OBJECTS

Accidents due to handling objects, especially heavy ones, caused 323 injuries, resulting in 42 cases of permanent partial disability. There were no deaths from this cause. Fractures, cuts, and bruises resulted in equal numbers from the dropping of objects (see case No. 12, p. 72). The minors caught between objects handled most often suffered cuts and bruises, but 7 had bones fractured, and 7 were so seriously injured that amputation of a member was necessary. In handling sharp or rough objects the workers were cut or bruised, suffering injuries which may have been slight in themselves but in one-half of which infection developed. Two of the 21 injuries received in accidents with hand trucks necessitated amputation, and

there were four sprains or fractures. In the three age groups the same percentage of injuries occurred from handling objects.

Table 45 gives the manner of occurrence of industrial injuries received by New Jersey minors while handling objects.

TABLE 45.—*Manner of occurrence of industrial injuries to minors due to handling objects: New Jersey*

Manner of occurrence of injury and kind of object handled	Industrial injuries to minors due to handling objects		Manner of occurrence of injury and kind of object handled	Industrial injuries to minors due to handling objects	
	Number	Per cent distribution		Number	Per cent distribution
Total	323	100.0	Sharp or rough objects	92	28.5
Heavy objects	210	65.0	Protruding wires or nails	24	7.4
Dropped	71	22.0	Sheet metal and sheet-metal objects	21	6.5
Catching worker against other object	51	15.8	Glass	14	4.3
Causing strain in handling	24	7.4	Wood and metal slivers	12	3.7
Falling while being loaded or piled	22	6.8	Other	21	6.5
Other	42	13.0	Hand trucks	21	6.5
			Striking worker	14	4.3
			Catching worker against other object	4	1.2
			Other	3	.9

FALLS OF PERSONS

Falls caused 1 death, 30 cases of permanent partial disability, and 207 cases of temporary disability. The percentage of falls among the injured minors of the three age groups was about the same. But 10 of the 14 falls suffered by children under 16 years of age were caused by slipping on level surfaces, while the falls of nearly one-half of the older minors were falls from elevations. Minors under 16 could not legally be employed on scaffolding or staging (see Appendix B, p. 108).

Table 46 shows the manner of occurrence of falls injuring employed minors in New Jersey.

TABLE 46.—*Manner of occurrence of industrial injuries to minors due to falls of persons: New Jersey*

Manner of occurrence of injury	Industrial injuries to minors due to falls		Manner of occurrence of injury	Industrial injuries to minors due to falls	
	Number	Per cent distribution		Number	Per cent distribution
Total	238	100.0	Falls into excavations	11	4.6
Falls from elevations	105	44.1	Floor openings	3	1.3
Stairs	27	11.3	Other	8	3.4
Ladders	25	10.5	Falls on level	122	51.3
Scaffolding and staging	24	10.1	Slipping	80	33.6
Benches, boxes, chairs, tables	7	2.9	Stumbling over loose objects	27	11.3
Other	22	9.2	Stumbling over fixed objects	3	1.3
			Other	12	5.0

VEHICLES

The most noticeable facts about the 206 injuries due to vehicles are that 102 of them were received in cranking the engines of automobiles, and that 76 of these 102 injuries were fractures and 10 were sprains, strains, or dislocations. General accident statistics have shown the greatest dangers from motor vehicles to result from being struck by them or being in collisions with them; but only 25 of the industrial injuries to minors were attributed to this cause. Cars and engines caused 18 injuries, usually because the workers fell from or in the cars or were struck by or caught between them.

Three minors were killed in accidents due to vehicles, and 26 were permanently partially disabled. Bones were fractured in 110 cases (see cases No. 5, p. 66, No. 13, p. 72), and there were 20 cases of sprains, strains, and dislocations, all injuries causing disablement for rather long periods of time. Approximately one-tenth of each age group were hurt by vehicles.

Table 47 shows the manner of occurrence of injury from vehicles.

TABLE 47.—*Manner of occurrence of industrial injuries to minors due to vehicles: New Jersey*

Manner of occurrence of injury and kind of vehicle	Industrial injuries to minors due to vehicles		Manner of occurrence of injury and kind of vehicle	Industrial injuries to minors due to vehicles	
	Number	Per cent distribution		Number	Per cent distribution
Total	206	100.0	Cars and engines and plant trucks on tracks	23	11.2
Automobiles and other power vehicles	159	77.2	Striking (or catching worker against other object)	6	2.9
Cranking	102	49.5	Falls from or in	5	2.4
Collisions	18	8.7	Other	12	5.8
Striking	7	3.4			
Overturning	2	1.0	Animal-drawn vehicles	17	8.3
Other	30	14.6	Other and not reported	7	3.4

HAND TOOLS

Three-fourths of the 91 hand-tool injuries were due to the slipping or glancing of the tool. There were 17 cases of permanent partial disability. The percentage of permanent partial disability (18.7) was lower than for injuries due to machinery but was higher than for injuries due to any other cause. Hand tools caused 2.8 per cent of the compensable injuries to minors under 16 years of age, 3.4 per cent of those to minors of 16 and 17 years, and 5.3 per cent of those to minors 18 to 20 years of age.

Table 48 shows the manner of occurrence of industrial injuries caused by hand tools to New Jersey minors.

TABLE 48.—*Manner of occurrence of industrial injuries to minors from hand tools: New Jersey*

Manner of occurrence of injury	Industrial injuries to minors due to hand tools	
	Number	Per cent distribution
Total	91	100.0
Glancing or slipping of tool in use	70	76.9
In hands of injured worker	65	71.4
In hands of fellow worker	5	5.5
Other and not reported	21	23.1

FALLING OBJECTS

Falling objects caused 89 injuries resulting in 8 cases of permanent partial disablement. Over one-half of the injuries consisted of cuts and bruises. There were 17 cases of fracture, 8 sprains, and 3 dislocations. Falling objects caused 1.8 per cent of the injuries to minors under 16 years of age, 2.9 per cent of those to minors 16 and 17 years old, and 5.5 per cent to those of 18 years and over.

Table 49 shows the manner of occurrence of industrial injuries caused to New Jersey minors by falling objects.

TABLE 49.—*Manner of occurrence of industrial injuries to minors due to falling objects: New Jersey*

Manner of occurrence of injury	Industrial injuries to minors due to falling objects		Manner of occurrence of injury	Industrial injuries to minors due to falling objects	
	Number	Per cent distribution		Number	Per cent distribution
Total	89	100.0	Objects falling from elevations	72	80.9
Objects collapsing	7	7.9	Machines and work benches	20	22.5
Piles	1	1.1	Piles	4	4.5
Other	6	6.7	Other	48	53.9
			Objects tipping over	10	11.2

OTHER CAUSES OF INJURY

Hot and corrosive substances, which caused 1 death and 5 cases of permanent partial disability, were responsible for 84 of the 258 remaining injuries to New Jersey minors. Molten metal caused 15 and hot water 11 of the 37 accidents involving hot liquids. Hot material such as sand, ashes, grease, fat, or cinders caused 11 injuries, acids caused 10, flames and hot metal (not molten) each caused 7, asphalt, pitch, or tar caused 3, and contact with hot surfaces caused 4. Four of the injured minors were under 16 years of age, 24 were 16 or 17 years of age, 56 were 18 years and over. A boy who worked as tending boy in a glass factory was burned by hot glass; a boy employed in a jewelry factory was burned by the explosion of

molten lead; a boy employed as messenger in a chemical factory tripped and in falling caught at a jar of acid, upsetting it so that the acid burned him.

Stepping on or striking against objects injured 60 minors, causing 5 cases of permanent partial disability. There were 46 accidents due to striking against objects and 14 due to stepping on sharp objects—mostly nails. The injuries included 35 cuts, 13 bruises, and 4 fractures. Infection developed in 16 cases, necessitating 1 amputation (see case No. 23, p. 79). There was little difference among the age groups, the percentage of injury due to this cause varying from 2.8 to 3.2.

Explosions were responsible for 18 injuries, causing 2 deaths and 2 cases of permanent partial disability. Of these injuries 7 were due to exploding steam or steam pipes or the escaping steam or hot water, 7 to exploding gasoline or other substances. All the injured were 18 years of age and over. Draft animals caused 18 accidents, 8 by kicking or stepping on the person injured, 5 by running away, 1 by biting. One of the injured minors was under 16 years of age and 5 were 16 or 17 years old. Electricity caused 8 injuries, which resulted in 2 deaths, 1 case of permanent partial disability, and 5 cases of temporary disablement lasting for various periods from 11 days to 339 days. The remaining 70 injuries, due to miscellaneous causes, produced 18 cases of permanent partial disability.

OCCUPATIONAL RISK

For New Jersey, as for Wisconsin, an estimate was made of the occupational risk of injury to minors under 20 years of age.[9] Because of differences in the occupational distribution of boys and girls, the risks to each sex are treated separately. Although relatively the same proportion of the boys as of the girls employed under 20 years of age were in manufacturing and mechanical industries, a higher percentage of the boys were in agricultural pursuits, in trade and in transportation, and a higher percentage of the girls in clerical occupations and in domestic and personal service. The injury rate per 1,000 employed was 16 for boys, 4 for girls.

INJURY RATES FOR BOYS

Different risks appear in the general occupation groups. Next after extraction of minerals, where the high rate was due to injuries suffered by iron-mine operatives, manufacturing and mechanical industries presented the greatest risk. Those in which the highest injury rates occurred were the lumber and furniture industries; metal industries; chemical manufacturing; printing, publishing, and engraving industries; and the manufacture of electrical supplies. In the lumber and furniture industries the laborers had an injury rate of 37 per 1,000 and the semiskilled operatives a rate of 72 per 1,000, rising to 91 per 1,000 in the case of furniture factories. In the iron and steel industries the rate was 51 among the semiskilled operatives—68 per 1,000 for those employed around blast furnaces and steel rolling

[9] For a discussion of the method and assumptions involved in estimating occupational risk, see p. 19. The New Jersey workmen's compensation law covers all employments, both private and public, excluding only public officials receiving more than $1,200 per year and those holding elective offices (Laws of 1911, ch. 95, Sec. I, as supplemented by Laws of 1913, ch. 145).

mills, 56 for those engaged in ship and boat building, 52 for those employed in car and railroad shops and 28 for those in automobile factories. In metal industries other than iron and steel 103 semiskilled operatives among every 1,000 employed were injured. Although in the metal industries the rates were lower for the laborers than for the semiskilled operatives they were 34 per 1,000 for the laborers around blast furnaces and steel rolling mills, and 46 for laborers in metal industries other than iron and steel. In chemical manufacturing 38 laborers and 48 semiskilled operatives per 1,000 were injured. The injury rate for the semiskilled in printing, publishing, and engraving industries was 64 per 1,000, and for the semiskilled in the manufacture of electrical supplies 56.

In the other manufacturing and mechanical industries the liability to injury was not so great. In the textile industries the rate was 11 per 1,000 for the laborers, 12 per 1,000 for the semiskilled employees. It was higher in the textile dyeing, finishing, and printing mills (22 for laborers, 57 for semiskilled) than in any other kind of textile mill. For the semiskilled in cotton mills it was 21, in knitting mills 8, in silk mills 4. In clothing manufacture 17 semiskilled employees per 1,000 employed were injured. In food industries the rate was 44 for the semiskilled, and 26 for the laborers. In paper and pulp mills the semiskilled had an injury rate of 34 per 1,000, in petroleum refineries 37, in rubber factories 30, in tanneries 29, in shoe factories 14, in potteries 14. In the glass factories the rate was 14 per 1,000 for the semiskilled and 8 per 1,000 for the laborers employed.

In occupations other than those in manufacturing and mechanical industries the rates in general were somewhat lower. In transportation it was 12 per 1,000, being higher for garage laborers and for chauffeurs than for others employed in transportation.

In trade the rate of 16 per 1,000 is attributable to the high rate of injuries to laborers, porters, and helpers in stores (68) and to delivery-men (58). Clerks in stores had a rate of 5 injuries per 1,000 employed, and salesmen in stores 3 per 1,000.

Table 50 shows the number of industrial injuries to boys under 20 years of age, and rates per 1,000 employed in the various occupation groups.

TABLE 50.—*Number of industrial injuries to boys under 20 years of age, and rates per 1,000 employed, by occupation groups: New Jersey*

Occupation group	Employed boys under 20 years of age [1]	Industrial injuries to boys under 20 years	
		Number	Per 1,000 employed
Total	86,595	1,352	16
Agriculture	3,439	18	5
Extraction of minerals	191	7	37
Manufacturing and mechanical industries	48,196	1,067	22
Transportation	7,258	87	12
Trade	7,055	113	16
Public service	359		
Professional service	730	4	6
Personal and domestic service	1,794	14	8
Clerical occupations	17,573	42	2

[1] Number estimated covered by the compensation law.

AGE AND OCCUPATIONAL RISK FOR BOYS

The rate of injury varied for the three age groups—the boys of 14 and 15 years (who were protected by the child labor laws), those of 16 and 17 years, and those of 18 and 19 years. It was 7 per 1,000 for the youngest boys, 16 per 1,000 for the second group, and 19 for the oldest boys. In manufacturing and mechanical industries, in trade, and in agriculture (the three classes in which two-thirds of the boys of each age group were employed) the injury rate rose with the age of the groups considered. The prohibition of employment of children under 16 years of age in certain dangerous manufacturing and mechanical occupations was reflected in their injury rate of 9 per 1,000 employed in these occupations, while for the boys of 16 and 17 years it was 23 per 1,000, and for those 18 and 19 years 27 per 1,000. As a smaller proportion of the boys under 16 years of age than of those of 16 and 17 years were apprentices and laborers and more were semiskilled operatives, among whom the injury rates in general are higher than among laborers, the difference in the injury rates for the two age groups becomes more significant.

Table 51 shows, by age groups, the injury rates per 1,000 for boys under 20 years employed in the various occupation groups.

TABLE 51.—*Industrial-injury rates per 1,000 boys under 20 years of age, by occupation groups and age: New Jersey*

Occupation group[1]	Industrial-injury rates per 1,000 boys under 20 years				
	Total	18–19 years	Under 18 years		
			Total	16–17 years	Under 16 years
Total	16	19	13	16	7
Agriculture	5	6	4	3	2
Extraction of minerals	37	54	20	24	----
Manufacturing and mechanical industries	22	27	19	23	9
Transportation	12	15	8	8	10
Trade	16	20	13	17	8
Professional service	6	2	16	21	----
Domestic and personal service	8	9	7	6	11
Clerical occupations	2	2	3	3	3

[1] No injuries were received by boys employed in public service.

INJURY RATES FOR GIRLS

That the injury rate for the girls was not so high as for the boys was due in part to differences in their occupations. Not only were a higher proportion of the girls than of the boys in domestic and personal service and in clerical occupations (occupations in which the injury rates were relatively low) and a smaller proportion in manufacturing and mechanical occupations, but there were differences within the main occupation groups.

Thus in manufacturing and mechanical industries a larger proportion of the girls were engaged in lines which offered relatively fewer risks. Nearly one-half were in textile manufacturing and clothing industries, where the likelihood of injury was less than in other manufacturing industries. However, their injury rates were also

lower than those of the boys in the same industries. For semiskilled workers in the textile industries, for example, the injury rate for girls was 5 per 1,000, in silk mills 2, and in textile dyeing, printing, and finishing mills 10, whereas for boys the rates in the same kinds of mills were 12, 4, and 57, respectively. The girls in semiskilled occupations in the clothing industries had a rate of 3 injuries per 1,000 employees, the boys a rate of 17 per 1,000. In chemical and allied industries the rate for semiskilled operatives was 13 for girls, 48 for boys; in iron and steel industries 24 for girls, 51 for boys. The lower rate of injuries to girls might be due in part to their being employed at less dangerous occupations.[10]

The differences in the injury rates of girls and boys employed in transportation (2 per 1,000 for girls, 12 for boys) was clearly due to their different occupations. Over 90 per cent of the girls in transportation were telephone operators, whose occupation offered but few risks, whereas more than two-thirds of the boys were chauffeurs, draymen, and laborers, with high injury rates. This was also true of minors employed in trade. The difference between the rate of 16 injuries per 1,000 boys employed and the rate of 2 injuries per 1,000 girls is attributable to the fact that a large proportion of the boys were delivery men and laborers, porters, and helpers, whereas the girls were almost exclusively clerks and saleswomen. In personal and domestic service a large number of boys were elevator tenders and janitors, whose occupations present many risks, whereas most of the girls were domestic servants. For laundry operatives the rates were very nearly the same—9 per 1,000 for the boys and 8 per 1,000 for the girls. In all clerical occupations the girls had a lower rate of injury than the boys.

Table 52 shows the number of industrial injuries to girls under 20 years of age, and rates per 1,000 employed in the various occupation groups.

TABLE 52.—*Number of industrial injuries to girls under 20 years of age, and rate per 1,000 employed, by occupation groups: New Jersey*

Occupation group [1]	Employed girls under 20 years of age [2]	Industrial injuries to girls under 20 years	
		Number	Per 1,000 employed
Total	73,649	295	4
Agriculture	235	1	4
Manufacturing and mechanical industries	39,172	260	7
Transportation	2,629	4	2
Trade	4,726	7	2
Professional service	1,200	2	2
Domestic and personal service	4,865	9	2
Clerical	20,810	12	1

[1] No injuries were received by girls employed in extraction of minerals or in public service.
[2] Number estimated covered by the compensation law.

AGE AND OCCUPATIONAL RISK FOR GIRLS

Although the girls employed in New Jersey had lower injury rates in general than the boys, their rates showed the same fluctuations with age groups as did those of the boys. In many occupations the

[10] The census classification of the semiskilled operatives in the various manufacturing and mechanical industries is not detailed enough to show the kind of work that the different persons were doing.

girls of 16 and 17 years had a higher injury rate than did those under 16 years.

Table 53 shows, by age groups, the injury rates per 1,000 for girls under 20 years of age employed in the various occupation groups.

TABLE 53.—*Industrial-injury rates per 1,000 girls under 20 years of age, by occupation groups and age: New Jersey*

Occupation group [1]	Industrial-injury rates per 1,000 girls under 20 years				
	Total	18–19 years	Under 18 years		
			Total	16–17	Under 16 years
Total	4	4	4	5	1
Agriculture	4		6	16	
Manufacturing and mechanical industries	7	9	6	8	2
Transportation	2	2	2	2	
Trade	2	2	1	1	
Professional service	2	1	5	6	
Domestic and personal service	2	3	1	2	
Clerical occupations	1	1	1	1	

[1] No injuries were received by girls employed in extraction of minerals or in public service.

AVERAGE TIME LOSS [11]

As in Wisconsin, so in New Jersey the average time lost in the various occupations again emphasizes the dangers of certain industries. Minors employed in metal industries and chemical industries lost more time because of accidents than did those in any other industry. In food industries, electrical-supply factories, and rubber industries the duration of disability was somewhat less, and in the textile mills and in clothing factories it was comparatively low. Boys had a greater time loss than girls, and the older and less protected minors lost more time than did the younger ones.

[11] For method of computing time loss see footnote 19, p. 25.

