
UNITED STATES DEPARTMENT OF LABOR

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BUREAU OF LABOR STATISTICS

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Earnings in the Manufacture of Industrial Machinery, 1942

(Part 2)



Bulletin No. 720-A
(Continuation of Bulletin No. 720)

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LETTER OF TRANSMITTAL

UNITED STATES DEPARTMENT OF LABOR,
BUREAU OF LABOR STATISTICS,
Washington, D. C., February 15, 1943.

The Secretary of Labor:

I have the honor to transmit herewith Part 2 of a report on earnings in the manufacture of industrial machinery, 1942. This part includes the following six branches of the industry: Machine tools, internal-combustion engines, tractors, miscellaneous metalworking machinery, food-products machinery, and mechanical power-transmission equipment. Part 1, published as Bulletin No. 720, dealt with agricultural machinery, mining machinery and equipment, textile machinery, construction machinery, miscellaneous industrial machinery, and oil-field machinery. The report was prepared in the Division of Wage Analysis, Robert J. Myers, Chief.

A. F. HINRICHS, *Acting Commissioner.*

HON. FRANCES PERKINS,
Secretary of Labor.

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PREFACE

To provide basic information on the effects of the transition to a war economy on industrial products, technological processes, occupational patterns, and wage structures, the Bureau of Labor Statistics has undertaken a series of studies of establishments manufacturing machinery and allied products. This bulletin contains a summary of the data collected during the spring and summer of 1942 from plants in six branches of the machinery industry. The individual reports are reprinted, with minor changes, from recent issues of the Monthly Labor Review, and the products discussed are machine tools, internal-combustion engines, tractors, miscellaneous metal-working machinery, food-products machinery, and mechanical power-transmission equipment.

A previous bulletin, No. 720, contains similar information on earnings in the manufacture of agricultural, mining, textile, construction, miscellaneous industrial, and oil-field machinery. Summaries of the data for additional industry branches are in preparation and are made available in mimeographed form as the analyses are completed.

Each of the industrial branches covered in this series of studies has been defined in terms of the principal products of the various plants during the year 1939—the latest period for which data are available from the Census of Manufactures. It is recognized that a group of plants, classified as constituting an industrial branch in 1939, may be far from a homogeneous group at the present time. It is, nevertheless, useful to begin with the 1939 classification as a starting point. The data on changes in type of product within a former industry are, in themselves, highly significant since they reflect, in addition to the developments which might be expected over a 3-year period, the impact of the war program.

The data for this survey were collected by trained field representatives of the Bureau who visited the plants and analyzed pay rolls and other pertinent records. The detailed wage data on individual employees are limited to day-shift workers in certain occupational groups selected for study either because of their numerical importance or because they are key jobs. In general, however, occupational earnings rates were compiled for 80 to 90 percent of the wage earners employed on day shifts. The several chapters in this bulletin were prepared by Oscar F. Brown, George E. Votava, and Virginia L. Amonette under the supervision of Harold R. Hosea.

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*Earnings in the Manufacture of Industrial
Machinery, 1942 (Part 2)*

**Chapter VII.—EARNINGS IN MANUFACTURE OF
MACHINE TOOLS**

Summary

The importance of machine tools in the production of war materials has had a marked effect on earnings and hours in this industry. Average hourly earnings, which amounted to 79.9 cents in August 1939, had risen to \$1.017 by the spring of 1942. Earnings in the industry have been progressively affected by the lengthened workweek, which increased by nearly 10 hours during this interval. If extra payments for overtime work were eliminated, it is estimated that the average hourly earnings figure of \$1.017 would be reduced by almost 12 cents. It is not possible to calculate accurately the amounts resulting from premiums for night work; that they are fairly significant is apparent from the fact that, of the 46 plants included in this study, 21 were operating 2 shifts and 19 were on a 3-shift basis.

The establishments in this industry are concentrated largely in the Northeast and Middle West. Although midwestern plants appear to pay higher wages than do eastern plants, the determination of the amount of the regional differences is complicated by correlated differences in size of plant, extent of unionization, size of community, and method of wage payment, all of which affect earnings.

The relatively high level of earnings in the industry is apparent from the fact that 22 occupational groups, which include more than a fourth of the male workers studied in detail, show averages above \$1.00 per hour, exclusive of extra payments for overtime and night work. Except for apprentices, none of the groups of male workers showed averages below 60 cents per hour.

Scope of Survey

According to the Census of Manufactures there were 200 plants engaged primarily in the manufacture of complete machine tools in 1939. These establishments include only those producing "power-

driven machinery employing a cutting tool for work on metal."¹ Plants manufacturing machine-tool and other metalworking machinery accessories will be discussed in a subsequent report, as will also those establishments producing machinery for the shaping, pressing, and forging of metal.

Of the 200 plants in the machine-tool group, 20 employed an average of 5 workers or less in 1939 and were excluded from this survey; the 46 establishments studied thus constitute slightly more than a fourth of the remaining plants which employed an average of 6 or more workers in 1939. The plants included in the survey were selected in such a way as to present a representative cross section of the industry. The earnings data shown in this report, in most instances, are based on a representative pay-roll period during April, May, or June 1942.

Characteristics of the Industry

GEOGRAPHIC DISTRIBUTION

More than 40 percent of the plants classified by the Census in this industry are in the Northeast; a fourth of them are in New England. The greater number of the remainder are in the North Central States, with Ohio, Michigan, and Illinois the most important single States. Few such plants are found elsewhere in the country.

The importance of machine tools in the production of war materials is generally appreciated; employment in these plants has shown substantial increases as a result of expanding war production. Because of the elaborate character of most machine tools, the production of such equipment is, in general, carried on in plants considerably larger than those manufacturing many other types of industrial machinery.

THE LABOR FORCE

Approximately 35 percent of the male workers for whom detailed wage and occupational data were collected may be classified as skilled, about 46 percent are semiskilled, and the remaining 19 percent unskilled. It will be noted that the proportion of skilled workers in this industry is not markedly higher than the ratios found in certain other branches of the machinery industries, despite the fact that the manufacture of machine tools involves large amounts of high-precision work. This apparent anomaly is explained in part by the relatively large size of the typical machine-tool plant, a characteristic which permits a more elaborate division of labor (and consequent "dilution of skill") than is found in many other types of machinery manufacturing. Thus much of the high-precision work is carried on by the use of complex machinery operated by semiskilled employees, who are relatively more numerous in this industry than they are in some of the other machinery-manufacturing branches.

Prior to the outbreak of the war, except in central-office work, the manufacture of machine-tools provided employment for few women. At the time the present survey was made, women still constituted less than 2 percent of the factory workers in the plants studied; they were found in only 7 of the 46 plants. Bench-assembly work was the most

¹ This definition corresponds to that of Census industry No. 1741 and is somewhat more limited than that for the machine-tool industry in the Bureau's monthly statistics on employment and pay rolls.

common occupation for women, and appreciable numbers of learners were found in this category. Inspection departments also reported numerous woman workers. Shortages of skilled male workers and increases in the use of automatic precision machines are reflected in a trend toward the employment of women as semiskilled and unskilled machine operators. Included in these occupations are burrers and operators of drill presses, engine lathes, grinding machines, milling machines, presses, and screw machines. There is little doubt that women will be employed for these types of work in increasing numbers.

Negroes constituted less than 1 percent of the workers in the 10 plants in which they were found; the remaining 36 plants employed no Negroes. Most of the Negro workers were laborers, janitors, helpers, and material handlers. Among the Negroes employed were 2 electricians, an auto mechanic, a crane operator, and a truck driver; all the others (130) were unskilled workers.

About one-third (15) of the 46 plants included in the survey were operating under agreements with nationally affiliated unions. Ten of these agreements involved unions affiliated with the American Federation of Labor, 3 with the Congress of Industrial Organizations, and 2 with the Mechanics Educational Society of America. Two-thirds of the larger plants (500 or more employees) reported such agreements. Three plants had agreements with independent unions, and the remaining 28 had no agreements. Union plants were more common in the Middle West than in the East.