RESULTS OF INDUSTRIAL INJURIES TO EMPLOYED MINORS[1]

During January, February, and March, 1925—from three to nearly six years after the occurrence of the injuries discussed in the preceding section of this report—a supplementary study was made through interviews with the injured workers themselves, with a view to discovering how their industrial and social lives had been affected by the injuries which they had received before they were 18 years of age. The study was limited to the minors who had been permanently disabled, and of this group practically all of those who could be located were visited and interviewed. No industrial handicap had been suffered by some of them; for others their industrial injury had proved a permanent barrier to the occupation or career which they had planned. In some cases in which there was no industrial handicap the injury was slight, perhaps the loss of one joint of a third or fourth finger. In some cases almost identical injuries had quite different effects, depending upon whether deftness of touch, accuracy of movement, keen vision, or physical strength was necessary in a given occupation. Sometimes a minor forced out of his occupation by his injury went into another occupation which promised as good an industrial future; his success in making such a change depended on one or more conditions—his education, his ability to do mental rather than manual labor, the occupations available in his community, and opportunities for vocational rehabilitation. In other cases he was forced out of a chosen occupation or career into an unskilled trade or one which offered little opportunity. In many cases the injured worker had experienced great difficulty in finding work of any kind that he could do.

The effect on other phases of the worker's life than the industrial one was more difficult to discover. There were instances where a child had been working during vacation only, intending to return to school, but did not return because of his injury. A number of young persons, sensitive over their deformities, felt themselves shut out of the social life and activities which they had enjoyed formerly; some of them had become discouraged and bitter because of their prolonged dependency on others and their small hope of economic independence in the future.

CASE NO. 1 (NEW JERSEY)

A 17-year-old girl obtained work as operator of a carding machine in a textile mill in a small town. The family (in which there were five girls) had come from an adjoining State because they heard there was "lots of work for girls" in this town. The father's wages

[1] This supplementary investigation, made by means of personal interviews with workers who had suffered injuries causing permanent partial disability when under 18 years of age, was made in Wisconsin by Harriet A. Byrne and in Massachusetts by Jane Kinsey, agents of the industrial division of the Children's Bureau, and in New Jersey by Edith S. Gray and Jane Kinsey.

as a day laborer were not enough to support the family. The girl had operated the machine one week when she was injured. She said the foreman had told her that if the wool stuck she was to put her hand into the machine and pull the wool loose. When she attempted to do this, her right hand was caught and severely torn by the teeth of the carding machine.

The company sent the girl to the hospital and supplied medical attendance; for several months she was treated daily by the doctor. Her hand not only was badly disfigured but was seriously disabled. The middle finger is bent and stiff, and the others are too stiffened to close over a pencil; on her fingers is a network of scars; and a large rough scar, which tears open if she tries to grip anything with any force, covers one-half of the back of her hand. The use of the hand has been reduced 50 per cent.[2]

The family knew nothing of the compensation law. The parents were foreign born, could not read English, and spoke it very brokenly. A lawyer of their own nationality heard of the accident and promised to get them some money for it. The records of the State compensation board show a payment of $850. The family received much less, however; they said, "the checks went to the lawyer, and he took something out of each one."

The girl's hand was healed after three months, but it was over a year before she tried to return to work. The experience made her very nervous and timid, and fearful of all power machinery. She returned to her old work but gave it up after two weeks, as she was afraid of it. One of her sisters, a weaver, tried to teach her to weave, but when the thread broke and had to be tied the girl screamed and ran, refusing to put her hands near the machine. In the four years that have elapsed since the accident she has worked less than six months; twice she tried to work in a canning factory, packing cans, but could not do the work. When interviewed she had been working in a pants factory on a power sewing machine for one week, earning $7. The family need this girl's earnings. Her father, who is 60 years old, has been unable for two years to get work; one sister, under 16 years of age, is in school; a second is "weak, coughs all the time, and can't work"; a third has a steady job in a canning factory at $11 a week; a fourth is a weaver at $10 a week when work is steady, but during this winter she has had only three days' work a week.

CASE NO. 2 (NEW JERSEY)

A 16-year-old boy who wanted to be a toolmaker worked at odd jobs during the summer, and in the fall got a job as apprentice toolmaker in a plant manufacturing steel novelties. In the third week of his employment, as he was grinding a tool, a bit of emery flew into his eye. He said that he had not been told of the danger in operating an emery wheel, nor had he been warned to wear goggles. The insurance carrier had the boy treated by three physicians; one, an eye specialist, performed two operations and treated the eye daily for four months. The eye was so injured that the boy's total vision was reduced 35 per cent.

[2] The final determination of the extent of the permanent disability suffered, on which depends the amount of compensation to be paid, is made by the State compensation bureau, board, or commission administering the compensation law, on the basis of a report from its own physician or an impartial physician.

At the end of four months the boy returned to his work as apprentice toolmaker but was forced to quit after two months. He said, "You have to have good eyes for that, it's close work, and I can't see well enough to do it." He then learned to be a knitter in a factory that used small hand machines. At first this promised to be a good occupation; it was piecework, and he made from $25 to $30 a week. But he soon found it highly seasonal. For the last two years he had not had more than seven months' work a year.

In the dull times in his trade the boy filled in with any odd jobs he could get. At the time of the interview a lay-off had lasted more than two months, during which time he had had one month's work driving a truck, substituting for a sick friend; at other times he had worked for the street railway, but work was slack there and temporary workers were laid off.

The only other wage earner in the family of three is the father, who is working at his trade of baker only irregularly because of injuries to his back sustained at his place of employment. The money received as compensation for the boy's injury, as well as all other savings of the family, have been spent in the times of slack work. At the age of 21 this boy is cut off from the occupation he wanted to follow, that of toolmaker, has learned a highly seasonal trade, and says, "I suppose I'll have to learn something new." He is a slight boy, not fitted for any heavy work, and his defective vision will be a handicap in any close work.

CASE NO. 3 (NEW JERSEY)

A 16-year-old boy who had completed the second year of high school obtained work in the sawmill department of a trunk factory during the vacation, in order to earn spending money. (His father is a skilled worker earning about $50 a week, and the boy expected to finish his high-school course and go to a professional school.) Although he had understood that he was to run errands and be a trucker, he made no objection when he was told to operate a disk saw which was power operated.

Several weeks later a knot in a board he was sawing struck the saw edge, and the board jumped and slipped out of his hand. Such saws are usually guarded at all places except the point at which they come in contact with the work; this one was not, and the boy's right hand was exposed to the edge of the saw on the whole area above the level of the table. His first finger was cut off at the first joint, the second and third fingers below the second joint, and the fourth finger at the first joint.

The boy was in the hospital for a short time, and his hand was in bandages until school opened 10 weeks later. He returned to school, although he was very nervous and his hand was very sensitive. The summer after his graduation from high school he obtained work as helper to a civil engineer. He became interested in this profession, and in the fall went to a technical school in a near-by city, enrolling for a three-year course in civil engineering. He remained in school one year but found that he was at too great a disadvantage. Because of his injured hand he could not use or adjust the necessary instruments. On his return home the boy applied for a number of positions but was rejected for all of them. His injury prevented him from writing well enough to do clerical work. The town in which he lives

is small and offers only limited opportunity for employment. Finally a family friend gave him a position as salesman in a hardware store, where he is earning about $20 a week. He is sensitive, dreads meeting strangers who notice his injury, and is unhappy and discouraged about his future.

CASE NO. 4 (WISCONSIN)

A 15-year-old boy left school after one and one-half years of high-school work because he wanted to supplement the family income. The family of three (his mother, brother, and himself) were living on his brother's wages of $22 a week, plus $15 a week received by his mother as alimony. Vacation work as a printer's devil had roused in this boy a determination to be a printer. At first he was unable to obtain work in a printing establishment. After a year as a salesman in a store he welcomed an opportunity to become an apprentice pressman, although the beginning wages were less than half the amount he received as salesman, because he was looking forward to the larger wages of a printer. But he was in his chosen occupation only three months. While he was helping to thread up a press, a revolving shaft pinched his left thumb between it and part of the folding mechanism; involuntarily he jerked his hand away, pulling off the nail and end of the thumb. At the hospital it was necessary to amputate part of the thumb.

Since his accident the boy has been employed as a salesman in stores, earning $20 a week. He hopes to get clerical work which will pay more; but opportunities for such positions are few in the small town in which he lives, and the accident has shattered his hope of becoming a printer.

CASE NO. 5 (NEW JERSEY)

A 14-year-old boy went to work as delivery boy for a department store during the summer after he graduated from grammar school. He continued working after school opened in the fall, although there was no economic necessity for his doing so. His father owned a small candy and cigar store from which he cleared enough to support the family of seven. The boy had been at work three years when he was hurt. As he was crossing the street to deliver some goods an automobile struck him, fracturing his leg half-way between hip and knee. The bone was so shattered that at first it was thought the leg would have to be amputated; but a silver plate was inserted, and the leg was saved. When the boy came out of the hospital, several months later, his injured leg was 1½ inches shorter than the other, and, as he said, "it sort of doubled up" when he walked. Compensation was given on the basis of 20 per cent loss of use of the leg.

After more than a year he returned to work with his former employer. For several months he was shifted from one job to another, all of them necessitating more standing or walking than he was able to do. Finally, completely discouraged, he left his employer and went to help in his father's store.

Now, five and one-half years after the accident, he walks with a slight limp and can not walk far nor stand long; he is incapaci-

tated for any active work and would have great difficulty finding employment.

CASE NO. 6 (NEW JERSEY)

A 14-year-old girl who had graduated from grammar school obtained work in an electrical factory for nine months, then went to a soap, powder, and perfumery factory, where she wrapped and packed cakes of fancy soap. (At night she attended a commercial school.) One day the forewoman asked her to substitute for a girl working on a blanking machine. She fed pieces of metal into the machine, operated by another girl, which cut out metal shaving cups. Two hours after she began this work a piece of metal stuck in the machine; as she tried to dislodge it with her left hand, the operator accidentally touched the lever and started the machine. Her second and third fingers were cut off close to the hand, the first and fourth fingers at the second joint.

After four months her hand had healed sufficiently for her to return to work. The employer had promised to give her work she could do, and when she objected to pasting labels (given her on the first day of her return), she was given clerical work in the office. There she has remained, her wages increasing from $14 to $23 a week. She can use the typewriter a little with her right hand and her left thumb. but seldom attempts to do it. She did not return to the commercial school.

In this instance a severe injury has not been apparently a great industrial handicap because the employer has given other work to this girl, now 21 years old, but it has made her very sensitive and averse to mingling with people who might notice her deformity.

CASE NO. 7 (NEW JERSEY)

A bright, ambitious boy, small for his age, worked during vacation, as he wanted to earn something while he was finishing his high-school course. He was the oldest of four children, all under 16 years of age. His father was earning $50 a week. When he was 15 he obtained work during the summer as a general helper in a paper-box factory; sometimes he operated a press which cut out paper boxes, although he was so small that he had to stand on a box to feed the machine. The next summer, after his second year of high school (when he was 16 years of age), he returned to the paper-box factory and was given work operating the press. This press was an automatic power machine, fed at the top, the two cutting plates closing at regular intervals. Such presses usually had a guard at the feeding point to push the operator's hand out of the way before the plates closed, but the machine on which he worked was a new one on which the guard had not been installed. The boy told the story of the accident as follows:

I was too short to reach the top of the plates to feed the machine so I had to stand on a box. I could not get a good balance on the box and often fell over toward the machine. At the time of the accident I think I slipped when I reached to put the pasteboard in and lost my balance. My right hand was between the plates. If the guard had been attached my hand would have been pushed up before the knife and plate came together, but it had not been installed, so the knife and plate came together and crushed my right hand. After

my accident the boss put another man on the machine, without guards, and he lost his right hand the next week. Then the boss installed the guards.

The boy was rushed to a hospital, and his hand was amputated at the wrist before his parents were notified of the accident.

At the opening of school, two months later, the stump was still bandaged; six months elapsed before it was sufficiently healed to permit the fitting of an artificial hand. The boy completed his high-school course, learning to write with his left hand. He had received $1,200 compensation, which he now used to pay his expenses at a school of business administration in a near-by city. In June, 1924, he graduated as a trained accountant and bookkeeper, but at the time he was interviewed, nine months later, he had been unable to get work. He says that when he applies for a position he is not even given an interview if the employer notices his artificial hand.

He is now 22 years old, bitter and unhappy, doubting whether he will ever be able to earn his living. He is very sensitive about his deformity, hiding his artificial hand as much as possible, and dreads meeting strangers.

CASE NO. 8 (NEW JERSEY)

A 15-year-old Italian boy (and his twin brother) left school to work in order to supplement the family income. There were three younger children in the family, and the father's earnings of $30 a week were insufficient for the family needs. After a year's work in different kinds of factories this boy entered the garment trades. In a year he had become coat operator and assistant marker and cutter in a men's clothing shop, acquiring enough speed as an operator to earn $40 a week during the busy season. As a cutter he expected in another year or so to earn $45 to $50 a week throughout the year.

During the dull season in his trade he obtained temporary work as a press helper in a waxed-paper mill. After two months he was injured while inserting a new roll of waxed paper in the cylinder press which stamped designs on the paper. The boy told of his accident as follows:

I had pulled back the hand switch to stop the press and was unscrewing a nut, preparing to take out the roll and put a new roll of paper into the press. My wrench slipped, and my hand fell against the impression cylinder. The press was slightly out of order and had not come to a full stop, so the cylinders were still turning and my hand was drawn in between them. There was a guard for the machine, around the cylinders, but it was "up" at the time. My four fingers on my right hand were crushed. The bones were broken in all four.

He was taken to a hospital where the second and third fingers were amputated at the second joint. The first and fourth fingers were saved but were stiff and useless for a year. This injury barred him from his chosen occupation, although he tried to return to it. He found that with the injured hand he could not operate the sewing machine as a coat maker, which required a deftness of touch in directing the feed impossible for him, nor hold scissors in cutting, nor manipulate a disk or straight electric cutter.

For a time he worked in the waxed-paper mill as general helper in the stenotype department and later returned to the garment trades as a presser, one of the least-skilled and lowest-paid occupations in the trade. He uses both a hand iron and a steam presser. The first and fourth fingers are no longer stiff, but the grip of his hand is

much weakened, and even in this occupation he is handicapped. His wages never go above $25 a week. His employer says he is industrious and a good worker.

CASE NO. 9 (NEW JERSEY)

A 15-year-old boy, eager to go to summer camp with his Boy Scout troup, got a vacation job to earn money for his expenses. He was a bright, energetic boy, president of his first-year class in high school and prominent in school athletics and activities. He obtained work as helper in the assembling department of a machine shop at $10 a week. Less than a month after he began work he was injured. He was helping a machinist attach a new belt to an emery wheel, and as he stood on a work bench adjusting the belt above while the machinist adjusted it below, he lost his balance; throwing out his left arm to steady himself he brought it in contact with the belt and shaft of an adjacent idle machine. Just what happened is not known, but from the position in which his arm was found afterwards it was thought that he had pushed his fingers between the belt and shaft, dislodging the belt, which doubled back, drawing in and crushing his hand and arm. The arm was broken in four places, the muscles torn, and the flesh lacerated.

He was rushed to the hospital by a physician who was in the factory, and his arm was amputated just below the shoulder. He remained in the hospital 10 days and for 3 months was under treatment. The shock, loss of blood, and worry over his future made him nervous and anemic.

He returned to high school in the fall and completed his course after three years, graduating with high scholastic standing. His deformity shut him out of the sports he loved, and his arm stump was so sensitive and painful that he was forced to lead a very inactive life.

The boy had a talent for drawing, and wished to become an illustrator or an advertising sketch artist. His stepfather's salary was not sufficient to enable him to send the boy to college as there were two younger children in the family; but the boy himself hoped to earn his way through a college in an adjacent State which offered the courses he wanted. He went there with letters of recommendation for four positions (waiter in a fraternity house, chauffeur for a private family, and houseman for other families). He found, however, that with only one arm he could not fill any of these positions, and he was unable to obtain clerical work. After a month he returned home, much discouraged. During that winter he made various unsuccessful attempts to earn money to complete his education. Part of the time he was ill from two falls in which he dislocated the stump of his left arm, tearing the muscles.

During the following summer he sold books on commission for three months, earning from $25 to $30 a week. With this money he is now, at 19 years of age, attending an academy of fine arts in a neighboring city to which he commutes. But he is working there at a disadvantage due to the loss of his arm and is not able to progress as rapidly as the other students. The money which he earned by selling books is almost gone. He has failed to obtain clerical work for, as he says, "nobody wants a one-armed man when there are plenty of two-armed

men to be had." Yet unless he can earn money to secure adequate training he will not be able to use the one special talent which he has.

CASE NO. 10 (NEW JERSEY)

A 14-year-old boy, oldest of five children, left school to go to work. His father's earnings of about $25 a week as a day laborer were the sole income of the family. Through a friend the boy got a job in a furniture factory at $12 a week. He fed boards into a glue machine operated by another worker, and had been employed about nine months when he was injured. As he glanced down at the pile of boards to see if the supply was running low, his right hand was caught by the machine; he cried out to stop the machine, but the operator thought he was only joking. He succeeded in pulling out his hand, but the palm was caught and badly torn by a screw.

He was in the hospital for five weeks. He has little use of the third and fourth fingers, and the grip of the hand is practically destroyed. In winter his hand soon becomes numb, so that he can not do outdoor work.

When he was able to work again he tried to get back his old job but was told there was no work for him. He tried unsuccessfully to get other work. After two and one-half years of unemployment he obtained work with a meat-packing concern for which his father had worked for 15 years. The first day he was put at piling boxes, but this work was too heavy for him. The next day he was made assistant foreman's helper, at $20.40 a week. After a year and a half in this position he had a dispute with his immediate superior and quit. In the seven months that have elapsed he has been able to get only one job. This was work in a bed factory, but it was too heavy, and he had to give it up after a week and a half.

The boy's father is also incapacitated now for heavy work, as he suffered a serious industrial injury over a year ago, when a box fell on him, striking him in the abdomen. He spent five months in the hospital, then was given light work by the company by which he had been previously employed, but after six months was discharged. Although the father and son apply daily at the various factories of the good-sized manufacturing town in which they live, neither one has been able to obtain work. Since the other children are all too young to work, the family is living on its small savings.

CASE NO. 11 (NEW JERSEY)

After his father's death a boy and his mother were living on the mother's earnings of $1.50 a day and on the $5 a week paid by a maternal uncle who lived with them. For three years they were forced to draw heavily on the insurance money left by the father, and it seemed necessary for the boy to go to work as soon as possible. After he completed the eighth grade at 14 years of age, his teacher obtained a position for him at $10 a week as office and messenger boy in the office and warehouse of a chain of grocery stores. Two weeks after he began work he was injured; the next four years, with two intervals of about two months each, he spent in hospitals.

The accident occurred when the freight elevator on which the boy was riding from one floor to another with a message was stopped by

the operator to put off a truck. The boy, thinking that another truck which was on the elevator was to be taken off also, started to step off. His right heel was caught between the floor of the car and the steel door jamb, and the flesh and part of the bone were torn off. As the boy said, "If the elevator man hadn't stopped when I yelled, my whole leg would have been taken off."

During the four years in the hospital 14 or 15 operations were performed. Twice the heel was grafted into the left leg. The first graft (into the shin) failed. When the heel was removed the wound in the shin did not heal and an ulcer developed, persisting more than a year. The second graft (into the calf of the leg) was more successful. The heel was partly built up and the wound in the leg healed more readily. Numerous skin-grafting operations were performed, the skin being taken from the boy's thighs.

Eight months ago the boy was discharged from the hospital, with the use of his foot reduced 50 per cent. He lacks almost an inch on the bottom of his right heel. Wearing an ordinary shoe, which he pads with cotton, he walks with a slight limp. Without the shoe he can not walk at all. He can not remain standing for any length of time, nor walk far.

Since his discharge the boy has worked less than three months. He was orderly in the hospital at $90 a month and meals for three weeks, but he was too slight to do the required lifting. For nearly three months he tried unsuccessfully to get work he could do. At his mother's request his former employer hired him as clerk at $10 a week in one of the chain stores. Part of his work was to take advertising cards to six branch stores with distances of several blocks between. The manager of the store objected to the length of time it took him to walk from one store to another, and at the end of five weeks, after a dispute over the way he served a customer, the boy quit. After two weeks a friend got him the place in a meat-packing company, which he had when he was interviewed. His work is to lift empty boxes off a truck and slide them down a chute. The work is light (the boxes weigh about 5 pounds), but he has to stand all the time, and his foot gets tired and sore. A box struck his left shin, and the scar (which he says opens easily) has opened again. He has worked two weeks, earning $22.98 each week, but he does not know whether he can continue the work.

While the boy was in the hospital he was paid compensation of $6.67 weekly, and the employer himself paid a voluntary contribution of $4 a week. This was practically the only income of the family, as there was no money remaining from the father's insurance, and the uncle was working irregularly and able to contribute but little. The storekeepers, who had known the mother for 20 years, gave her liberal credit, and some aid was received from relatives and other persons.

The final hearing on the case took place soon after the boy left the hospital. The weekly compensation of $6.67 had been paid for 217 weeks; and medical and hospital bills amounting to $1,605. 50. The compensation bureau determined the permanent disability to be 50 per cent loss of use of the foot, and ordered the payments to be continued for 62½ weeks more. This will make the total compensation, paid in a period of five years, $1,864.27. But when the further payments cease (in 10 months) the family do not know how they

will get along. It is not known how long the former employer will continue his purely voluntary contribution; the mother is no longer physically able to go out to work by the day; the uncle (now almost 70 years old) is out of work, and the injury to the boy—who is not yet 19 years of age—has greatly limited the kinds of work open to him. Spending four years in a hospital at this impressionable period of his life has circumscribed this boy's horizon and concentrated his thoughts to an unfortunate degree upon his accident and the various operations which he has undergone.

CASE NO. 12 (NEW JERSEY)

A 15-year-old boy, retarded in school, left school to go to work. He was the oldest of five children whose father earned $30 a week. The boy worked in various factories for a few months, and soon after he was 16 he obtained work as a rivet passer in a shipyard at $15.84 a week. He had worked less than six months when a rivet dropped by a passer on the upper level struck him in the left eye. He was given hospital care, and two specialists in a neighboring city treated him for several weeks but could not save the vision of his eye. Two months later he returned to his work, but as another man was hit in the eye by a rivet soon afterwards the boy was afraid to remain in this occupation and obtained a transfer to a job of picking up bolts at the same wage.

He left the shipyard after six months and obtained work as a truck driver. This was not full-time work; but he had been rejected by several factories at which he applied for other work, when the physical examination which they required disclosed his defective vision, and no examination was required for truck driving. His eye looked normal, and he said that he could drive in a straight line but had trouble turning corners. He says that he has not had any accident on his truck.

A year ago, while he was out of employment, the boy suffered a severe injury from being struck by a truck. His right leg was broken and crushed at the thigh; he was in the hospital for two months and for six months was unable to stand. His right leg is short, and he walks with a perceptible limp. He could not obtain damages because the accident was due to his own negligence and not to that of the truck driver. Since this second injury the only work he has been able to obtain has been an occasional job as truck driver. He says he can not find other work because most of the factories of the city where he lives require physical examinations, and will not hire him when his eye defect is discovered. With the handicap of his two injuries, his driving a truck is dangerous to himself and to others. Although now 22 years old, he is still dependent upon his father for support.

CASE NO. 13 (NEW JERSEY)

In one family it was necessary for each of the 12 children to go to work as soon as possible. The father earned $25 a week and was furnished a house by the gas company for which he worked. The second child in the family completed the sixth grade a few months before he was 15 years old, and at the close of the school year he

obtained work as a plumber's helper at $5 a week. When he was 16 he worked for nine months for the gas company. After this he was employed as the driver of a delivery wagon for a local store at $15 a week. He had been in this position three months when he was hurt.

A laundry automobile backed into his delivery wagon, throwing him to the ground. He fell between the wheels and the curb, striking his head and falling in such a position that he could not move. His horse, becoming frightened, lunged forward, pulling the heavy wagon over the boy's left arm just below the shoulder. The automobile driver got the unconscious boy from under the wagon. At the hospital it was feared that the arm would have to be amputated, as the bone was crushed to splinters. The mother would not consent to the amputation, however, until a specialist was consulted. The specialist inserted a six-inch silver plate and saved the arm. The boy spent three months in the hospital and was incapacitated for work for three months more.

As the injury, though received in the course of his employment, was caused by a third party, a suit was brought [3] against the laundry owner; the jury gave a verdict for $1,500 on the testimony of physicians that the use of the boy's arm was reduced 35 per cent. The lawyer's fee was $450, the operation $150, and there were other medical expenses (the hospital bills were paid through another source).

The boy returned to his work at the store at his former salary. After six months he obtained a better-paid position with the gas company earning $25 to $30 a week. He can not raise his arm above his shoulder, and in wet weather it is so painful that he can not drive the car in which he goes about to read meters. He is incapacitated for heavy work but can usually do the work required in his present position.

CASE NO. 14 (WISCONSIN)

A 16-year-old boy was working as construction helper for an electric light and power company. He had been at work a month when he was sent to the top of a pole to pull wires through it. The pole was decayed and gave way, and the boy fell to the ground. His skull and jaw were fractured, and both arms were broken. He left the hospital after six weeks, badly scarred, with the use of both hands reduced 20 per cent, and unable to remember anything from one day to the next.

The boy had left school a short time before he would have completed the eighth grade, because he "wanted things the other boys had," which his father could not buy for him. When he had partly recovered from his injuries he enrolled in a commercial school but remained only a week, as his head hurt him badly.

Because he had been illegally employed he received treble compensation amounting to $3,898. For a few months payments were made weekly, after which the rest was given in a lump sum, and a guardian was appointed (the boy's parents were divorced).

[3] When a third party is legally liable to the injured employee for an injury, the existence of a right of compensation under the compensation law is not a bar to an action by the employee against the third party (New Jersey, Laws of 1911, ch. 95, sec. 23 (f), as amended by Laws of 1919, ch. 93).

For a year and a half he was not strong enough to attempt any kind of work. Since then he has worked intermittently as a barber, but is out of work much of the time because of his poor health. He is 21 years old now and much discouraged about his future.

CASE NO. 15 (WISCONSIN)

A 16-year-old boy left school in 1918 and did farm work till late in the fall, not returning to high school (he had completed the third year). That winter he remained at home; in the summer he went into the hemp factory owned by the uncle with whom he lived. When he had been there four weeks he was hurt. Helping at a hemp-breaking machine operated by another man, he misjudged the length of time before the hemp would be adjusted and the machine would be started. His right hand was caught and crushed, and only the quickness of the operator prevented the boy's whole arm and body from being drawn into the machine. At the hospital his arm had to be amputated midway between the wrist and elbow. Total compensation of $3,535 was paid, as well as the hospital and medical expenses. Later an artificial hand was secured.

The boy did not recover sufficiently to attempt work for nearly a year. He was shut out from any manual labor. For two years he attended vocational schools in near-by cities, learning to write with his left hand and studying bookkeeping and accountancy. Through the second school he attended he obtained a position as timekeeper and accountant in an automobile factory. He is now 23 years of age and is self-supporting.

CASE NO. 16 (WISCONSIN)

A 14-year-old boy left school as soon as he could legally, and obtained work as errand boy in a general job printing and binding establishment. His father had been ill for five years, there were seven in the family, and this boy's earnings were needed.

After working one week the boy, not realizing the risk he was running, investigated a round-cornering machine while the operator was absent. While his right hand was in the machine he touched a lever which caused the knife to descend, and his first and second fingers were cut off at the first joint.

Compensation was awarded by the commission, but the employer and the insurance carrier contested the case, on the ground that the injury did not occur in the course of the boy's employment. The lower court affirmed the award, thus supporting the commission's contention that a boy of that age naturally would be attracted to machinery, and that the employer should have provided better supervision to prevent the occurrence of such an injury.

The State supreme court, however, reversed the decision, and the child received no compensation. The employer gave $35 to the family. The doctor canceled his bill when he found that the boy's mother would have to pay it, but she did pay the hospital bill of $15.

For six weeks the boy was unable to work. Then he returned to his former employment as errand boy at his former wage of $8.64. During the next five years he held a number of jobs, most of them for only a short time. At the time he was interviewed he had been

out of work for a month. He thinks that his injury is a serious handicap in obtaining work. In at least one instance when he had been hired he was rejected as soon as his injured hand was noticed. Now, at 19 years of age, he can obtain work only very irregularly.

CASE NO. 17 (NEW JERSEY)

Retarded in school and disliking the work, a boy left school as soon as he could do so legally, and obtained work in a cigar factory, spreading out tobacco in the warehouse and rolling away empty hogsheads. He earned $10 a week which he gave to his father, who allowed him $2 for spending money. He had been working about four months when he was injured. He described the accident as follows:

> We had been spreading out the tobacco to dry on the floor and were rolling the empty hogsheads away. We had hooks to catch the hogsheads. The boss sent a deaf and dumb boy to help me. I caught a barrel with my hook. He was on the other side of it. I told him to roll it away from me toward the wall. He could not hear me and rolled it toward me instead, knocking me down while the hook handle was still in my hand and the hook fastened in the barrel. The handle was jammed into my arm as I fell, dislocating it at the elbow.

The company physician strapped the boy's arm and sent him back to work. He was put on easy work for a few days and when the pain grew intolerable was sent to the hospital, where he remained two months. Finally the doctors said they could do nothing more for him, and he returned to the factory. He received $252 as compensation for a 15 per cent reduction in the use of his left arm. He remained in the cigar factory, sorting cigars at $12 a week, for two and one-half years, was laid off in a dull season, and obtained a job cutting threads of gas mantles at $11. After six months he began washing windows of engine cabs for a railroad, earning $20 a week, and sometimes more by working overtime. He tried to become a fireman on the railroad but failed to pass the physical examination because of his weak arm, and knows of no other work on the railroad which he is physically able to do. Though he is strong and of good physique he can not lift heavy weights because the bone of the lower arm is still out of place. The bone protrudes on the inner side of the elbow. He is now 18 years old and would like to do more skilled work, feeling the need of earning better wages. He continually hurts the arm through overexertion, and is discouraged about his future.

CASE NO. 18 (MASSACHUSETTS)

A 14-year-old girl obtained work as helper in the sample department of a blanket factory. Her father was dead, and the two sisters and a brother who supported the family of seven on their earnings of $47 a week thought the younger children should go to work as soon as possible. The girl's work was to cut samples with hand scissors and to prepare sets of blankets for delivery. She occasionally helped to cut blankets on an old-fashioned cutting machine controlled by a hand lever. After three years she was told to help an inexperienced operator (another girl of 17) on this cutting machine. As she was arranging the blankets in the machine, which cut 8 or 10 at once, the operator let go the lever, and the heavy knife blade dropped, cutting

off the ends of all four fingers of the helper's right hand. The first finger was severed at the base of the nail, the second finger below the first joint, the third finger at the first joint, and the tip of the fourth finger was cut off.

The girl was given first aid at the factory and was then taken to the hospital. The bones were rounded off and the ends of the fingers were closed with stitches. The third finger was left with almost no flesh pad, only the skin over the end of the bone. The girl returned to her work after 11 weeks, but found it very difficult. Not only were her fingers very sore and sensitive, but she could no longer grasp firmly with her injured hand and was continually letting objects drop.

She is able to hold her position only because a friend who works with her does all the cutting; she herself can not use the scissors and finds it difficult to wrap the blankets. The loss of blood at the time of the accident, the nervous shock, and the pain of contacts with her injured hand have caused several nervous collapses, which have forced her to give up her work for periods of several months. She is now 20 years old, thin, pale, and nervous. Her wages rose from $12.30 a week to $16.85 but were recently reduced to $15.50 when the wages throughout the mill were cut.

CASE NO. 19 (MASSACHUSETTS)

A 17-year-old boy had been taking violin lessons for eight years and was looking forward to a career as a concert violinist. He wished to earn money to pay for his music lessons, as his father's earnings of $30 a week were the sole income for the family of three, and during the summer vacation applied for clerical work in a surgical-instrument factory. He was told that before he could be given clerical work he must work for a short time in the shop. He was placed temporarily at operating a punch press, which cut out frames to be used as holders for hypodermic needles. On the fourth day he received an injury which ended his hope of a musical career. One of the frames caught in the machine, and the boy, not accustomed to the machine and awkward in handling the materials, put his left hand under the die to dislodge the frame; at the same time he unconsciously pressed the lever, and the die descended, cutting off his second and third fingers at the first joints.

In the fall the boy returned to school. His fingers were very sensitive. The physician reported to the State industrial accident board that "the stumps show poor flaps, skin thin and adherent with crusts." That year the boy completed his high-school course. He obtained a clerical position during the day and went to a school of business administration at night, paying his tuition with the $460 he had received as compensation for the loss of his fingers. In the two years that have elapsed his finger stumps have hardened enough for him to become a typist with a fair degree of speed, earning $25 a week. He is attending night classes at a university, planning to take a degree, and thinks he has found a means of earning a living, but concert work or any use of the violin is now permanently closed to him, and he feels that nothing can compensate him for this.

CASE NO. 20 (NEW JERSEY)

A 16-year-old boy, whose father and brother had irregular work as street laborers (earning about $24 a week), left school to go to work. His first job was cleaning spools in a sewing-machine factory. He remained at this factory several months, turning his wages over to his mother, then obtained work as a punch-press operator in a metal-novelties factory. He had been at work six days when he was injured. As he stated, "I was talking to a boy across the room while I was feeding the press. I had my hand under the knife, and I guess I must have put my foot down on the lever without noticing. Anyway the knife came down all of a sudden and cut my hand." His left thumb and index finger were amputated at the second joint.

When he tried to return to work, six months after the injury, the grip of his left hand had been destroyed. As he could not operate a press with one hand, he was transferred to a laborer's job in another department; but the work was too heavy for him. He tried to obtain work as a street laborer with his father but could not handle the shovel or other tools. Since his accident, four and one-half years ago, the boy has never had a job which made any wage return, although he has applied for work at a number of factories in his own and near-by towns. Recently he has been helping, without pay, at a lunch stand where "quick lunches" are served. He has learned to cook and thinks he could do the work necessary, but the owner refuses to employ him as a relief worker because of his hand. "He said he could not leave me alone at the stand because I could not handle things right with only one hand. He said I could help around, but he does not pay me." The boy is bitter and discouraged. He would like to have a lunch stand of his own, but this seems impossible. The wages of his father and brother now amount to $37 a week, and this, supplemented by his mother's earnings of $5 a week from laundry work, is the income for a family of four.

CASE NO. 21 (MASSACHUSETTS)

A 17-year-old girl left school to work, although her father was willing for her to remain in school. She thought she should get work so that she could buy her own clothes and pay board at home, as the family consisted of 13 persons, 8 of whom were under 16 years of age. She obtained work in an elastic-webbing factory at $14 a week. Here she took care of the starch tank and fed the strips of web into the finishing machine. As the web passed through the machine it left threads on the rolls. These had to be cleaned off so that they would not stick to the next strip of web and mark it. The finishers had been warned not to clean the rolls in motion, but they disregarded the warning because if they stopped the machines the heated rolls burned the threads, making them very difficult to remove. After two months, as the girl was rubbing the threads off the rollers, her foot slipped on the wet floor; and as she fell forward her right hand was drawn into the rollers and crushed.

She was taken to a hospital where her hand was treated for three weeks, but her fingers could not be saved. The first, third, and fourth fingers were amputated at the hand; the second became crooked and stiff. Because the flesh had been badly torn, the hand was very

slow in healing. She remained in the hospital ten and one-half weeks, and for a year or more was treated at the out-patient department. She carried her hand in a sling because it was very sensitive; and she could not use it at all for a year and a half.

She was unable to do her former work; and though her employer offered her a position in the office she was very nervous and did not want to work at the scene of her accident. Through friends she obtained a place as telephone operator, her wages beginning at $8 a week and gradually increasing to $13.50. In this work she can use her other hand almost entirely. Although the skin on her injured hand is thin and badly scarred, she says the hand is better, and not so sensitive to heat and cold and to contacts. She manages to write and to iron with it. The accident and long disability have been a severe strain upon the girl, and she is thin and nervous; however, she is ambitious and eager to work, and tries to make the best of her situation.

CASE NO. 22 (NEW JERSEY)

A 16-year-old boy left school on completing grade 7B. He did not wish to continue in school, and it seemed best for him to go to work, as his father earned only $18 a week and there were four in the family. His first job was winding armatures in an electrical-supply factory, where he earned $20 a week. After eight or nine months he went to another electrical-supply factory, where he worked with the fan-motor crew cutting wire and winding springs and earned about $24 a week. He had been at this factory nearly a year when he was injured.

He said he called the foreman's attention to the fact that the wire supplied to him was split but was told to use it anyway. As he cut the wire a piece flew up and hit his left eye. The doctor to whom he was sent said the blow had caused a hemorrhage. He put a shield over the eye, and the boy remained at home nine days. The foreman sent for him, and he went back to work with his eye bandaged. He tried to do his old work but could not see well enough; he was given other work on the fan motors, at 25 cents an hour, but much of this he could not do. The other men in the crew used to "give time" to help him, as they knew that his father was then out of work and the family was dependent on the boy's earnings.

The first compensation payment was not made until 9 or 10 months after the injury, when the State compensation bureau determined that 90 per cent of the vision of the left eye was lost. A lump sum of $200 was paid, and after that $24 every two weeks till the total award of $1,080 had been paid.

The boy remained at the factory for nearly two years after his injury, until after a disagreement with a new foreman the whole fan-motor crew quit. Then he obtained work as a truck driver at $25 a week. He said that he could do this work "except when he got caught in a jam," but "when your eye is gone you get to feel things coming up on that side of you." Two months ago work became slack, and he was laid off. He has found no other work yet but says he must, as he can not afford to be idle. His father can get only three days' work a week and is earning only $20. His 18-year-old sister has to stay at home as their mother has been ill for several months. The boy is now 22 years old, big and strong, yet he is handicapped

for many kinds of work as the sight of his left eye is practically destroyed. Recently a glaze has come over the eye, but he has not gone to a physician for examination.

CASE NO. 23 (NEW JERSEY)

From the time he was 11 years old a boy had gone after school and on Saturdays to the basket factory where his father worked to help him prepare the materials for the next day's work. The year he was 16 he failed to pass the eighth grade of school. That summer, and until the following spring, he worked in the basket factory at piecework. His earnings varied from $15 to $35 a week. This money he turned over to his mother, who gave him spending money and bought his clothes out of it. In the spring he returned to school, completed the eighth grade, and planned to enter high school in the fall.

During the vacation he returned to the basket factory, where he received in August an apparently slight injury which nevertheless had serious results. He stepped on a tack on the factory floor; he said that as tacks were always lying about, and as he had stepped on them before, he had pulled it out and thought no more about it. Three days later, however, not only his great toe (which the tack had pierced) but his whole foot was badly swollen, as infection had set in. For four months he was under the care of a physician, who lanced his toe, drained it, and poulticed it. An X ray then disclosed that the bone was affected. The boy was taken to a hospital, and most of the toe was amputated. He could not walk again until March, and then only with a perceptible limp. Compensation of $700 was paid him.