METHOD OF WAGE PAYMENT

Approximately half of the employees in 12 of the larger plants were paid under an incentive-wage system. These workers constituted slightly more than a fifth (22 percent) of all those included in the survey. The remaining 78 percent of the workers studied were paid straight hourly rates.

In 8 of the smaller plants, payment for overtime work was made on the basis of the minimum statutory requirements, i. e., time and a half for work over 40 hours per week. In 34 plants this rate was also applied to any work above 8 hours in a day. All Saturday work in 14 of the plants was paid for at the rate of time and a half; in another this rate applied to the first 8 hours of Saturday work, double time being paid thereafter. For Sunday work 4 plants paid time and a half, 1 paid time and a half plus 10 percent, and 23 paid double time. The extent of continuous operation in this industry has resulted in methods of payment for overtime work not commonly found in the other machinery branches studied thus far. One plant paid time and a half for all work on the sixth consecutive day and double time for the seventh and for holidays, and another paid double time for work on the seventh consecutive day or above 12 hours in any day. In these latter cases, penalty rates do not apply to work on Saturday and Sunday, unless these days constitute the sixth or seventh consecutive working day for the employee.

Twenty-one of the 46 plants studied were operating 2 shifts,² and 19 were on a 3-shift basis; only 6 plants reported a single shift. Of the 2-shift plants, 7 paid no premium for night work, 4 paid an addi-

² Some of these plants operate continuously by the use of two long shifts and a "swing" shift, the latter being used ordinarily to cover week ends.

tional 10 cents per hour, 3 had a 5-cent differential, and the remainder operated under other arrangements (table 1). In 4 of the plants operating 3 shifts, there was no differential for the second and third shifts. Eleven plants paid the same premiums to workers on both of the late shifts and the remaining 4 paid somewhat more liberal wages on the third shift than on the second.

TABLE 1.—*Wage Differentials for Second and Third Shifts in Plants Manufacturing Machine Tools*

Number of shifts worked	Number of plants	Differential paid for—		
		Second shift	Third shift	
Plants with 1 shift only...	6	-----		
Plants with 2 shifts.....	7	No differential.....		
	4	10 cents per hour.....		
	3	5 cents per hour.....		
	2	10 percent over base rate.....		
	1	5 cents per hour, plus paid rest period of ½ hour.....		
	1	8 cents per hour.....		
	1	8.5 cents per hour.....		
	1	10 percent over base rate, plus paid lunch period of ½ hour.....		
	1	10 percent over base rate, union members only.....		
	Plants with 3 shifts....	4	No differential.....	No differential.....
		5	10 percent over base rate.....	10 percent over base rate.....
3		5 cents per hour.....	5 cents per hour.....	
2		10 cents per hour.....	10 cents per hour.....	
1		5 to 10 percent over base rate, based on length of service (minimum 5 cents per hour).....	8 hours pay for 7.5 hours' work, plus 5 to 10 percent over base rate.....	
1		5 cents per hour.....	10 cents per hour.....	
1		5 cents per hour, all journeymen (prorated to learners).....	10 cents per hour, all journeymen (prorated to learners).....	
1		6 cents per hour.....	10 cents per hour.....	
1		10 percent over base rate, machine operators and assemblers only.....	10 percent over base rate.....	

Hours and Earnings

TREND FROM 1939 TO 1942

Data on the trend of earnings and hours for selected periods since August 1939 are available for 41 of the 46 plants studied.³ Hourly earnings in these plants, including extra payments for overtime and night work, averaged 79.9 cents in August 1939. The corresponding average for the latest period (April-June 1942) is \$1.017. Gross average hourly earnings in this industry have been inflated progressively by payments for overtime work, as is indicated by the increase of nearly 10 hours in the workweek during the 34-month period. These figures were compiled from the records of the plants included in this special survey and are not, as already pointed out, comparable with the Bureau's regular monthly series on this industry since the latter is based on a larger number of plants and a broader definition of the industry (see footnote 1, page 2). It may be noted, however, that the trend in earnings since August 1939, as indicated in table 2, corresponds closely to that shown by the Bureau's monthly series. It is estimated that the average hourly earnings in August 1939 would be reduced by slightly over 3 cents by the elimination of overtime pay-