As he was discouraged about losing so much time from school he did not go back, but returned to work at the basket factory, where he has remained ever since. His toe is in bad condition and "gathers" with slight provocation. Two years ago this forced him out of work for two months, and last winter he lost five weeks because of it. The doctor advises an X ray, believing that the bone is affected and that the rest of the toe must be amputated. Since the boy already limps because of the injury he fears that walking will be still more difficult if the whole toe is amputated.

CASE NO. 24 (WISCONSIN)

A 16-year-old boy had to leave school to go to work just before completing his second year in high school. His father, the only wage earner, was ill, and the burden of supporting the family of five fell upon this oldest son, who gave up his hope of a medical education to become a timekeeper and apprentice in an electrical-supply factory. He had been working three months when a chip of steel from a casting he was cleaning flew into his left eye. The factory nurse and two local physicians treated the severe hemorrhage which followed but did not realize that the piece of steel was in the boy's eye. They thought he was "bluffing" when he returned to work a few days later with his eye still bandaged and complained of the pain. The compensation commission awarded compensation of $227 for what was determined to be a 10 per cent reduction of vision. Nearly

nine months later, when he was working at night as a toolmaker, the boy suddenly discovered that the vision of the eye was nearly gone. He could only distinguish between light and dark. A specialist in a near-by city, to whom he was sent by his employer, discovered and removed from the eye a piece of steel nearly a quarter of an inch long. The vision of the eye could not be saved, and the eyeball had turned brown from the rusting of the steel. The case was reopened before the compensation commission, and an additional $1,880 was paid in three installments.

Since the loss of the vision of his left eye the boy has had a number of positions. When interviewed he was working as tool and die maker, earning $35 a week. But he can not judge distance and works under a constant strain, fearing an injury to his other eye.

CASE NO. 25 (WISCONSIN)

A 15-year-old boy began to work after completing the eighth grade of school. The father contributed little to the support of the mother and eight children. Although three of the children were already at work the mother felt that this boy's earnings were needed also. He obtained employment assembling boxes in the wood-working department of an electrical-supply factory, earning $9.90 a week. After working two weeks, as he was cleaning a saw machine, his right hand was caught in the saw, and his second, third, and fourth fingers were cut off at the second joint. Because he was illegally employed, treble compensation of $977 was paid. For two years he continued to work for the same employer but found himself so seriously handicapped by his injury that he wished to fit himself for some other occupation. His mother decided that he should go to a technical high school in a near-by city.

The father deserted the family some time ago; three children are still contributing to the support of the home. His mother has helped the boy all she could although the financial burden has been heavy; the boy has helped himself all he could by doing odd jobs during the school year and by working during vacations. For two summers he worked in his home town for the electric company. He is now completing his last year in the technical high school. He feels that the time has been well spent and that he can become self-supporting.

CASE NO. 26 (MASSACHUSETTS)

A 16-year-old boy, disliking school, was glad to leave to go to work. His father's earning of $25 to $30 a week would have been sufficient to support the family of three (father, mother, and boy), but an older brother had been disabled by war wounds and the father contributed to the support of this son and his family.

The boy obtained work in an oilcloth factory as trucker and as operator of a cooling machine. He earned $16.80 a week, of which he gave $10 to his father. He had been at work a year and four months when he was injured. At the request of a fellow worker he attempted to shape a scraper handle on a circular saw, knowing nothing of the danger he was incurring. He let the board slip and his right hand came in contact with the saw, which cut off all four fingers at the second joint.

Compensation for the loss of his fingers was refused at first on the ground that operating the saw was not part of his work. But the State industrial accident board ruled that the accident occurred in the course of his employment, and a total compensation of $332 was paid.

For six months the stumps of the boy's fingers were too sore and sensitive to use. Then he returned to his former employment but found that he was unable to operate the cooling machine and that there was not enough trucking to keep him busy. He worked on part time for seven months, then was laid off and not recalled. At present he is a driver of a delivery wagon at $18 a week and is able to do the work required, although it is difficult for him. He can grip the reins with only one hand—the horse he drives is easily managed. He can use his right hand only as prop under the cases and bags of groceries he must lift, holding and manipulating them with his left hand, and they often slip from his grasp. In cold weather his hand is very painful and soon becomes numb. He is afraid that he will lose this job and that he will be unable to find other work on account of his physical handicap.

CASE NO. 27 (MASSACHUSETTS)

A 15-year-old boy, the oldest of eight children, left school to go to work because his father thought he ought to do so. The family income consisted of the father's earnings of $27 a week. For more than a year the boy worked at odd jobs in leather tanneries and shoe-shining parlors, then obtained work as helper on a wringing machine in a tannery at $13 a week. On the third day of his employment he was feeding the wet skins into the wringer, and one skin went in faster than he had expected. His right hand was drawn into the machine, his fingers were crushed, and the palm of the hand was cut.

The boy was sent to the hospital to have his hand dressed; and continued under treatment for two months. He lost the use of his third finger, which became stiff and crooked, and for five months he was unable to work. He wished to become a mechanic and tried to work in a garage but found that he could not use the tools with his injured hand. Returning to his former employment at the tannery he found that no advance in wages was possible in this occupation nor in that of hanging skins, which he also did for some time. He is now tacking skins (stretching them by means of pliers and fastening them on boards). He can earn $31 a week at this, but the pliers irritate his finger so that it is swollen and purple and has a deep ring indented in it. He fears that he must give up this work; he is much discouraged and thinks that he can never hold more than a laborer's job.

CASE NO. 28 (MASSACHUSETTS)

To earn spending money a 13-year-old boy started to work after school and on Saturdays in a candy store, preparing pans in the candy kitchen, freezing ice cream, and running errands. As soon as school closed he worked full time, earning $5 a week. Early in the summer, when he was barely 14 years old, he was severely injured. As he was shoveling ice into the power-driven ice-cream freezer the

shovel slipped and his right hand went into the unguarded gears. His little finger was ground off, and the flesh on his other fingers and on his hand up to the wrist was badly lacerated. At the hospital a part of his hand was amputated so that the line of the hand is straight from the third finger to the wrist. Skin from his arm was grafted on the torn flesh. He was in the hospital seven weeks and for three months was under treatment.

The State factory inspector reported:

> I noticed that a guard, which had formerly been provided for the bevel gears open to contact, was not in its place on the machine. * * * After questioning the proprietor relative to the guard he stated that it had been taken off some time ago, and they had neglected to put it back again. * * * If this safeguard was on the machine where it belonged it would have been utterly impossible for above accident to happen.

Compensation of $1,500 was paid by the insurance carrier 18 months after the accident, but part of this went to the lawyer whom the father had hired because at first only $600 had been offered. The father tried to save the rest for the boy but during the past year has had to use some of it for family expenses. There are six in the family, and the father and sister, the only wage earners, have had very irregular employment.

The injured boy, now 16 years old, is completing his first year in high school. He is handicapped in school because he can no longer write legibly with his right hand and has not been able to learn to write well with the left one. His wrist and fingers were very weak for a long time. They are gradually growing stronger, but he can lift very little with that hand. "It gives out," he says, "and I drop things." The hand is very sensitive to contacts and to heat and cold; the skin is scarred and discolored and breaks easily. The boy hopes to obtain work as salesman in the candy store when he finishes high school. He probably will never be able to use tools nor to operate any kind of machine in the mills which are the chief industries of his community.

CASE NO. 29 (MASSACHUSETTS)

An orphan boy, dependent upon an uncle and aunt, went to work when he was 14 years old. His uncle, a mixer in a rubber plant, was the only wage earner, and there were three children in his family. The boy had been in the hospital with a septic leg for several months during the winter. When school closed he obtained work as a doffer in a textile mill so that he could buy his own clothes and pay some board. He kept this position more than a year, his wages rising from $7.60 to $14.50. He then obtained a better position, operating a bolt-threading machine. He was on piecework, earning from $18 to $20 a week. As he wished to become a mechanic, so that he might later earn the wages of a skilled workman, he took a job as mechanic's helper in an automobile factory, although he earned only $12. He had been in the factory 10 months and felt that he was making progress, even though his wages had not risen, when he received an injury that barred him from skilled work. As he was grinding a tire plate, either his hand or the plate slipped, and his right hand came in contact with the grinding wheel. His thumb was ground off to the first joint.

Three weeks later he returned to the factory but found that the loss of his thumb prevented his doing his former work. He could not pick up tools or small parts, nor do other necessary things that required deftness of touch and ability to grasp small objects. This also prevented his return to his former employment as doffer in the textile mills and as operator of bolt-threading machines. The company transferred him to the stock room as assistant to the stock clerk at the same wage of $12. He saw no prospect of advancement and after several months left to become a drill-press operator. He could operate the drill but his inability to pick up small objects made him so much slower than the other operators that he was laid off. The only work he could find was the unskilled job of trucker in a gun factory.

The boy is now 20 years old and is still a trucker, earning $26 a week when the factory is running full time. He says that he can earn his living at unskilled jobs like his present one—jobs which have no future—but that he can never learn a trade. "Of course I'd be a good deal better off if I could become a mechanic, but I know I can't now, so I don't make any fuss over it. I just take my mind off it."

CASE NO. 30 (MASSACHUSETTS)

To earn spending money a 12-year-old boy ran errands for a meat market and grocery store during summer vacations. He had operated the meat-grinding machine without injury several times; but one day during the second summer as he was feeding meat into the machine his right hand went too far, and the index and second fingers were so badly cut that it was necessary to amputate them at the hand. He spent three weeks in the hospital and was unable to use his hand for three months. The wound did not heal well and broke open easily.

He returned to school but did not like it; he wrote with great difficulty, and his hand was still sore and very sensitive. He left school as soon as he could do so legally but had difficulty in finding work that he could do. The grip of his right hand was destroyed so that he could not handle tools nor operate a machine, and he constantly dropped things. He is now 17 years of age and a helper on the delivery wagon of a furniture store, earning $12 a week. He can not lift heavy pieces of furniture and in helping with other pieces often strikes his hand till it is raw. His mother is eager to have him become an electrician, but it is doubtful that he could learn such a trade thus handicapped.

CASE NO. 31 (MASSACHUSETTS)

During the summer vacation a 15-year-old boy worked as general helper in a grocery store, and after school opened he worked there two hours each afternoon. His father was dead, his older brother was out of work, and his mother and two sisters earned only $32.50 to support the family of five. He hoped to earn enough to buy his school books and some of his clothes. In December of that year, as he was coming out of the stock room with his arms full, he stepped into a space between the floor boards, turning his ankle. The pain was not severe enough to make him quit work that day, but the

following day his ankle was so painful that the family physician had it X-rayed, and discovered a separation of the small bones. A cast was put on. A week later the boy's temperature was high, and a discharge began to seep through the cast. He was sent to the hospital and the cast was taken off. Slivers of bone were removed from the foot, and the ankle bone was scraped. The wound was kept open for drainage for a month.

The boy remained at the hospital for three months and was paid $287 compensation. He walked on crutches until the following September. When he reentered school he was walking with a cane and could walk only to and from school. During the Christmas holidays he tried to work in the grocery store again but found that he could not stand on his foot. He was nervous and below par physically, and at the end of the year his physician advised him to give up school as too confining. This was his first year in high school; he was retarded on account of his long absence the previous year.

He returned to the grocery as clerk at $12 a week and has remained there for the eight months that have elapsed. He limps slightly, and his leg tires quickly. He is a pale, thin, nervous boy of 18 years, very much discouraged about the future. He has not the physical endurance for harder work, yet his wages would not support him were he not living at home. His brother and one sister are now away from home, his mother is not well enough to work, and the only income of the family is his wage of $12 and his sister's of $15.

CASE NO. 32 (MASSACHUSETTS)

A 14-year-old boy who had completed the eighth grade left school because his two older sisters, who together earned $27 in a textile mill, thought he should contribute to the support of the family. The father, who had been injured five years before, could not even walk without help. The boy was so small for his age that he could not find employment for some time after leaving school. He was compelled by an attendance officer to attend continuation school five days a week for seven months of the following school year until the next April, when he obtained work in a shoe factory, cementing soles, at $6.15 a week. After five months he went to another factory where he tacked heels and cemented soles. He liked his work and developed enough speed so that he was earning $12 a week at the time of his injury seven months later. As he was looking for more heels for his work in the room where the skiving machine was, he stumbled over a box and fell against the machine. He threw out his hands to save himself, his right hand went under the blade of the machine, and his body struck the treadle. This brought down the knife, which cut off his index and second fingers at the first joint. Compensation of $139.43 was paid.

When the boy's fingers healed he returned to work but found he could no longer tack heels because he could not pick up the tacks nor hold the tools. He could still cement soles by grasping the brush with his fist, but this was awkward and he was so slow that his employer transferred him to other work. He tried several kinds of work but found none that he could do, as the grip of his right hand was too badly impaired. After four months he left the shoe factory to

work in a textile mill. Here he tried several kinds of work before he found any that he could do satisfactorily. He tried to be a folder, but stacking the cloth made the ends of his fingers bleed, causing him pain—also staining the cloth. He was transferred to work as a washer, but the chemical soap irritated the stumps of his fingers and his whole hand became numb from the water. Again he was transferred, this time to become a feeder for an inspecting machine. This was comparatively easy work as he did not handle the cloth enough to irritate his hand. He acquired speed in feeding and now earns $27.30 a week. But he dreads a slack season in the mill which may cause him to be laid off, because there are so few kinds of work that he can do.

CASE NO. 33 (MASSACHUSETTS)

A 14-year-old boy left school to look for work. His father was dead and the family (consisting of five persons), was dependent on the earnings of the two older sisters, each of whom earned $14 a week in the textile mills. After the slack season (two or three months later) this child obtained work as a band boy in a worsted mill, sewing bands, oiling machines, and collecting waste and wheeling it away in a hand truck. For this he received $10.26 a week. He had worked 11 months when he was injured.

As he was waiting at the elevator shaft with his truck, a passer-by hit the truck, and it rolled toward the elevator shaft, which was open except for a board across it 3 or 4 feet from the floor. In pushing the truck back to prevent its falling into the shaft the boy put his right foot partly over the edge of the shaft, and the descending elevator caught his foot and crushed it to the instep. He was given first aid at the mill, then taken to a doctor, who found that the toes were crushed and that there was a compound fracture. He took the boy to the hospital in a near-by city and operated, succeeding in saving the foot, although the other physicians thought part of it would have to be amputated. The boy was in the hospital 65 days and could not walk without crutches for 11 months after his injury.

When he could walk he returned to the mill. His foot became tired very quickly, pained him after standing, and was extremely sensitive to cold. He was given work in the roller room where his duties were much the same as in his former occupation, but the work was lighter. Later he was transferred to the weaving room, supplying the weavers with yarn, at an increased wage of $18. At present he is a "fixer" in the spinning room, changing the frames on the spinning machines, earning $20 a week. In all these occupations he has had to stand continuously, which is difficult for him. He has lost the use of his second toe, which folds under the great toe in such a manner as to make standing and walking uncomfortable, although he does not limp perceptibly.

Although compensation of $413 was paid, and all hospital and medical bills were settled by the insurance carrier, the accident was a severe financial burden on the family. The compensation did not cover the loss of the boy's wages, and many extra expenses were necessarily incurred for him.

SUMMARY AND CONCLUSIONS

Within 12 months 7,478 industrial injuries occurred to employed minors under 21 years of age in three States, 38 resulting fatally, 920 in partial disability for life, and the remaining in disability lasting for more than a week (for more than 10 days in case of injuries occurring in two of the States).

Machinery—the most frequent cause of injury—was responsible for over one-third (36.2 per cent) of the injuries. In Massachusetts and Wisconsin (the two States where comparable statistics were available), it caused twice as high a percentage of the accidents to minors as of the accidents to workers 21 years of age and over, notwithstanding the fact that the employments forbidden to young boys and girls are chiefly the operation of dangerous machines.

Table 54 shows the causes of industrial injuries to employed minors in Wisconsin, Massachusetts, and New Jersey. Table 55 shows the extent of their disability, by cause of injury.

TABLE 54.—*Causes of industrial injuries to minors in Wisconsin, Massachusetts, and New Jersey*

Cause of injury	Number	Per cent distribution	Cause of injury	Number	Per cent distribution
Total	7,478	100.0	Hand tools	469	6.3
Machinery	2,706	36.2	Stepping on or striking against objects	415	5.5
Handling objects	1,643	22.0	Falling objects	288	3.9
Falls of persons	779	10.4	Hot and corrosive substances	262	3.5
Vehicles	543	7.3	All other and not reported	373	5.0

Most of the machines now used are power operated. In each of the three States the great majority of the power-machine accidents to minors occurred during the operation (including starting and stopping) of the machine, not while the machine was being adjusted, cleaned, or oiled. Furthermore, most of the injuries took place at the working point of the machine. Apparently the mechanical safeguards to prevent operators from being caught in gears, flywheels, set screws, and belts, together with the laws forbidding children to clean or oil machinery in motion, have been effective in reducing to a comparatively small proportion the injuries due to these causes.

TABLE 55.—*Extent of disability, by cause of injury, to minors employed in Wisconsin, Massachusetts, and New Jersey*

Cause of injury	Extent of disability			Cause of injury	Extent of disability		
	Death	Permanent partial	Temporary		Death	Permanent partial	Temporary
Total	0.5	12.3	87.2	Stepping on or striking against objects		2.2	97.8
Machinery	.4	25.3	74.4	Falling objects	1.0	4.9	94.1
Handling objects		4.9	95.1	Hot and corrosive substances	.4	2.3	97.3
Falls of persons	.9	4.4	94.7	All other and not reported	2.7	8.0	89.3
Vehicles	1.3	5.7	93.0				
Hand tools		6.8	93.2				

The types of power-driven machines on which most of the injuries occurred were in each State those used in its chief industries. In Wisconsin metal-working, woodworking, and paper and paper products making, in Massachusetts textile, metal-working, and leather-working, and in New Jersey metal-working, rubber and composition working, and textile machines were the most frequent cause of the machine injuries.

Operation of certain dangerous power-driven machines is forbidden to children under 16 years of age in all three of the States in which the study was made; and the prohibition of these occupations to minors under 18 years would materially decrease the number of injuries to young workers. There were proportionately more accidents from power-driven machinery to minors 16 and 17 years of age than to those under 16, who were more adequately protected by the law; or to those of 18 years or over, who had more experience, more nearly mature judgment, and better powers of muscular coordination. Moreover, minors 16 and 17 years old suffered proportionately more severe injuries than either the younger or the older workers. Death or permanent partial disability resulted from 13.4 per cent of all the injuries to workers 16 and 17 years of age; for workers under 16 the corresponding percentage was 10.7, and for workers of 18, 19, and 20 years it was 12.7.

The necessity of providing legal safeguards for young workers is indicated by the severity of the injuries to Wisconsin minors employed under illegal conditions.[1] One-third of the injuries occurring to minors at work in illegal occupations, and one-half of the injuries caused by violation of safety orders (as compared with only one-tenth of the injuries to minors employed under legal conditions) resulted in death or permanent partial disability.