³ The plants for which comparable data are not available are, in general, small, and the general averages would presumably be changed but slightly by their inclusion in this comparison.

ments. In the average for the latest period the estimated correction for this factor amounts to almost 12 cents, and reduces the hourly rate to about 90 cents (table 2). This figure is also affected, of course, by premium payments for extra-shift work. It is not possible to estimate accurately the effect of such bonuses on the general average because of the great variety of methods of calculating such premiums in the different plants, the varying proportions of workers employed on second and third shifts, and other complex factors. As is indicated in table 3, the average straight-time hourly earnings of first-shift workers in the selected occupations amounted to 86.0 cents per hour.

TABLE 2.—Average Hourly Earnings and Average Weekly Hours of Workers in 41 Machine-Tool Plants, for Specified Periods,¹ 1939-42

Year and month	Average hourly earnings	Estimated average hourly earnings exclusive of extra overtime earnings	Average weekly hours
August 1939.....	\$0.799	\$0.763	42.5
April 1940.....	.800	.736	46.7
August 1940.....	.796	.744	44.8
February 1941.....	.844	.754	50.7
August 1941.....	.914	.820	50.1
April-June 1942 ²	1.017	.900	52.1

¹ The data for several companies were used with reduced weight in order to avoid overrepresentation of large plants.

² Data for 1 plant based on a January-February pay roll and for 4 plants based on March pay rolls.

EARNINGS FOR SELECTED OCCUPATIONS

Average hourly earnings, exclusive of extra payments for overtime and night work, are available for the greater part of the day-shift workers employed in the machine-tool plants studied. These workers constitute a sufficiently large proportion of total employment in such plants to provide reliable indexes of prevailing rates.⁴

The fairly high level of earnings in this industry is apparent from the fact that 22 occupational groups, which include 26.0 percent of the male workers whose earnings appear in table 3, show averages above \$1.00 per hour even when extra payments for overtime and night work are excluded. Most important numerically among these groups are the class A assemblers, the several categories of class A machine operators, class A working foremen, and tool and die makers. None of the groups of male workers showed averages below 60 cents per hour, with the exception of first- and second-year apprentices.

⁴ Detailed data on numbers of workers and certain other factors are necessarily omitted from this discussion as well as from the tables in order to avoid disclosure of information on operations connected with the war program.

TABLE 3.—Average Hourly Earnings¹ of Day-Shift Workers in Selected Occupations in Machine-Tool Plants, by Region, April-June 1942