A comparison of the extent of disability resulting from injuries due to the different causes may best be made on the basis of the accidents occurring in Massachusetts, because, as has been previously stated, this information is available in Massachusetts for all accidents causing disability for more than the day, turn, or shift on which they occurred. The percentage of deaths, permanent total disabilities, and permanent partial disabilities resulting from these injuries was twice as high among the injuries due to machinery as among those due to any

[1] Wisconsin is the only State of the three covered by the study where statistics are available on this point (see p. 8).

other cause, with the single exception of those caused by electrical shocks.[2] Injuries received from some classes of machinery were more likely to be severe than those from others. The percentage of deaths and permanent disabilities, either total or partial, was highest among injuries caused by woodworking machines (19.1 per cent), rubber and composition working machines (18.1 per cent), printing and bookbinding machines (16 per cent), and machines used in tanneries (15.5 per cent). Among injuries due to paper and paper products making machinery the percentage of injuries causing more than temporary disability was 11.9, among metal-working machine injuries 10. The machines which caused the highest percentage of severe injuries (the same ones that caused large numbers of the accidents to minors in all three States) were wood planers (26 per cent), metal punch presses (23 per cent), circular saws, (20.8 per cent), other wood saws (19.4 per cent), wood-tenoning and molding machines (17.3 per cent), leather-cutting machines (17.3 per cent), textile dyeing, finishing, and printing machines (18 per cent), textile carding and combing machines (10.9 per cent).

This analysis supports the evidence from other sources that a high proportion of injuries to minors is due to machinery, that some of the machines which minors under 16 years of age are forbidden to operate are causing not only frequent but also severe injuries to workers of 16 and 17 years (for whom they are not prohibited), that most of the machine injuries occur while the worker is operating the machine, and that most of them take place at the working point of the machine.

Handling objects was the second most frequent cause of injury in all three of the States covered by the study. The most serious results of handling heavy objects are strains, the number of which could be reduced by prohibiting young workers from doing work which involves heavy lifting. This is especially necessary in view of the large number of cases of hernia (122) resulting from strains. The percentage of hernia cases among all the injuries to minors was 1.5 in Wisconsin, 2.3 in Massachusetts, 0.7 in New Jersey.[3] Another class of objects handled—namely, sharp or rough objects—was the cause of many injuries. Probably many of these injuries were slight in themselves, but infection developed in a large proportion of them. In New Jersey, for example, infection developed in one-half of the compensable injuries caused by handling rough or sharp objects.

Infection is an important factor in increasing the disability resulting from slight injuries. In Wisconsin infection occurred in 10 per cent of the injuries to minors from all causes (being responsible for permanent partial disability in 10 cases); in Massachusetts it was present in 16.6 per cent of all the cases, and in New Jersey in 8.3 per cent of them. It is still necessary to lay stress upon the desirability of maintaining first-aid stations, and of educating the workers in regard to the importance of prompt treatment for even slight injuries. The need of such education for the protection of especially the younger workers is to be seen in the fact that in Massachusetts[4] the

[2] Annual Report of the Massachusetts Department of Industrial Accidents, 1922, Table X, p. 74.

[3] The question whether any given case of hernia is compensable under the law is difficult of determination. New Jersey is the only State of the three covered by the study in which there is specific statutory provision on this point (see New Jersey, Laws of 1911, ch. 95, paragraph 11, as amended by Laws of 1919, ch. 93, sec. 1).

[4] Massachusetts is the only one of the three States covered by the study in which comparable figures on this point were available. See p. 29.

percentage of the injuries to minors followed by infection was twice as high as the corresponding percentage of the injuries to all workers.

Among all the causes of industrial injuries to minors, falls of persons ranked third in the number of injuries caused. Seven deaths were due to falls, but the percentage of permanent partial disability from this cause was comparatively low. Most of the injured fell on level surfaces because of slipping and stumbling over objects. The falls from elevations were mostly from stairs.

A noteworthy fact about injuries caused by vehicles was the large number due to cranking the engines of automobiles. So many of these caused fractures that the duration of the consequent disability was long. The proportion of deaths and permanent partial disability resulting from injuries caused by vehicles was higher than for any other cause except machinery and electrical shock.

Injuries from hand tools were due chiefly to the glancing or slipping of the worker's tool. No deaths resulted from these injuries; the proportion of permanent partial disability was 6.8 per cent, as compared with 12.3 per cent of the injuries from all causes.

Stepping on or striking against objects did not usually cause severe injuries. Sharp objects, protruding nails, and wires caused many of these injuries, and most of the wounds gave little trouble if treated promptly.

Objects falling from machines and work benches caused the largest number of injuries due to falling objects. Three deaths were caused by falling objects, and one-twentieth of the injuries caused permanent partial disability.

The handicap placed by these accidents on young workers was disclosed by personal interviews with minors who suffered permanent partial disablement before they were 18 years of age. Although some have been able to follow the same occupation or a more promising one, in the three to six years that have elapsed, others have been forced by their injuries out of chosen occupations into work with smaller industrial opportunities, and some have been unable to find any kind of employment. Many of these young people, now in their early twenties, are sensitive over their deformities, discouraged by their prolonged economic dependence upon their families, and hopeless over the future.

Industrial risks for minors as well as for adults can be reduced by requiring more adequately guarded machinery and safer work places, but the findings of this study indicate that for young workers special dangers exist. One is indicated by the high proportion of injuries in which infection developed. If this proportion is to be decreased the natural carelessness of youth must be overcome. Although this would not reduce the number of injuries, it would prevent many of them from disabling the young worker. Another danger is seen in the high proportion of the injuries to minors due to machinery. The analysis which this report presents of accidents to minors in three States shows not only the large number of machine injuries but their severity. It shows also the great need of further protection for boys and girls 16 and 17 years of age whose employment—particularly in the operation of dangerous machines—is far less safeguarded than is the employment of younger workers.

APPENDIXES

Appendix A.—GENERAL TABLES

TABLE I.—*Extent of disability incurred by minors from industrial injuries, by age and sex of injured: Wisconsin*

Age and sex of injured	Industrial injuries to minors			
	Total	Extent of disability		
		Death	Permanent partial	Temporary
Both sexes	[1] 2,282	12	[1] 259	2,011
14 years	26	----------	4	22
15 years	93	----------	10	83
16 years	210	----------	15	195
17 years	292	1	32	259
18 years	544	3	66	475
19 years	587	5	72	510
20 years	523	3	57	463
Under 17 years, not otherwise specified	6	----------	2	4
Boys	[1] 2,009	9	[1] 225	1,775
14 years	20	----------	4	16
15 years	72	----------	9	63
16 years	180	----------	13	167
17 years	243	1	27	215
18 years	477	2	57	418
19 years	531	3	63	465
20 years	481	3	49	429
Under 17 years, not otherwise specified	4	----------	2	2
Girls	273	3	34	236
14 years	6	----------	----------	6
15 years	21	----------	1	20
16 years	30	----------	2	28
17 years	49	----------	5	44
18 years	67	1	9	57
19 years	56	2	9	45
20 years	42	----------	8	34
Under 17 years, not otherwise specified	2	----------	----------	2

[1] Includes 1 injury to a minor whose age was not reported.

TABLE II.—*Location of industrial injuries sustained by minors, by extent of disability: Wisconsin*

Location of injury	Industrial injuries to minors									
	Total		Extent of disability							
				Permanent partial					Temporary	
			Death	Total[1]		Dismemberments		Other		
	Number	Per cent distribution		Number	Per cent distribution	Number	Per cent distribution	Number	Per cent distribution	Number	Per cent distribution
Total	2,282	100.0	12	259	100.0	193	100.0	66	100.0	2,011	100.0
Head	142	6.2	4	13	5.0	1	.5	12	18.2	125	6.2
Eye	69	3.0		12	4.6	1	.5	11	16.7	57	2.8
Ear	2	(2)		1	.4			1	1.5	1	(2)
Other	71	3.1	4							67	3.3
Upper extremities	1,508	66.1		241	93.1	189	97.9	52	78.8	1,267	63.0
Shoulder and upper arm	25	1.1		2	.8			2	3.0	23	1.1
Elbow and lower arm	264	11.6		12	4.6	4	2.1	8	12.1	252	12.5
Hand	1,219	53.4		227	87.6	185	95.9	42	63.6	992	49.3
Palm	213	9.3		3	1.2	3	1.6			210	10.4
1 finger	148	6.5		148	57.1	114	59.1	34	51.5		
2 fingers	33	1.4		33	12.7	29	15.0	4	6.1		
3 fingers	13	.6		13	5.0	11	5.7	2	3.0		
4 fingers	2	(2)		2	.8	2	1.0				
Fingers, not otherwise specified	781	34.2								781	38.8
Thumb	29	1.3		28	10.8	26	13.5	2	3.0	1	(2)
Lower extremities	484	21.2		5	1.9	3	1.6	2	3.0	479	23.8
Hip and leg above knee	20	.9		2	.8			2	3.0	18	.9
Knee and lower leg	205	9.0								205	10.2
Foot	163	7.1								163	8.1
Toes	96	4.2		3	1.2	3	1.6			93	4.6
Trunk	142	6.2	7							135	6.7
Not reported	6	.3	1							5	.2

[1] Per cent distribution not shown where base is less than 50.

[2] Less than one-tenth of 1 per cent.

TABLE III.—*Cause of industrial injuries sustained by minors, by extent of disability: Wisconsin*

Cause of injury	Industrial injuries to minors						
	Total		Extent of disability				
			Death [1]	Permanent partial		Temporary	
	Number	Per cent distribution		Number	Per cent distribution	Number	Per cent distribution
Total	2,282	100.0	12	259	100.0	2,011	100.0
Machinery	864	37.9	2	200	77.2	662	32.9
Motors and transmission	28	1.2	-------	5	1.9	23	1.1
Machines other than power-driven machinery	15	.7	-------	4	1.5	11	.5
Power-driven machinery	772	33.8	1	187	72.2	584	29.0
Woodworking	212	9.3	1	58	22.4	153	7.6
Metal-working	285	12.5	-------	79	30.5	206	10.2
Paper-making	68	3.0	-------	8	3.1	60	3.0
Paper products making	50	2.2	-------	7	2.7	43	2.1
Printing and bookbinding	24	1.1	-------	8	3.1	16	.8
Tanning	11	.5	-------	2	.8	9	.4
Leather-working	38	1.7	-------	12	4.6	26	1.3
Food, beverages, and tobacco	24	1.1	-------	5	1.9	19	.9
Textile	36	1.6	-------	5	1.9	31	1.5
Laundry	4	.2	-------	-------	-------	4	.2
Rubber and composition making	14	.6	-------	2	.8	12	.6
Other	6	.3	-------	1	.4	5	.2
Hoisting machinery	49	2.1	1	4	1.5	44	2.2
Elevators	21	.9	1	1	.4	19	.9
Cranes, hoists, derricks	28	1.2	-------	3	1.2	25	1.2
Vehicles	147	6.4	2	5	1.9	140	7.0
Falling objects	101	4.4	2	5	1.9	94	4.7
Falls of persons	159	7.0	2	2	.8	155	7.7
Stepping on or striking against objects	146	6.4	-------	3	1.2	143	7.1
Hand tools	166	7.3	-------	10	3.9	156	7.8
Handling objects	491	21.5	-------	26	10.0	465	23.1
Hot and corrosive substances	88	3.9	-------	1	.4	87	4.3
Electricity	7	.3	1	-------	-------	6	.3
Explosions	13	.6	2	1	.4	10	.5
Rafting and river driving	19	.8	-------	1	.4	18	.9
Occupational diseases or harmful conditions	11	.5	-------	-------	-------	11	.5
All other causes and not reported	70	3.1	1	5	1.9	64	3.2

[1] Per cent distribution not shown where base is less than 100.

TABLE IV.—*Cause of industrial injuries sustained by minors, by age of injured: Wisconsin*

Cause of injury	Industrial injuries to minors							
	Total		Under 16 years of age		16–17 years of age		18–20 years of age	
	Number	Per cent distribution	Number	Per cent distribution	Number	Per cent distribution	Number	Per cent distribution
Total	2,282	100.0	119	100.0	509	100.0	1,654	100.0
Machinery	864	37.9	39	32.8	238	46.8	587	35.5
Motors and transmission	28	1.2	4	3.4	7	1.4	17	1.0
Machinery other than power-driven	15	.7	1	.8	3	.6	11	.7
Power-driven machinery	772	33.8	33	27.7	217	42.6	522	31.6
Woodworking	212	9.3	9	7.6	70	13.8	133	8.0
Metal-working	285	12.5	7	5.9	66	13.0	212	12.8
Paper-making	68	3.0			12	2.4	56	3.4
Paper products making	50	2.2	3	2.5	16	3.1	31	1.9
Printing and bookbinding	24	1.1	4	3.4	12	2.4	8	.5
Tanning	11	.5	2	1.7	3	.6	6	.4
Leather-working	38	1.7	1	.8	10	2.0	27	1.6
Food, beverages and tobacco	24	1.1	2	1.7	10	2.0	12	.7
Textile	36	1.6	4	3.4	11	2.2	21	1.3
Laundry	4	.2			1	.2	3	.2
Rubber and composiiton making	14	.6	1	.8	5	1.0	8	.5
Other	6	.3			1	.2	5	.3
Hoisting apparatus	49	2.1	1	.8	11	2.2	37	2.2
Elevators	21	.9			8	1.6	13	.8
Cranes, hoists, derricks	28	1.2	1	.8	3	.6	24	1.5
Vehicles	147	6.4	6	5.0	29	5.7	112	6.8
Falling objects	101	4.4	2	1.7	17	3.3	82	5.0
Falls of persons	159	7.0	10	8.4	29	5.7	120	7.3
Stepping on or striking against objects	146	6.4	14	11.8	30	5.9	102	6.2
Hand tools	166	7.3	12	10.1	36	7.1	118	7.1
Handling objects	491	21.5	23	19.3	94	18.5	374	22.6
Hot or corrosive substances	88	3.9	9	7.6	15	2.9	64	3.9
Electricity	7	.3					7	.4
Explosions	13	.6			4	.8	9	.5
Rafting and river driving	19	.8	1	.8	2	.4	16	1.0
Occupational diseases or harmful conditions	11	.5					11	.7
All other causes and not reported	70	3.1	3	2.5	15	2.9	52	3.1

TABLE V.—*Extent of disability incurred by minors from industrial injuries, by age and sex of injured: Massachusetts*

Age and sex of injured	Industrial injuries to minors			
	Total	Extent of disability		
		Death	Permanent partial	Temporary
Both sexes	3,177	12	159	3,006
14 years	[1] 68	----------	6	62
15 years	200	----------	8	192
16 years	357	1	13	343
17 years	491	----------	24	467
18 years	670	----------	29	641
19 years	682	5	38	639
20 years	709	6	41	662
Boys	2,527	12	133	2,382
14 years	[1] 53	----------	6	47
15 years	143	----------	7	136
16 years	257	1	8	248
17 years	360	----------	18	342
18 years	539	----------	21	518
19 years	567	5	35	527
20 years	608	6	38	564
Girls	650	----------	26	624
14 years	15	----------	----------	15
15 years	57	----------	1	56
16 years	100	----------	5	95
17 years	131	----------	6	125
18 years	131	----------	8	123
19 years	115	----------	3	112
20 years	101	----------	3	98

[1] Includes 1 injury to a boy 12 years old.

TABLE VI.—*Location of industrial injuries sustained by minors, by extent of disability: Massachusetts*

Location of injury	Industrial injuries to minors						
	Total		Extent of disability				
				Permanent partial		Temporary	
	Number	Per cent distribution	Death [1]	Number	Per cent distribution	Number	Per cent distribution
Total	3,177	100.0	12	159	100.0	3,006	100.0
Head	90	2.8	6	5	3.1	79	2.6
Eye	39	1.2	-------	5	3.1	34	1.1
Ear	4	.1	-------	-------	-------	4	.1
Other	47	1.5	6	-------	-------	41	1.4
Face and neck	67	2.1	-------	-------	-------	67	2.2
Trunk	287	9.0	1	-------	-------	286	9.5
Back	103	3.2	1	-------	-------	102	3.4
Ribs	15	.5	-------	-------	-------	15	.5
Hernia	73	2.3	-------	-------	-------	73	2.4
Other	96	3.0	-------	-------	-------	96	3.2
Upper extremities	2,097	66.0	-------	149	93.7	1,948	64.8
Shoulder	31	1.0	-------	-------	-------	31	1.0
Elbows and upper arm	47	1.5	-------	-------	-------	47	1.6
Lower arm	248	7.8	-------	2	1.2	246	8.2
Hand	1,671	52.6	-------	146	91.8	1,525	50.7
Palm	82	2.6	-------	-------	-------	82	2.7
1 finger	817	25.7	-------	112	70.4	705	23.5
2 fingers	107	3.4	-------	10	6.3	97	3.2
3 fingers	24	.8	-------	3	1.9	21	.7
4 fingers	15	.5	-------	2	1.3	13	.4
Thumb	294	9.3	-------	14	8.8	280	9.3
Hand, general	332	10.5	-------	5	3.1	327	10.9
Arm, general	95	3.0	-------	1	.6	94	3.1
Other	5	.2	-------	-------	-------	5	.2
Lower extremities	597	18.2	1	5	3.1	573	19.1
Hip	11	.3	-------	-------	-------	11	.4
Upper leg	15	.5	-------	-------	-------	15	.5
Knee	73	2.3	-------	-------	-------	73	2.4
Lower leg	30	.9	-------	-------	-------	30	1.0
Ankle	95	3.0	-------	-------	-------	95	3.2
Foot	278	9.0	1	5	3.1	272	9.0
Toes	102	3.2	-------	5	3.1	97	3.2
Other and general	176	5.5	1	-------	-------	175	5.8
Leg, general	77	2.4	-------	-------	-------	77	2.6
Body, general	51	1.6	4	-------	-------	47	1.6
Constitutional	6	.2	-------	-------	-------	6	.2

[1] Per cent distribution not shown where base is less than 100.

TABLE VII.—*Cause of industrial injuries sustained by minors, by extent of disability: Massachusetts*

Cause of injury	Industrial injuries to minors						
	Total		Extent of disability				
				Permanent partial		Temporary	
	Number	Per cent distribution	Death [1]	Number	Per cent distribution	Number	Per cent distribution
Total	3,177	100.0	12	159	100.0	3,006	100.0
Machinery	1,028	32.4	3	136	85.5	889	29.6
Motors and transmission	7	.2		1	.6	6	.2
Machines other than power-driven machinery	11	.3		3	1.9	8	.3
Power-driven	939	29.6	2	130	81.8	807	26.8
Woodworking	87	2.7	2	14	8.8	71	2.4
Metal-working	183	5.8		32	20.1	151	5.0
Paper-making	17	.5		1	.6	16	.5
Paper-products making	48	1.5		8	5.0	40	1.3
Printing and bookbinding	46	1.4		10	6.3	36	1.2
Tanning	18	.6		2	1.3	16	.5
Leather-working	122	3.8		15	9.4	107	3.6
Food, beverages, and tobacco	49	1.5		8	5.0	41	1.4
Textile	294	9.3		35	22.0	259	8.6
Laundry	5	.2		1	.6	4	.1
Rubber and composition making	22	.7		2	1.3	20	.7
Building and engineering	5	.2		1	.6	4	.1
Clothing	29	.9				29	1.0
Other	14	.4		1	.6	13	.3
Hoisting machinery	71	2.2	1	2	1.2	68	2.3
Elevators	60	1.9	1	2	1.2	57	1.9
Cranes and derricks	11	.3				11	.4
Vehicles	190	6.0	2			188	6.3
Falling objects	98	3.1	1	1	.6	96	3.2
Falls of persons	382	12.0	4	2	1.2	376	12.5
Stepping on or striking against objects	209	6.6		1	.6	208	6.9
Hand tools	212	6.7		5	3.1	207	6.9
Handling objects	829	26.1		12	7.5	817	27.2
Electricity	10	.3	1			9	.3
Explosions	15	.5	1			14	.5
Hot and corrosive substances	90	2.8				90	3.0
Animals	20	.6				20	.7
Occupational diseases	23	.7				23	.8
All other causes	71	2.2		2	1.2	69	2.3

[1] Per cent distribution not shown where base is less than 100.