Occupation and class	United States		New England and Middle Atlantic		North Central States	
	Percent of workers	Average hourly earnings	Percent of workers	Average hourly earnings	Percent of workers	Average hourly earnings
All workers.....	100.0	\$0.860	100.0	\$0.776	100.0	\$0.924
Male workers.....	99.0	.863	98.2	.780	99.6	.926
Apprentices, first year.....	.4	.437	.5	.400	.3	.490
Apprentices, second year.....	.5	.560	.4	.509	.6	.590
Apprentices, third year.....	.5	.646	.4	.571	.6	.686
Apprentices, fourth year.....	.2	.706	.1	.620	.2	.775
Assemblers, bench, class A.....	4.0	1.044	4.6	.940	3.4	1.151
Assemblers, bench, class B.....	4.2	.954	4.0	.837	4.2	1.035
Assemblers, bench, class C.....	3.9	.841	1.7	.797	5.5	.851
Assemblers, floor, class A.....	3.5	1.025	4.1	.944	3.1	1.106
Assemblers, floor, class B.....	3.3	.838	3.6	.813	3.1	.860
Assemblers, floor, class C.....	2.3	.780	1.3	.753	3.0	.789
Blacksmiths.....	.1	.881	.1	.791	.1	.969
Boring-mill operators, class A.....	1.7	1.134	1.7	1.001	1.7	1.236
Boring-mill operators, class B.....	.5	.900	.4	.850	.6	.927
Broaching-machine operators.....	.1	.891	.1	.820	.1	.955
Buffers.....	.6	.817	.8	.612	.5	1.086
Burrers, class B.....	.3	.912	.2	.859	.3	.939
Burrers, class C.....	.4	.708	.6	.642	.3	.813
Carpenters, class A.....	.2	.958	.2	.896	.2	1.002
Carpenters, class B.....	.2	.824	.2	.787	.2	.850
Carpenters, class C.....	.4	.708	.5	.574	.3	.848
Casting cleaners.....	.5	.743	.3	.742	.6	.743
Chippers, class B.....	.4	1.008	.5	.925	.3	1.113
Chippers, class C.....	.1	.687	.2	.627	.1	.768
Coremakers, class A.....	.1	1.181	.2	(²)	.1	(²)
Crane followers.....	.2	.769	.4	.726	.1	.909
Crane operators.....	.5	.834	.4	.737	.5	.896
Craters.....	.6	.889	.4	.906	.7	.881
Drill-press operators, class A.....	1.6	.984	1.0	.837	1.6	1.073
Drill-press operators, class B.....	1.3	.849	1.1	.728	1.4	.820
Drill-press operators, class C.....	.9	.847	.4	.693	1.3	.820
Electricians.....	1.0	.947	1.1	.850	.9	1.042
Elevator operators.....	.1	.766	.1	.640	.2	.810
Firemen, stationary boiler.....	.1	.845	.2	.757	.1	.945
Foremen, working, class A.....	2.3	1.124	3.7	1.056	1.2	1.276
Foremen, working, class B.....	.5	1.043	.4	.978	.5	1.082
Gear cutters, class A.....	.4	1.005	.4	.881	.4	1.092
Gear cutters, class B.....	.4	.805	.4	.730	.4	.862
Gear finishers.....	.2	.938	.1	(²)	.3	.932
Grinding-machine operators, class A.....	2.5	1.022	2.7	.838	2.4	1.181
Grinding-machine operators, class B.....	1.9	.846	2.2	.735	1.6	.961
Grinding-machine operators, class C.....	.7	.886	.1	.708	1.1	.895
Heat treaters, class A.....	.5	.908	.5	.731	.4	1.066
Heat treaters, class B.....	.5	.796	.5	.721	.5	.852
Helpers, journeymen's.....	.7	.708	.9	.647	.6	.777
Helpers, machine operators'.....	.8	.674	1.5	.644	.2	.819
Inspectors, class A.....	1.7	.926	2.5	.824	1.1	1.106
Inspectors, class B.....	1.5	.566	1.3	.666	1.6	.993
Inspectors, class C.....	.4	.709	.2	.703	.5	.711
Janitors.....	1.5	.693	1.4	.596	1.6	.757
Job setters.....	(¹)	1.204	(²)	(²)	.1	1.250
Laborers.....	1.5	.687	1.3	.601	1.6	.741
Laborers, foundry.....	.2	.675	.5	.680	(³)	(²)
Lathe operators, engine, class A.....	2.3	1.062	1.4	.974	3.1	1.092
Lathe operators, engine, class B.....	1.3	.858	.9	.819	1.7	.875
Lathe operators, engine, class C.....	.6	.813	.6	.744	.6	.872
Lathe operators, turret, class A.....	2.0	1.041	1.9	.909	2.1	1.133
Lathe operators, turret, class B.....	1.5	.840	1.3	.744	1.6	.899
Lathe operators, turret, class C.....	.3	.859	.1	(²)	.4	.878
Lay-out men, class A.....	.1	.994	.1	.963	.1	1.012
Learners, journeymen and other.....	6.9	.646	6.2	.617	7.2	.666
Learners, machine operators.....	6.7	.633	6.4	.594	7.1	.659
Machine operators, all-round.....	.7	.955	.5	.743	.8	1.048
Machinists.....	.9	1.015	.4	1.011	1.3	1.016
Metal-saw operators.....	.3	.707	.4	.657	.2	.790
Milling-machine operators, class A.....	1.8	.978	2.2	.862	1.4	1.119
Milling-machine operators, class B.....	1.2	.805	1.6	.714	1.0	.916
Milling-machine operators, class C.....	.3	.943	(²)	(²)	.5	.957
Millwrights.....	.6	.830	.9	.729	.4	1.001
Molders, bench and floor.....	.1	(²)	.3	(²)	.1	(²)

See footnotes at end of table.

TABLE 3.—Average Hourly Earnings¹ of Day-Shift Workers in Selected Occupations in Machine-Tool Plants, by Region, April-June 1942—Continued

Occupation and class	United States		New England and Middle Atlantic		North Central States	
	Percent of workers	Average hourly earnings	Percent of workers	Average hourly earnings	Percent of workers	Average hourly earnings
Male workers—Continued.						
Molders, machine.....	0.1	(²)	0.3	(²)		
Packers.....	.2	\$0.864	.2	\$0.737	0.2	\$0.947
Painters, brush.....	.9	.842	.6	.754	1.1	.880
Painters, spray.....	.7	.832	.7	.824	.8	.838
Patternmakers.....	.5	1.282	.8	1.050	.4	1.576
Pipefitters.....	1.1	.982	1.1	.842	1.1	1.142
Planer operators.....	2.3	1.006	1.8	.898	2.7	1.061
Repairmen, machine.....	.6	.970	.5	.831	.7	1.048
Screw-machine operators, class A.....	.6	1.161	.3	(²)	.8	(²)
Screw-machine operators, class B.....	.4	.929	.4	.859	.3	.984
Screw-machine operators, class C.....	.6	.869	.5	.725	.6	.966
Shake-out men.....	1.1	.717	.2	(²)	(²)	(²)
Shaper operators.....	.5	.861	.6	.743	.4	.995
Sheet-metal workers, class A.....	1.1	1.119	1.1	1.100	(³)	(²)
Sheet-metal workers, class B.....	.2	.936	.3	.938	.1	.931
Stock clerks.....	3.8	.708	5.1	.638	3.0	.797
Straighteners.....	(³)	.998	(³)	(²)	.1	1.061
Testers, class A.....	.2	1.240	(³)	(²)	.3	1.259
Testers, class B.....	1.1	1.078	(³)	(²)	.2	1.086
Testers, class C.....	1.1	.959	(³)	(²)	.1	.948
Thread-milling-machine operators.....	.2	1.024	.1	.974	.2	1.045
Time clerks.....	1.3	.690	1.8	.592	1.0	.833
Tool and die makers.....	1.2	1.176	1.0	1.036	1.4	1.253
Tool grinder operators.....	.4	.969	.2	.723	.6	1.049
Truck drivers.....	.2	.823	.2	.733	.2	.892
Truckers, hand.....	1.3	.677	1.8	.634	.9	.742
Truckers, inside.....	.3	.837	.2	.711	.3	.926
Watchmen.....	1.2	.695	1.6	.618	1.0	.784
Welders, hand, class A.....	.2	1.054	.2	1.055	.2	1.053
Welders, hand, class B.....	1.1	.860	.1	.880	.1	.840
Female, workers	1.0	.547	1.8	.543	.4	.561
Assemblers, bench, class C.....	.1	.558	.1	(²)	(³)	(²)
Burrers, class C.....	.1	.538	(³)	(²)	.1	(²)
Drill-press operators, class C.....	(³)	.616	(²)	(²)	(³)	(²)
Inspectors, class B.....	.1	.618	.1	(²)	(³)	(²)
Inspectors, class C.....	.2	.485	.3	(²)	(³)	(²)
Learners, machine operators and others.....	.6	.537	1.3	.548	.3	.468

¹ Averages are based on actual earnings exclusive of extra payments for overtime.

² Number of plants and/or workers too small to justify computation of an average.

³ Less than a tenth of 1 percent.

In some occupations the comparative levels of wages of workers in the various classes, for the industry as a whole, are influenced by variations in wage structure. Thus, class C grinding-machine and turret-lathe operators show a higher average than class B operators in the country as a whole, owing to the fact that the former group is found principally in the high-wage midwestern plants. Variations in wage structure resulting from differences in size of plant exercise a similar influence in some cases.