TABLE VIII.—*Cause of industrial injuries to minors, by age of injured: Massachusetts*

Cause of injury	Industrial injuries to minors							
	Total		Under 16 years of age		16–17 years of age		18–20 years of age	
	Number	Per cent distribution	Number	Per cent distribution	Number	Per cent distribution	Number	Per cent distribution
Total	3,177	100.0	[1] 268	100.0	848	100.0	2,061	100.0
Machinery	1,028	32.4	98	36.6	321	37.9	609	29.5
Motors and transmission	7	.2	------	------	1	.1	6	.3
Machinery other than power-driven	11	.3	------	------	6	.7	5	.2
Power-driven machinery	939	29.6	85	31.7	293	34.6	561	27.2
Woodworking	87	2.7	2	.7	26	3.1	59	2.9
Metal-working	183	5.8	9	3.4	46	5.4	128	6.2
Paper-making	17	.5	------	------	------	------	17	.8
Paper products making	48	1.5	1	.4	24	2.8	23	1.1
Printing and bookbinding	46	1.4	1	.4	18	2.1	27	1.3
Tanning	18	.6	1	.4	10	1.2	7	.3
Leather-working	122	3.8	14	5.2	38	4.5	70	3.4
Food, beverages, and tobacco	49	1.5	6	2.2	18	2.1	25	1.2
Textile	294	9.3	41	15.3	87	10.3	166	8.0
Laundry	5	.2	------	------	2	.2	3	.1
Rubber and composition making	22	.7	1	.4	7	.8	14	.7
Building and engineering	5	.2	------	------	1	.1	4	.2
Clothing	29	.9	6	2.2	11	1.3	12	.6
Other	14	.4	3	1.1	5	.6	6	.3
Hoisting machinery	71	2.2	13	4.9	21	2.5	37	1.8
Elevators	60	1.9	13	4.9	18	2.1	29	1.4
Cranes and derricks	11	.3	------	------	3	.4	8	.4
Vehicles	190	6.0	[1] 17	6.3	31	3.7	142	6.9
Falling objects	98	3.1	7	2.6	20	2.4	71	3.4
Falls of persons	382	12.0	46	17.2	97	11.4	239	11.6
Stepping on or striking against objects	209	6.6	28	10.4	67	7.9	114	5.5
Hand tools	212	6.7	10	3.7	54	6.4	148	7.2
Handling objects	829	26.1	44	16.4	205	24.2	580	28.1
Electricity	10	.3	------	------	1	.1	9	.4
Explosions	15	.5	3	1.1	5	.6	7	.3
Hot and corrosive substances	90	2.8	6	2.2	19	2.2	65	3.2
Animals	20	.6	------	------	5	.6	15	.7
Occupational diseases	23	.7	2	.7	4	.5	17	.8
All other causes	71	2.2	7	2.6	19	2.2	45	2.2

[1] Includes one injury to a boy 12 years of age.

TABLE IX.—*Cause of compensable accidents to Massachusetts adults* [1] *and minors*

Cause of accident	Per cent distribution	
	Adults	Minors
Total	100.0	100.0
Machinery	16.5	32.4
Power-driven machinery	14.1	29.6
Woodworking	2.3	2.7
Metal-working	3.5	5.8
Paper and paper products making	.7	2.0
Tanning and leather working	1.6	4.4
Textile	4.4	9.3
Other	1.8	5.4
Hoisting machinery	1.9	2.2
Other machinery	.4	.6
Vehicles	8.5	6.0
Falling objects	5.6	3.1
Falls of persons	17.2	12.0
Stepping on or striking against objects	6.0	6.6
Hand tools	6.6	6.7
Handling objects	29.5	26.1
Electricity	.5	.3
Explosions	.8	.5
Hot and corrosive substances	3.3	2.8
Animals	1.2	.6
Occupational diseases	1.3	.7
Miscellaneous	3.0	2.2

[1] Annual report of the Massachusetts Department of Industrial Accidents, 1922, Table X. From the totals given in this table of tabulatable accidents injuries causing disability of 10 days or less and injuries to minors were subtracted

TABLE X.—*Extent of disability incurred by minors from industrial injuries, by age and sex of injured: New Jersey*

Age and sex of injured	Industrial injuries to minors			
	Total	Extent of disability		
		Death	Permanent partial	Temporary
Total	2,019	14	502	1,503
10–13 years	5		1	4
14 years	48	1	11	36
15 years	56	1	11	44
16 years	280	2	74	204
17 years	402	1	108	293
18 years	442	4	106	332
19 years	414	2	106	306
20 years	372	3	85	284
Boys	1,684	13	413	1,258
10–13 years	5		1	4
14 years	43	1	10	32
15 years	48	1	11	36
16 years	221	2	60	159
17 years	321	1	91	229
18 years	357	4	81	272
19 years	357	2	84	271
20 years	332	2	75	255
Girls	335	1	89	245
14 years	5		1	4
15 years	8			8
16 years	59		14	45
17 years	81		17	64
18 years	85		25	60
19 years	57		22	35
20 years	40	1	10	29

TABLE XI.—*Location of industrial injuries sustained by minors, by extent of disability: New Jersey*

Location of injury	Industrial injuries to minors						
	Total		Extent of disability				
			Death [1]	Permanent partial		Temporary	
	Number	Per cent distribution		Number	Per cent distribution	Number	Per cent distribution
Total	2,019	100.0	14	502	100.0	1,503	100.0
Head	80	4.0	4	19	3.8	57	3.8
Brain	2	[2]				2	.1
Eye	39	1.9		18	3.6	21	1.4
Ear	1	[2]				1	[2]
Other	38	1.9	4	1	.2	33	2.2
Face and neck	54	2.7		20	4.0	34	2.3
Trunk	80	4.0	1	3	.6	76	5.1
Back	20	1.0	1	1	.2	18	1.2
Sternum	1	[2]				1	[2]
Ribs	6	.3				6	.4
Abdomen	9	.4				9	.6
Hernia	15	.7				15	1.0
Side	11	.5				11	.7
Other	18	.9		2	.4	16	1.1
Upper extremities	1,381	68.4	1	424	84.5	956	63.6
Shoulder	22	1.1				22	1.5
Elbow and upper arm	24	1.2		3	.6	21	1.4
Lower arm	186	9.2		17	3.4	169	11.2
Arm, general	72	3.6		4	.8	68	4.5
Hand	1,063	52.6	1	399	79.5	663	44.1
Palm	38	1.9		1	.2	37	2.5
1 finger	603	29.9	1	255	50.8	347	23.1
2 fingers	106	5.3		56	11.2	50	3.3
3 fingers	23	1.1		12	2.4	11	.7
4 fingers	16	.8		8	1.6	8	.5
Thumb	139	6.9		43	8.6	96	6.4
Hand, general	138	6.8		24	4.8	114	7.6
Other	14	.7		1	.2	13	.9
Lower extremities	382	18.9		34	6.8	348	23.2
Hip	6	.3				6	.4
Upper leg	21	1.0		5	1.0	16	1.1
Knee	28	1.4				28	1.9
Lower leg	45	2.2		6	1.2	39	2.6
Ankle	62	3.1		5	1.0	57	3.8
Foot	176	8.7		15	3.0	161	10.7
Toes	66	3.3		7	1.4	59	3.9
Other and general	110	5.4		8	1.6	102	6.8
Leg, general	44	2.2		3	.6	41	2.7
Body, general	42	2.1	8	2	.4	32	2.1

[1] Per cent distribution not shown where base is less than 100.
[2] Less than one-tenth of 1 per cent.

TABLE XII.—*Cause of industrial injuries sustained by minors, by extent of disability: New Jersey*

Cause of injury	Industrial injuries to minors						
	Total		Extent of disability				
			Death [1]	Permanent partial		Temporary	
	Number	Per cent distribution		Number	Per cent distribution	Number	Per cent distribution
Total	2,019	100.0	14	502	100.0	1,503	100.0
Machinery	814	40.3	5	348	69.3	461	30.7
Motors and transmission	20	1.0	1	6	1.2	13	.9
Machines other than power-driven machinery	6	.3		1	.2	5	.3
Power-driven machinery	734	36.4	2	333	66.3	399	26.5
Woodworking	48	2.4		23	4.6	25	1.7
Metal-working	344	17.0		167	33.3	177	11.8
Paper-making	11	.5		5	1.0	6	.4
Paper products making	21	1.0		13	2.6	8	.5
Printing and bookbinding	29	1.4		14	2.8	15	1.0
Tanning	6	.3		2	.4	4	.3
Leather-working	9	.4		5	1.0	4	.3
Food, beverages, and tobacco	40	2.0		17	3.4	23	1.5
Chemical	17	.8		12	2.4	5	.3
Textile	67	3.3	1	18	3.6	48	3.2
Rubber and composition	83	4.1		39	7.8	44	2.9
Clay, glass, and stone	13	.6		4	.8	9	.6
Clothing	24	1.2		4	.8	20	1.3
Other	22	1.1	1	10	2.0	11	.7
Hoisting machinery	54	2.7	2	8	1.6	44	2.9
Elevators	26	1.3	1	2	.4	23	1.5
Cranes and derricks	28	1.4	1	6	1.2	21	1.4
Vehicles	206	10.2	3	26	5.2	177	11.8
Falling objects	89	4.4		8	1.6	81	5.4
Falls of persons	238	11.8	1	30	6.0	207	13.8
Stepping on or striking against objects	60	3.0		5	1.0	55	3.7
Hand tools	91	4.5		17	3.4	74	4.9
Handling objects	323	16.0		42	8.4	281	18.7
Electricity	8	.4	2	1	.2	5	.3
Explosions	18	.9	2	2	.4	14	.9
Hot and corrosive substances	84	4.2	1	5	1.0	78	5.2
Animals	18	.9				18	1.2
All other causes	70	3.5		18	3.6	52	3.5

[1] Per cent distribution not shown where base is less than 100.

TABLE XIII.—*Cause of industrial injuries sustained by minors, by age of injured; New Jersey*

Cause of injury	Industrial injuries to minors							
	Total		Under 16 years of age		16–17 years of age		18–20 years of age	
	Number	Per cent distribution	Number	Per cent distribution	Number	Per cent distribution	Number	Per cent distribution
Total	2,019	100.0	109	100.0	682	100.0	1,228	100.0
Machinery	814	40.3	47	43.1	305	44.7	462	37.6
Motors and transmission	20	1.0	2	1.8	7	1.0	11	.9
Machinery other than power-driven	6	.3			2	.3	4	.3
Power-driven machinery	734	36.4	39	35.8	282	41.3	413	33.6
Woodworking	48	2.4	2	1.8	17	2.5	29	2.4
Metal-working	344	17.0	13	11.9	118	17.3	213	17.3
Paper-making	11	.5			2	.3	9	.7
Paper products making	21	1.0	3	2.8	10	1.5	8	.7
Printing and bookbinding	29	1.4	2	1.8	14	2.1	13	1.1
Tanning	6	.3			2	.3	4	.3
Leather-working	9	.4			4	.6	5	.4
Food, beverages, and tobacco	40	2.0	4	3.7	15	2.2	21	1.7
Chemical	17	.8	1	.9	4	.6	12	1.0
Textile	67	3.3	8	7.3	29	4.3	30	2.4
Rubber and composition making	83	4.1	2	1.8	42	6.2	39	3.2
Clay, glass, and stone	13	.6	1	.9	4	.6	8	.7
Clothing	24	1.2			9	1.3	15	1.2
Other	22	1.1	3	2.8	12	1.8	7	.6
Hoisting machinery	54	2.7	6	5.5	14	2.1	34	2.8
Elevators	26	1.3	6	5.5	10	1.5	10	.8
Cranes and derricks	28	1.4			4	.6	24	2.0
Vehicles	206	10.2	11	10.1	63	9.2	132	10.7
Falling objects	89	4.4	2	1.8	20	2.9	67	5.5
Falls of persons	238	11.8	14	12.8	88	12.9	136	11.1
Stepping on or striking against objects	60	3.0	3	2.8	22	3.2	35	2.9
Hand tools	91	4.5	3	2.8	23	3.4	65	5.3
Handling objects	323	16.0	17	15.6	108	15.8	198	16.1
Electricity	8	.4			1	.1	7	.6
Explosions	18	.9					18	1.5
Hot and corrosive substances	84	4.2	4	3.7	24	3.5	56	4.6
Animals	18	.9	1	.9	5	.7	12	1.0
All other causes	70	3.5	7	6.4	23	3.4	40	3.3

Appendix B.—SELECTIONS FROM STATE LAWS PROHIBITING THE EMPLOYMENT OF MINORS IN DANGEROUS OCCUPATIONS [1]

WISCONSIN [2]

* * * * * * *

(a) No employer shall employ or permit any minor or any female to work in any place of employment, or at any employment dangerous or prejudicial to the life, health, safety or welfare of such minor or such female, or where the employment of such minor may be dangerous or prejudicial to the life, health, safety or welfare of other employees or frequenters.

(b) It shall be the duty of the industrial commission, and it shall have power, jurisdiction and authority to investigate, determine and fix reasonable classifications of employments and places of employment, minors and females, and to issue general or special orders prohibiting the employment of such minors or females in any employment or place of employment dangerous or prejudicial to the life, health, safety or welfare of such minor or female, and to carry out the purposes of sections 103.05 to 103.15 inclusive, of the statutes. **[Stat. 1923, sec. 103.05, subsec. (2).]**

Until such time as the industrial commission shall investigate, determine and fix the classifications provided for in paragraph (b) of subsection 2 of this section, the employments and places of employment designated in the following schedule shall be deemed to be dangerous or prejudicial to the life, health, safety or welfare of minors or females under the ages specified:

(*a*) Minors under twenty-one years of age: In cities of the first, second, and third class, before six o'clock in the morning and after eight o'clock in the evening of any day, as messenger for a telegraph or messenger company in the distribution, transmission, or delivery of messages or goods.

(*b*) Minors under eighteen years of age:

1. Blast furnaces; in or about.
2. Boats and vessels engaged in the transportation of passengers or merchandise; pilot; fireman; engineer.
3. Docks; in or about.
4. Dusts; operating or using any emery, tripoli, rouge, corundum, stone carborundum, and abrasive or emery polishing wheel, where articles of the baser materials, or of iridium, are manufactured.[3]
5. Electric wires; on the outside erection and repair of electric wires.
6. Elevators; in, the running or management of any elevators, lifts or hoisting machines.[4]
7. Explosives, in or about establishments where nitroglycerin, dynamite, dualin, gun cotton, gunpowder, or other high or dangerous explosives are manufactured, compounded or stored.
8. Matches; in dipping, dyeing or packing.
9. Mine or quarry; in or about.
10. Oiling or cleaning; in oiling or cleaning dangerous or hazardous machinery in motion.
11. Railroads; street railways and interurban railroads; switch tending, gate-tending, or track repairing; as brakeman, fireman, engineer, motorman, conductor, telegraph operator.
12. Wharves; in or about.

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[1] In effect during the period of the study (see footnote 1, p. 1).

[2] In addition to the restrictions placed by statute upon the employment of minors in dangerous occupations, the further restrictions made by resolutions of the Wisconsin Industrial Commission are given in this appendix.

[3] By order of the industrial commission, becoming effective Sept. 27, 1920, this provision does not apply to apprentices indentured under section 2377 of the statutes grinding their own tools on emery wheels under supervision, if all general orders of the industrial commission relating to such work are observed.

[4] By order of the industrial commission, becoming effective Sept. 27, 1920, this provision does not apply to apprentices indentured under section 2377 of the statutes using hand hoists in bringing material from machinery at which they are employed as a part of their training under the terms of their indenture.

13. Females: in the distribution or delivery of messages for any telegraph or telephone company or other employer engaged in similar business.

(*c*) Children under sixteen years of age:

1. Bakeries; dough brakes or cracker machinery of any description.
2. Belts; adjusting belts (in motion); sewing belts (in any capacity).
3. Boilers; operating any steam boiler or steam generating apparatus.
4. Bowling alleys; as pin boys.
5. Building trades; on scaffolding, or on a ladder or in heavy work.
6. Burnishing machines in any tannery or leather manufacturing.
7. Corrugating rolls in roofing or washboard factories.
8. Dusts; occupations causing dust in injurious quantities.
9. Emery or polishing wheel for polishing metal.
10. Immoral purposes; manufacture of goods for.
11. Iron and steel, wire or iron-straightening machinery, punchers or shears.
12. Laundry machinery.
13. Liquors; in or about any store, brewery, distillery, bottling establishment, hotel barroom, saloon, saloon dining room or restaurant, any place in connection with a saloon or a similar place of any name, or in or about any dance hall, bowling alley, pool room, beer garden, or similar place of any name, in which strong, spirituous or malt liquors are made, bottled, sold or given away.
14. Machinery; oiling or assisting in oiling, wiping or cleaning any machinery in motion. Operating or assisting in operating or taking material from any circular or bandsaw, or any crosscut saw or slasher, or other cutting or pressing machine from which material is taken from behind.
15. Paints and poisons; manufacture of paints, colors or white lead. Manufacture of any composition in which dangerous or poisonous acids are used. Manufacture or preparation of compositions of dangerous or poisonous dyes. Manufacture or preparation of compositions with dangerous or poisonous gases. Manufacture or preparation of compositions of lye or in which the quantity thereof is injurious to health.
16. Presses; cylinder or job, boring or drill.
17. Rubber; washing, grinding, or mixing mill of calender rolls in rubber manufacturing.
18. Stamping machines; in sheet-metal and tinware manufacturing, in washer and nut factory, in lace, paper, and leather manufacturing.
19. Theater or concert hall.
20. Tobacco; in any tobacco warehouse, cigar or other factory where tobacco is manufactured or prepared.
21. Woodworking; woodshaper, woodjointer, planer, sandpaper, wood-polishing, or wood-turning machine.
22. Wool, cotton, hair, upholstering; carding machine or machine used in picking wool, cotton, hair, or any upholstering material.
23. Any other employment dangerous to life or limb, injurious to the health, or depraving to the morals.

(*d*) Females:

1. Any female under seventeen years of age in any capacity where such employment compels her to remain standing constantly.
2. Any female in or about any mine or quarry. [Ibid., subsec. (3).]

RESOLUTIONS OF THE WISCONSIN INDUSTRIAL COMMISSION

Resolutions adopted March 11, 1918:

That no permit shall hereafter be granted for the following employments or places of employment:

(1) Minors under seventeen years of age in bowling alleys.

(2) All minors under seventeen years of age in or about any brewery, distillery, liquor bottling establishment, barroom, saloon, saloon dining room or restaurant, beer garden, any place in connection with a saloon or a similar place of any name, or in or about any dance hall, pool room, hotel, store other than a drug store, or similar place of any name in which strong, spirituous or malt liquors are made, bottled, sold, served or given away.

(3) All minors under fourteen years of age in any drug store, and all minors under sixteen years of age in any drug store which has a Government license for the sale of strong, spirituous or malt liquors.

(4) Female children under seventeen years of age in any hotel, restaurant, boarding or rooming house.

(5) Male children under sixteen years of age in any hotel.

Resolutions adopted March 3, 1919:

That no permits shall hereafter be granted for the following employments or places of employment:

(1) Children under sixteen years of age in lumbering and logging operations.

(2) Minors under seventeen years of age in any pool room or billiard hall.

Resolutions adopted August 11, 1919:

That no permit shall be granted to any child to work in any place of employment in which an active strike or lockout of the employees is in progress.

Resolutions adopted since the period of the study (i. e., since June 30, 1920):

That no permit shall be granted for the following employments or places of employment:

All minors under fourteen years of age in any drug store and all minors under sixteen years of age in any drug store which has a Government permit to fill physicians' prescriptions for the use of strong, spirituous, or malt liquors.[5]

Female child under seventeen years of age in any hotel, club house, restaurant, boarding house or rooming house, including boarding and rooming places conducted by industrial plants for their own employees.[5]

That no permit shall be granted to any child for employment upon work given out by factories to be done in homes.

That all permit officers be instructed to hereafter issue no child labor permits for the employment of minors in messenger service on the streets by employers who are operating outside of the provisions of the compensation act. * * * all minors under seventeen years of age to work in dance pavilions, street carnivals, or other traveling shows. * * * in road construction or threshing crews.

MASSACHUSETTS

No person shall employ a minor under sixteen or permit him to work in operating or assisting in operating any of the following machines: (1) Circular or band saws, (2) wood shapers, (3) wood jointers, (4) planers, (5) picker machines or machines used in picking wool, cotton, hair, or any other material, (6) paper-lace machines, (7) leather burnishing machines, (8) job or cylinder printing presses operated by power other than foot power, (9) stamping machines used in sheet metal and tinware or in paper or leather manufacturing or in washer and nut factories, (10) metal or paper cutting machines, (11) corner staying machines in paper box factories, (12) corrugating rolls such as are used in corrugated paper or in roofing or washboard factories, (13) steam boilers, (14) dough brakes or cracker machinery of any description, (15) wire or iron straightening or drawing machinery, (16) rolling mill machinery, (17) power punchers or shears, (18) washing or grinding or mixing machinery, (19) calender rolls in paper and rubber manufacturing or other heavy rolls driven by power, (20) laundering machinery, (21) upon or in connection with any dangerous electrical machinery or appliances, or in adjusting or assisting in adjusting any hazardous belt to any machinery, or in oiling or cleaning hazardous machinery, or in proximity to any hazardous or unguarded belts, machinery or gearing while such machinery or gearing is in motion; nor on scaffolding; nor in heavy work in the building trades; nor in stripping, assorting, manufacturing or packing tobacco; nor in any tunnel; nor in a public bowling alley; nor in a pool or billiard room. No such minor shall be employed or permitted to operate, clean, or repair a freight elevator. * * * **[Gen. Laws 1921, ch. 149, sec. 61.]**

No person shall employ a minor under eighteen or permit him to work: (1) In or about blast furnaces; (2) in the operation or management of hoisting machines; (3) in oiling or cleaning hazardous machinery in motion; (4) in the operation or use of any polishing or buffing wheel; (5) at switch tending; (6) at gate tending; (7) at track repairing; (8) as a brakeman, fireman, engineer, motorman or conductor upon a railroad or railway; (9) as a fireman or engineer upon any boat or vessel; (10) in operating motor vehicles of any description; (11) in or about establishments wherein gunpowder, nitroglycerin, dynamite or other high or dangerous explosive is manufactured or compounded; (12) in the manufacture of white or yellow phosphorus or phosphorus matches; (13) in any distillery, brewery, or any other establishment where malt or alcoholic liquors are manufactured, packed, wrapped or bottled; (14) in that part of any hotel, theatre,

[5] Amending resolution of March 11, 1918 (see above).

concert hall, place of amusement or other establishment where intoxicating liquors are sold. This section shall not prohibit the employment of minors in drug stores. [Ibid., sec. 62.]

The department of labor and industries may, after a hearing duly held, determine whether or not any particular trade, process of manufacture or occupation, in which the employment of minors under the age of sixteen or eighteen is not forbidden by law, or any particular method of carrying on such trade, process of manufacture or occupation, is sufficiently dangerous or is sufficiently injurious to the health or morals of minors under sixteen or eighteen to justify their exclusion therefrom. No minor under sixteen or eighteen shall be employed or permitted to work in any trade, process or occupation thus determined to be dangerous or injurious to such minors, respectively. [Ibid., sec. 3.]

NEW JERSEY[6]

No minors under sixteen years of age shall be employed, permitted or suffered to work at any of the following occupations or in any of the following positions:

Adjusting any belt to any machinery; sewing or lacing machine belts in any workshop or factory; oiling, wiping or cleaning machinery or assisting therein; operating or assisting in operating any of the following machines; circular or band saws; wood choppers; wood jointers; planers; sand paper or wood-polishing machinery; wood-turning or boring machinery; picker machines or machines used in picking wool, cotton, hair, fur or any other material; carding machines; paper lace machines; job or cylinder printing presses operated by power other than foot power; boring or drill presses; stamping machines used in sheet metal and tinware or in paper and leather manufacturing, or in washer and nut factories; metal or paper cutting machines; corner staying machines in paper box factories; corrugating rolls, such as are used in corrugated paper, roofing or washboard factories; steam boilers, dough brakes or cracker machinery of any description; wire or iron straightening or drawing machinery; rolling mill machinery; power punches or shears; washing, grinding or mixing machinery; calender rolls and mixing rolls in paper and rubber manufacturing; laundering machinery; or in proximity to any hazardous or unguarded belting, machinery or gearing, which, in the judgment of the Commissioner of Labor, is a menace to the safety of such minor. No minor under the age of sixteen years shall be employed, permitted or suffered to work in any capacity in, about, or in connection with any processes in which dangerous or poisonous acids are used; or in the manufacture or packing of paints, colors, red or white lead; or in any process in which lead or its compounds are employed; or in soldering; or in occupations causing mineral, animal or vegetable dust in injurious quantities including flint, clay, metal and talc dust; tobacco, rubber and cotton dust; silk, fur, wool and leather dust; or in the manufacture or use of dangerous or poisonous dyes; or in the manufacture or preparation of compositions with dangerous or poisonous gases or fumes; or in the manufacture or use of compositions of dye in which the quantity thereof is injurious to health; or in any trade process which shall offer such exposure to excessive heat, cold, muscular exertion or other physical risk as shall, in the judgment of the Commissioner of Labor, be harmful to the health and future working efficiency of such minor. * * * [Comp. Stat. 1910, vol. 3, Labor, sec. 22 (as amended by Laws of 1914, ch. 252, sec. 4).]

No child under the age of sixteen years shall be employed in any mercantile establishment[7] coming within the provisions of this act in any employment that is detrimental to health or is dangerous to life and limb of a child of that age, or that exposes him to excessive heat or cold, or that requires an excessive muscular exertion that is detrimental to the health and strength of a child of that age, or in the handling of any goods, wares or merchandise that are poisonous or that give off dust, fumes or gases, or in working around any heated metal, combination of metal or metals or their salts, that give off any dust, fumes or gases that are detrimental to the health, or on, in or around any scaffolding of any character whatsoever, or on, in or around any building that is under construction, or in any employment whatsoever which exposes him to conditions that will retard his growth or injure his health, or in any place that is damp and unhealthy,

[6] In addition to the restrictions placed by statute upon the employment of minors in dangerous occupations the further restrictions made by orders of the New Jersey commissioner of labor are given in this appendix.

[7] "Mercantile establishment" is defined by section 15 of this act, amended by Laws of 1918, ch. 204, as "any employment of any person for wages or other compensation other than in a factory, workshop, mill, place where the manufacture of goods is carried on, mine, quarry, or in agricultural pursuits.

or that is injurious in any way to the health and strength of a child, or in any place where, on account of the light or the nature and character of the work, the child's eyesight or hearing will be injured. * * * [**Laws of 1911, ch. 136, sec. 5 (as amended by Laws of 1918, ch. 204, sec. 5).**]

No minor under sixteen years of age shall be required, allowed or permitted to clean any part of the gearing or machinery in any place coming under the provisions of this act [factory, mill, workshop, newspaper plant, printery, or place where printing or the manufacture of goods of any kind is carried on], while the same is in motion, or to work between the fixed or traversing parts of any machinery while it is in motion by the action of steam, water or other mechanical power. [**Comp. Stat. 1910, vol. 3, Labor, sec. 36.**]

Boys under 18 shall not be employed underground in a mine. [**Laws of 1919, ch. 187, sec. 25.**]

ORDERS OF THE COMMISSIONER OF LABOR[8]

By order of the Commissioner of Labor, permits for employment must be refused to children under sixteen years of age for the following employments: Corkworking machines (unless fully guarded); drill presses; spindle drills; furs (curing skins and counting skins); hemstitching machines (unless fully guarded); hydraulic presses; polishing wheels; lathes; milling machines; power ragrolling machines; shear tables; certain textile machines—warping, weaving, winding, redrawing, twisting—(unless fully guarded); fireworks plants; munitions plants. (By "fully guarded" it is meant that guards must be inspected and approved by the State labor department.)

[8] These orders have all been issued since the period of the study. List furnished August, 1924, by the director of the child labor bureau, New Jersey Department of Labor.

Appendix C.—BRIEF LIST OF REFERENCES ON INDUSTRIAL ACCIDENTS TO EMPLOYED MINORS IN THE UNITED STATES, WITH ANNOTATIONS[1]

1. Final Report of the Industrial Commission, Vol. XIX, p. 917. Washington, 1902.

The problem of industrial accidents as it relates to working children is not a new one, and even before the beginning of the present century a realization of the need of special protection for young workers had resulted in the enactment in a few States of laws prohibiting children under certain ages from working at some kinds of especially dangerous machines or processes. This report of the Federal Industrial Commission, appointed under act of Congress in 1898 to "consider and recommend legislation to meet the problems presented by labor, agriculture, and capital," recognized the importance of the subject, and in connection with the commission's recommendation of "more comprehensive and efficient laws for the protection of children," it was stated that—

> "It has been found that children are much more liable to accidents in factories than are adults. Thus, a recent report of the Minnesota bureau of labor shows that boys under 16 have twice as great a probability of accidents as adults, * * * while practically all of the accidents to female operatives occur to the young girls. It is hardly to be expected that a young girl or boy will take the necessary care to avoid accidents in a factory."

2. United States Bureau of Labor Report on Condition of Women and Child Wage-Earners in the United States, Vol. I (Cotton Textile Industry, pp. 385–396). Washington, 1910.

In this extensive investigation made under authorization of an act of Congress passed in 1907, information was obtained relative to accidents to workers in the cotton manufacturing industry. It was found that although children were generally employed in the less hazardous occupations and were not working on very dangerous machines, the accident rate in the southern cotton mills was 48 per cent higher for workers 14 and 15 years of age than for those 16 years of age and over—this in spite of the fact that in the latter group are included occupations of relatively high accident liability. Moreover, the young child was found to be apparently not only more liable to all kinds of accident, but especially liable to more severe ones. In cases of injury from shafts, belts and gears, where the loss of part of a finger is usually the mildest result, the rate was two and one-third times as high for children 14 and 15 years of age as for the workers of 16 years and over, and in gear accidents alone the rate was three and one-third times as high. In conclusion, it is said (p. 386):

> "It appears then that comparison of the number employed with the number injured in each age group, the consideration of a group of particular severity, and the examination of particular kinds of injury all point in the same direction—the hazard of the child is high."

3. "The accident hazard of working children." Statistical Bulletin, Metropolitan Life Insurance Co., March, 1922, pp. 7, 8.

This article cites the industrial-mortality experience of the Metropolitan Life Insurance Co. as evidence of the fact that—

> "One of the most serious indictments of child labor is the heavy accident toll paid by young wage-earners. In spite of safety devices and safety campaigns, a high rate of injuries is sustained by boys and girls engaged in our mines and factories."

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[1] Prepared by Ella Arvilla Merritt, of the industrial division of the Children's Bureau.

An analysis of the statistics of the company for 1921 shows:

> "Of all the deaths of boys 13 to 17 years old who had been gainfully employed, one death out of every three was due to accidents. Among those not gainfully employed, one death out of every four was due to accidents. There was a total of 199 accidental deaths among working boys aged 13 to 17 in this year, and of this number, 43 were actually industrial accidents. These deaths resulted directly out of the work in which these boys were engaged. There were eight deaths in mines and quarries, seven in machinery accidents, three in railroad accidents, three deaths by electricity, and six in vehicular accidents, all related to occupation.
>
> "As one would expect from the existence of so many fatal accidents, there are, undoubtedly, a very large number of both permanent and temporary disabilities resulting from the employment of young workers. Unfortunately, the material of the Metropolitan is limited to fatal accidents only, but there are many other sources of information which bring this point out."

Summaries of a number of accident studies are given, and the article concludes:

> "Notwithstanding our 'back-to-school' campaigns and our realization that entering industry at an early age only too often leads to blind-alley occupations and future industrial ineffectiveness, the number of children engaged in industry in the United States is steadily growing. If, therefore, a further analysis of mortality and accident disability of adolescents bears out the findings of this small study that the chief difference between working children and those not gainfully employed lies in their susceptibility to accidents, it certainly is necessary to intensify our safety campaigns in the factories and mills, safeguard our dangerous machines and entirely prohibit minors from engaging in those pursuits where industrial accident hazard is greatest."

4. "Study of accident records in a textile mill," prepared under the direction of Amy Hewes. The Journal of Industrial Hygiene, October, 1921, pp. 187–195.

The article listed above as reference No. 3 mentions this study as one of the "other sources of information" which give evidence of the large number of disabilities resulting from the employment of young workers:

> "A recent study made in a textile mill in Connecticut showed that 1,221 accidents occurred in 1920. In this report, contrary to the usual custom, the figures included accidents which did not cause any lost time. Moreover, conditions in this mill may not be typical for the textile industry in general, as the mill in question is one of the finest silk plants in the country, and, therefore, conditions would probably be more favorable than in less capably managed factories."

An analysis of the results of this report shows clearly the importance of age as a factor in the accident rate. Over one-fourth of the 1,164 accidents to workers whose ages were known occurred to persons under 20 years of age, although these comprised only 15 per cent of the total number employed. Moreover, the accident rate per 100 workers was much higher for the workers under 20 than for those above—42.9 per cent for workers between 15 and 20 years of age as compared with 21.6 per cent for workers 20 years of age and over. It is further stated (p. 195) that—

> "An examination of the individual records also showed that the young people tended to encounter more than one injury to a greater degree than did older persons. Approximately one half (47.2 per cent) of the 212 persons who had more than one accident were between 14 and 25 years old, though this group constituted less than one-third (31.4 per cent) of the whole number of employees."

5. Annual Reports of the Massachusetts Industrial Accident Board, 1916–1917, pp. 19, 213–220; 1917–1918, p. 120; 1918–1919, p. 71. Annual Reports of the Massachusetts Department of Industrial Accidents; 1919–1920, p. 63; 1920–1921, p. 67; 1921–1922, p. 45.

6. Conserving Children in the Industries of Massachusetts. Industrial Bulletin No. 15, Massachusetts Department of Labor and Industries, Division of Industrial Safety. Boston, 1920.

7. Eaves, Lucile: One Thousand Industrial Accidents Suffered by Massachusetts Children. (See reprint in The American Child, Vol. 2, Nov., 1920, pp. 222–232, National Child Labor Committee, 215 Fourth Ave., New York.)

The reports of the Massachusetts Industrial Accident Board and the Department of Industrial Accidents show for the six years between July 1, 1916, and June 30, 1922, a total of 7,813 accidents to children under 16 years of age sufficiently severe to cause a loss of time beyond the day or shift on which the worker was engaged at the time of his mishap. Thirty-one of these accidents resulted fatally.

The Massachusetts Department of Labor and Industries analyzes, in the bulletin cited, the accidents occurring in the year ended June 30, 1919. In that year 1,691 children 14 and 15 years of age suffered injuries necessitating a longer absence than the remainder of the day or shift on which the accident occurred. There were 62 cases of permanent disability and 10 fatalities—that is, practically one child out of every 23 injured either was killed or suffered the amputation or loss of use of some member, as finger, arm, hand, or eye. Machinery caused 1,163 injuries (69 per cent of the total injuries)—113 of them occurring in connection with cleaning and oiling the machines and 99 in adjusting tools and belts.

According to the special study of 1,000 of these accident records (reference No. 7, p. 3) a larger proportion of the accidents to the children under 16 resulted in permanent partial disability than the accidents to the workers of 16 years of age and older. This report also points out the fact that these accidents occurred in spite of the legal safeguards established in Massachusetts for the purpose of restricting the employment of children to the "safe areas of industry." The law does not permit children to enter industrial employment until they are 14 years of age, and those under 16 are prohibited from working in a large number of manufacturing and other occupations generally regarded as dangerous. It is further stated (pp. 7–8) that—

> "Exceptionally vigorous efforts are being made by Massachusetts officials for the promotion of the safety of working children. Yet the inspectors reported that 89 of the injured children were working without the certificates required by law and 125 were employed in occupations other than those specified on their employment certificates. Thus over 200, or 20 per cent, of the children were employed without the legal safeguards which the State provides. The elaborate regulations by which the Massachusetts legislators have sought to palliate the evils which must result from the employment of children who have not reached years of discretion are extremely difficult to enforce. When a boy or girl enters a busy factory or workshop there is a natural tendency to fill spare time with any tasks for which help is needed, and a bright child is eager to experiment with the interesting machinery operated by fellow workers."

Administrative difficulties are emphasized also in the report issued by the department of labor and industries (p. 13):

> "The development of modern industry is very largely the history of new processes in production. Hazards incidental to complex machinery have multiplied in rapid succession. The constant invention of machine methods in manufacturing establishments renders difficult the grouping of existing dangerous employments for children under statutory designation. In this Commonwealth the entire system of legal enactment for the conservation of youth in industry rests upon the principle that no child under 16 years of age should be employed or permitted to work in proximity to an industrial hazard in which he may sustain occupational injury. In many lines of employment deemed to be of an extra hazardous nature a minor under 18 years of age is not permitted to work. Effective administration of the statutes intended to control the welfare of children is necessary to save the child from the dangerous hazards existing in the mills and factories of the State."

After quoting the legal provisions relating to the employment of minors in hazardous occupations in Massachusetts, this report continues (pp. 12,13):

"Notwithstanding the plain requirements of these statutes, many serious violations take place.

* * * * * * *

"Some typical cases cited from the experience of the inspectors attached to the Division of Industrial Safety illustrate clearly the type of accidents taking place.

"In one of the larger cities of the Commonwealth, where the inspector was ordered to investigate an injury to a minor 15 years of age, he found that the child was employed in a wood-chopping establishment in proximity to a hazardous saw, and that he sustained serious lacerations to his right hand, making amputation at the wrist necessary.

"In another part of Massachusetts a girl 15 years of age, employed in a meat market, while operating a motor-driven machine used for the purpose of grinding meat, suffered the loss of four fingers on her left hand.

"In 1919, 233 orders were issued by this Department for the exclusion of minors in hazardous trades, and 43 prosecutions occurred during the same year for the employment of minors on dangerous machinery. While flagrant violations of the statutes meet with prompt prosecutions, such action does not constitute an adequate remedy for the evil. Imposing the maximum penalty under the statutes does not appear effective enough to prevent injuries to children."

8. New York Department of Labor, Division of Women in Industry: Children's Work Accidents. Special Bulletin No. 116, January, 1923.

This study of accidents to young workers in New York engaged in occupations covered by the workmen's compensation law, shows that in the year July, 1919, to July, 1920, nearly 2,000 [3] boys and girls under 18 years of age were injured seriously enough to disable them for two weeks or more—12 of them being injured fatally. Only accidents causing disablement for a two-weeks' period are compensated under the law, and it was only for these compensable accidents that an accurate statistical record was kept. The report ignores, therefore, the much larger number of accidents causing disablement for a shorter period (of all the accidents reported to the industrial commission in that year only 14.8 per cent were compensable) as well as accidents to the minors—as messengers, errand boys and girls, and workers in agriculture and domestic service—who are not covered at all by the compensation law.

Under the New York law the industrial employment of minors under 14 years of age is illegal, and the employment of those between 14 and 18 is subject to certain restrictions, these restrictions being much more numerous, however, for workers under 16 than for those 16 and 17 years old. It is pointed out (p. 11) that 9 of the injured children were nevertheless under 14 years of age (3 only 12 years and one 11 years old); 19 children between 14 and 16 were working on machines the operation of which was forbidden by the law; and there were 15 cases of injury when the worker was cleaning machinery while it was in motion. This latter work was prohibited by law not only to all minors under 18 but to girls up to 21 years of age. In 8 other cases minors were hurt while adjusting the machine when it was in motion. The report states that although these 8 cases could not technically be called violations the "spirit of the law was undoubtedly violated," adding (p. 11):

"In the 37 total accident cases when the accident occurred during adjustment or cleaning, it is probable that many more cases than those so recorded (i. e., 23) occurred while the machinery was in motion, or when it was started accidentally. Serious consideration should be given to the advisability of permitting children so young to do this type of work."

Of the 1,817 accidents [4] for which tabulations are made 1,472 happened to boys, 345 to girls. Manufacturing occupations were responsible for nearly four-

[3] The number of accidents reported was 1,983; the number of children injured was slightly smaller, since in a few cases a child suffered two accidents during the year.

[4] While this report was in preparation, reports came in from district offices of 166 additional compensation accidents (bringing the total number of accidents up to 1,983) which had occurred during the year, but which were not sent in early enough to be included in the statistical study.

fifths (79 per cent); trade accounted for 117 accidents; transportation and public utilities for 120; construction had 76 to its discredit. Classified by causes, 1,021 or considerably over half of the 1,817 accidents, occurred in connection with machines. Metal-working machines led—392 accidents (348 to boys and 44 to girls) being attributed to them; textile machines (including sewing machines) ranked second with 118 accidents. The metal stamping and trimming power presses were the most dangerous. The following description is given of the type of accidents on these presses (p. 14):

> "A 17-year-old girl employed in a large can factory was operating a * * * power press piercing holes in 5/8-inch round shells; one of the shells stuck in the die and as the girl was trying to remove it with her fingers, she accidentally tripped the press catching her fingers between the die and the punch, which caused a mashing of the first finger of the right hand so bad that the finger had to be amputated. The machine was not guarded; the girl was supposed to use a fork in taking shells in and out from the die."

Other presses or machines operating on the same principle played a large part in these accidents. In the metal-working group alone, there were 120 accidents on foot or hand presses, drill presses, and milling and gear cutting machines, making 307 accidents on presses in the metal industry. In addition to these, 147 accidents occurred in connection with presses in other industry groups, including printing presses, celluloid presses, and punches and similar machines in the paper-products, leather-working, and woodworking industries.

Among other causes of accidents were physical strain, where young workers were lifting or pushing weights beyond their strength; the glancing or slipping of a hand tool, as where a screw driver which an electrician's helper was using slipped and entered his eye, injuring it so badly that he lost his sight; explosions; burns from hot water or molten metal; and acid burns caused by the spilling of carbolic or nitric acid.

One of the most important considerations is the extent of disability resulting from accidents. Over 21 per cent of these children suffered more than temporary disability. The fatalities numbered 12, as has been shown, and in 214 cases the child suffered a total loss of the use of the part hurt, or dismemberment; in 173 cases impairment of use resulted; and in 32 additional cases there was permanent partial disability. In other words 12 boys were killed and 348 boys and 73 girls were maimed for life because of industrial accidents.[5] The report gives the following details concerning 10 of the fatal accidents (pp. 9–10):

> A 17-year-old boy was working as a laborer for a contractor on concrete work fell from the roof into the engine room, suffering a fractured skull and laceration of the brain.
>
> A 16-year-old boy who was working as an errand boy jumped off the elevator at the second floor and fell through the shaft down to the basement.
>
> Another 16-year-old boy, also an errand boy, was struck by an automobile while he was making a delivery.
>
> A 15-year-old boy was caught and crushed between the elevator and the shaft wall while the elevator was in motion and under the guidance of the operator. He had a compound fracture of the skull.
>
> A 17-year-old boy died from a 35-foot fall from a ladder where he was working as an electrician's helper.
>
> A 17-year-old helper in the canning department of a condensed milk manufacturing concern was cleaning sanitary pipes. He slipped and fell off a platform while carrying an iron pipe. He was so injured internally that he died two weeks later.
>
> A 17-year-old boy working as a general helper in a manufacturing concern ran to stop the elevator from which he had just taken some supplies. Instead of stopping it by the rope he jumped on. He was caught between the upper floor and the car, landing on his knees. The cervical vertebrae were fractured and death resulted.
>
> A 16-year-old boy fell from a roof when working as a laborer. His skull was fractured.

[5] This information is based upon the 1,983 compensable accidents finally reported for the year. See p. 16, reference No. 8.

A 17-year-old boy, an elevator operator, caught his foot between the shaft and the elevator as it began to ascend. A combination of very serious injuries resulted and death ensued in four days.

A 17-year-old boy working as a laborer was caught on the exposed end of a line shaft extending through the wall of the machine room to the outside of the building. Both arms were twisted off at the shoulder joints, he suffered a fracture and other severe injuries and shock, and died in about 20 minutes.

The fact that 9 of these 10 fatal accidents occurred to boys 16 and 17 years old is in itself an indication of the need of greater protection for workers of these ages. It is significant of the steps already taken in protection of the workers under 16, for whom employment at hazardous occupations and in dangerous surroundings is much more restricted than for the older group, that only 8 per cent of the accidents occurred to children 14 and 15 years old. More than 9 out of 10 accidents were suffered by boys and girls between 16 and 18 years of age. Slightly over a third (611) of all the accidents to minors under 18 occurred in operating the machines or working at the processes which have been found so dangerous that the State law entirely prohibits them for workers under 16. Over half of these (307) occurred in connection with the operation of metal cutting or stamping machinery, and for this reason the report recommends (p. 17) the extension of the prohibited age to 18 for work on such machines. The fact that the injuries of so large a proportion of the minors of 16 and 17 years resulted from work already recognized as dangerous for youthful and immature employees shows that even at 16 or 17 years of age the young worker should not be permitted to take such risks.

9. Reports of the Industrial Board of the State of Indiana: Year 1918–19, pp. 32, 60; year 1919–20, pp. 31, 102, 103; year 1920–21, pp. 30, 111; year 1922–23, p. 10; year 1923–24, p. 15.

The experience of Indiana, another State where the law gives minors under 18 years of age special protection—in greater degree to those of 14 and 15 than to those of 16 and 17 years—shows the need for very careful administrative provisions to make these legal prohibitions effective. During the three-year period ending September 30, 1921, the State industrial board reported 4,940 accidents to minors under 18, 14 per cent of them to boys and girls not yet 16. Many of these workers were illegally employed. A special investigation of 122 minors 16 years of age and under injured in a period of two months in 1919 showed that 31 per cent of them were illegally employed; out of 282 injured workers under 16 whose cases were investigated the next year 47 per cent or nearly half were working contrary to law. A study covering 850 boys and girls under 18, victims of industrial accidents in the year ending September 30, 1921, revealed 448 cases of illegal employment. This means that in 53 per cent—over half—of the cases where young persons under 18 met with injury they were working without the safeguards with which the State law purported to protect them. These boys and girls are not entitled to compensation, since minors illegally employed are not under the workmen's compensation act. This system, the report states, is liable to work a hardship on minors who do not know of their right to recover damages at common law and those who fall into the hands of unscrupulous lawyers.

In the year 1922–23 the industrial board investigated the cases of 1,221 minors reported as under 18 years of age who had been injured in industry. It was noticed that there was during the year a decided decrease in the number of accidents reported for boys and girls under 18 years of age and a corresponding increase in the number reported for young persons 18 and 19 years of age. A special study of all accidents reported for young persons of this age during a 10-day period in July revealed the fact that 25 per cent of those injured during this period and claiming to be 18 or 19 years of age were under 18, one being only 14 years of age. The 25 per cent were unlawfully employed and therefore not covered by the compensation law. A supplementary investigation of 656 accidents to young persons claiming to be 18 or 19 years old showed that in fact 122 of them were under 18 years of age. During the next year (1923–24), 125 injured minors claiming to be 18 years of age proved on investigation to be under that age, and in 291 other cases of injury to minors under 20 years of age, their employment was found to be illegal.

10. De Lima, Agnes, and McConnell, Beatrice: Casualties of Child Labor. Ten Children Illegally Employed in Pennsylvania and What Happened to Them. Consumers' League of Eastern Pennsylvania, 818 Otis Bldg., Philadelphia, Pa., December, 1924.

Pennsylvania is another State where the child labor law prohibits the employment of minors under 16 and under 18 years of age in many hazardous occupations and where the compensation law excludes illegally employed minors from its provisions. This brief report describes the first 10 cases in a study of injuries to working children. The following are typical:

> "A certain firecracker company was accustomed to doling out home work to children to do after school. Wrappers and cases for bombs and torpedoes were commonly made in this way. When vacation time came the boss suggested to a number of his youthful helpers that they come and work in the factory, although the law prohibits children under 18 from being employed where high explosives are manufactured. Thirteen of those who responded were under the legal age. The children were supposed to prepare the cases and wrappers and pass them on to an older employee at the same work table, who put the explosive in the wrapper. One boy stretched the paper casing over two nails driven in the table in front of him. Another workman, in attempting to drive one of the nails in a little more deeply, struck a torpedo with his hammer. The torpedo promptly exploded and ignited a large vessel of powder that was also on the work table. In the resulting explosion and fire one child, George, 15 years old, was instantly killed—literally blown to bits."
>
> Three other children were also injured—a 14-year-old boy who was so severely burned that the middle finger of his left hand had to be amputated, the remaining fingers are stiff, and the fleshy part so burned that no normal tissue can grow; and a 13 and a 14 year old boy whose burns, though in the case of one boy very serious, have not resulted in permanent disability.
>
> "In comparison with a firecracker factory, a grocery store may seem to offer safe employment. But Frank, 13 years old, and thus below the legal working age, lost the use of his right hand as a result of attempting to operate a meat-slicing machine in one of the chain stores of the X Grocery Co. The knife struck his right wrist, cutting it severely and permanently affecting a nerve in the forearm. The boy has no control over the third and fourth fingers; the tissues have wasted away and the hand looks dead and unsightly. Two costly operations have been performed in an effort to restore the normal use of the hand, but to what avail remains to be seen.
>
> "Josephine, a Polish girl, 13 years old when employed without a working permit, on a dangerous machine without proper supervision, will go through life mutilated and incapacitated. She was put to work at a machine commonly known as a 'picker,' in which sharp, needle-like spines pick or separate the strands of yarn. A girl working at the next picker was told to show Josephine how to run her machine. No other instructions were given, although the machine is so dangerous as to come under the prohibited section of the child labor law. Josephine's job was to watch this picker and remove the rolls when they were filled. If the yarn broke, she had to shut off the power and tie the broken ends together. On the second day of her employment the yarn broke, and when she attempted to stop the machinery to mend the break, not being familiar with the machine, which was not well guarded, her right hand was caught and literally 'picked' to a pulp before she could be extricated. Almost the entire hand had to be amputated. The third and little fingers are left, but are stiff and useless. The hand, save for a strip the width of the remaining fingers, is gone.
>
> "John, a victim of unguarded machinery and a foreman's careless and unlawful order to oil it while in motion, suffered a mangled leg and other injuries to head, body, eyes, and arms that have permanently incapacitated him. The boy's leg was caught in the machinery of the mountain scenic railway of the amusement company where he was illegally employed."

11. Wisconsin Industrial Commission: Wisconsin Labor Statistics, October, 1923, p. 8; March, 1924, p. 7.

In Wisconsin boys and girls up to 18 years of age not only are prohibited from work in a large number of dangerous occupations, but are further protected by the so-called treble-compensation feature of the workmen's compensation act, under which three times the usual compensation must be paid in case of a child injured while illegally employed, the employer, and not the insurance carrier, being primarily liable for the additional two-thirds.[6] Yet these reports show that in spite of such protection the toll of injuries is large. A summary of the compensable cases settled by the commission during the calendar years 1919, 1920, and 1921 gives 13.7 per cent of the injuries to all workers as occurring to minors under 21 years of age, and these young workers show a somewhat higher incidence of injuries causing permanent partial disability than is the case for workers 21 years of age and over. Of the 19,058 accident cases settled under the workmen's compensation act during the year ending June 30, 1923, 2,251 (12 per cent) were injuries to minors under 21 years of age. Ten of these accidents were fatal and 164 caused permanent partial disability for life.

12. Minors in Automobile and Metal-Manufacturing Industries in Michigan, pp. 48–56. Children's Bureau Publication No. 126. Washington, 1923.

The records of the State industrial accident board, which were examined in connection with this study of minors in automobile and metal-manufacturing industries in Michigan, showed a total of 1,905 compensable accidents[7] to employed minors during the year 1918. Of these, 28 resulted fatally, 238 involved dismemberment, and the balance (1,639) temporary disability for 15 days or longer.

The large majority (77 per cent) of these accidents occurred in the manufacturing industries, and in this group metal-working factories were responsible for over half. An analysis according to occupation rather than industry shows that 863 accidents (45 per cent of the total) were accidents to machine operators; of these, 56 per cent were accidents to operators of metal-working machines and 22 per cent to operators of woodworking machines. When the cause of accident was considered, machinery was shown to have been responsible for 984 accidents, or 52 per cent of the total number; and nearly all of these—45 per cent of the entire number of accidents—were caused by power-driven machinery. In this power-machine group, metal-working machines caused 56 per cent of the accidents, and punch presses headed the list of specified types of machines, being responsible for a far larger number of accidents than any other machine. Woodworking machines caused nearly one-fourth (24 per cent) of the accidents due to power-working machinery.

GENERAL COMMENT ON THE REFERENCES CITED

During the quarter century since the Federal Industrial Commission made its report (see reference No. 1) the development of safety standards and increased legislative protection have brought about a very considerable reduction in industrial hazards for all workers. But the studies here discussed show that it is still true not only that "the hazard of the child is high" (see p. 110) but that the large percentage of injuries suffered by boys and girls as compared with older workers continues, in spite of the fact that as a rule children are at work in the safer occupations. These reports indicate that present legal restrictions do not sufficiently protect young workers from the hazards of industry. This may be due to a number of causes: Some laws do not cover a sufficient number of occupations; others are worded in too general terms; administrative provisions may be lacking or not carried out; inspection may be inadequate. Most of the reports and investigations cited above deal with conditions in States where the child labor laws give probably more than the average protection to young workers[8] and

[6] Wisconsin, Stat. 1923, sec. 102.09, subsec. (7), subdivisions (a), (b). Since the period of this study the law has been amended to require only double compensation in case the injured minor is employed without a permit, provided he is not employed in a prohibited occupation or in an occupation for which the industrial commission has declared no permit shall be issued. In the latter cases treble compensation is still exacted. (Wisconsin, Acts of 1925, ch. 384.)

[7] That is, causing death or causing disability for at least 15 days.

[8] In 29 States there are either no restrictions or very few extending up to the age of 18 relating to occupations generally recognized as physically dangerous. In 6 others there are no prohibitions (or practically none) relating to dangerous occupations for children of any age.

where the impetus of compensation legislation has focused public interest and effort upon the reduction of industrial accidents.

A number of factors are mentioned as important in causing a high accident rate for young workers. For instance, it is said (p. 194 of reference No. 4), "The peculiar susceptibility of young people to accidents is probably due to a combination of influences, of which inexperience and unfamiliarity with the work and the necessary precautions, carelessness and a form of bravado, lack of attention and concentration due to lack of training, as well as possible greater exposure to the objective dangers of their trades play a part."

The same idea is expressed in a recent publication treating the general aspects of child welfare:[9] "The child is more prone to accidents than the adult, and will suffer even in industries regarded as comparatively safe, since young boys and girls are naturally careless. Children can not concentrate their attention on their work, and are therefore frequently the victims of accidents which maim them for life and lessen or destroy their economic capacity."

The Massachusetts study discussed above as reference No. 7 states (p. 4) that:

> "Inability to control perfectly the machinery or tools with which [the children] worked was the chief cause of the accidents reported. * * * Nearly one-third of the accidents were due to the difficulties which children experience in gaining control over the new powers given by machinery and tools. The awkwardness of children of the adolescent age, particularly of the boys, proves that they have not learned to direct perfectly the activities of their own bodies, so their inability to control fully any additional force is not surprising."

The conclusion given (p. 18) in the New York report discussed above as reference No. 8 is that "The carelessness, the irresponsibility, the natural curiosity of children, coupled with the lack of coordination in children of the adolescent age would seem to point to the fact that children by the very nature of their youth are less able to protect themselves than those more mature and consequently more steady."

The greater hazard for the younger workers than for adults is thus emphasized in the same New York study (p. 7):

> "Even in carefully managed factories and workshops, even with frequent and adequate factory inspection, the natural irresponsibility, carelessness, and above all the curiosity of youth subjects young workers to a greater accident hazard than more mature people. * * * It is often impossible to secure from adolescents a certain cooperative spirit which is almost necessary in the effective prevention of accidents. * * * The question of age is always an important one. Young employees are generally accepted as being subject to a greater accident risk and, therefore, in need of special protection. * * * The younger the years the more stringent should be the care in reducing to the minimum the accident risk."

Another phase of the problem suggested by these studies is the fact that an accident with its consequent injury often has more serious consequences for a child than would be the case for an adult. For example, the United States Bureau of Labor report on women and child wage earners discussed above as reference No. 2 emphasizes this aspect (p. 386):

> "A given injury is a more serious matter for the child. Surgeons always hesitate to perform operations upon the young which would instantly be used with more mature patients. The shock of an operation disturbs the poise of an immature organism much more than where the progress of time has hardened the resisting powers. With the adult there is usually little beyond the direct disability of the accident itself. With the child there is much more likely to be far-reaching series, the intrusion of infectious disease at an unguarded moment, a lasting damage to the functions of the nervous system, leading forward to consequences of the most serious kind in after years. A long history of degeneracy and dependence may have its beginning in exposure to industrial hazard."

[9] Mangold, George B.: Problems of Child Welfare, p. 362. New York, 1924.

One of the Massachusetts studies discussed above (reference No. 6) states (p. 16):

> "The loss of a hand or an arm imposes upon the child a serious burden for life. The loss of fingers or thumbs frequently results in their exclusion from certain processes in industry and a substantial loss in their earning power."

The New York report previously mentioned (cited as reference No. 8) contains the following statements (pp. 6, 19):

> "Accidents collect a large toll and socially their cost is obvious, especially when the injury permanently disables a child—a member of society who is but beginning to play his part in the community. * * * There is no doubt but that even when the accident is not fatal, a total or partial disability to a younger person is a greater social loss than the same accident to an older person. The loss of a hand to a 17-year-old boy affects his entire working life and determines in large measure his contribution to the community. For this reason alone the protection of working boys and girls from industrial accidents is highly important."

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