The number of women employed in these plants is insufficient to warrant regional comparisons for individual occupations. The largest single group of women consists of those classified as learners, who received an average of 53.7 cents per hour. The lowest rate is that for class C inspectors who earned 48.5 cents per hour; the rate of 61.8 cents for class B inspectors is the highest for any group of women. The earnings of the grinding-machine, engine-lathe, and milling-machine operators would presumably exceed these, but the data are not adequate to yield statistically reliable averages.

The combined weighted totals shown in table 3 indicate the existence of substantial regional wage differences in this industry. They show a difference of 14.8 cents per hour between the average of 77.6 cents per hour for the 20 plants in the East and that of 92.4 cents for the 26 midwestern establishments. This amount is not, however, to be interpreted as a purely regional difference. Of the 26 midwestern plants, 11 are operating under agreements with nationally affiliated unions, while such agreements are in effect in but 4 of the 20 eastern establishments. On the other hand, the midwestern plants employ only about three-fourths as many workers, on the average, as those in the East. The net effect of these two factors, which tend to offset one another, cannot be precisely stated on the basis of the data available, but there are indications that the 14.8 cents referred to above may overstate somewhat the actual regional difference for types of plants, locations, and types of work.

The regional differences in the averages of male workers in individual occupations are, of course, subject to certain of the qualifications outlined above in connection with the weighted totals. However, the occupational rates for the midwestern plants are almost uniformly above those for the plants in the New England and Middle Atlantic States. In the few exceptions—craters, class B sheet-metal workers, and welders—the numbers of workers or the differences in rates are too small to be considered as highly significant.

Comparable data which are available for 17 important occupational groups indicate that size of plant exercises a considerable effect on earnings. Wages in the large plants are in every instance higher than those in the small, and in 6 of the 17 occupations the difference amounts to more than 20 cents (table 4). This comparison is also influenced somewhat by differences in the extent of unionization and in method of wage payment, but leaves little doubt as to the substantial wage advantage of the workers in large plants.

TABLE 4.—Average Hourly Earnings¹ of Day-Shift Male Workers in Machine-Tool Plants, North Central Region, By Occupation and Size of Plant, April-June 1942

Occupation and class	Average hourly earnings in plants employing—	
	Under 500 workers	500 workers or more
Assemblers, bench, class A.....	\$0.982	\$1.181
Assemblers, bench, class B.....	.812	1.085
Assemblers, bench, class C.....	.642	.869
Drill-press operators, class A.....	.937	1.118
Drill-press operators, class B.....	.775	.962
Drill-press operators, class C.....	.662	.918
Electricians.....	.988	1.047
Inspectors, class A.....	1.055	1.113
Inspectors, class B.....	.861	1.006
Janitors.....	.594	.787
Laborers.....	.628	.829
Lathe operators, engine, class A.....	.969	1.158
Lathe operators, engine, class B.....	.782	.942
Milling-machine operators, class A.....	.951	1.185
Milling-machine operators, class B.....	.730	1.007
Stock clerks.....	.656	.836
Tool and die makers.....	1.163	1.264

¹ Averages are based on actual earnings exclusive of extra overtime payments.

Chapter VIII.—EARNINGS IN MANUFACTURE OF INTERNAL-COMBUSTION ENGINES

Summary

The manufacture of internal-combustion engines is concentrated in the States of Wisconsin, New York, Ohio, Michigan, and Pennsylvania. According to the latest Census of Manufactures (1939), one-fifth of the plants, which employed one-third of the workers in the industry, were in Wisconsin. Altogether, 21 plants were covered in the Bureau's survey; one third of these reported that all of their current production was for war work or was being done under high priority ratings. All but 4 were operating either two or three shifts during the spring of 1942.

Employment in these plants more than doubled between August 1939 and the period of the present survey, and estimated average hourly earnings (exclusive of extra payments for overtime) increased from 69.7 cents in August 1939 to 83.9 cents in the spring of 1942. Plants situated in the more densely populated areas paid an average of about 15 cents per hour more than the plants in the smaller communities.

Scope of Survey

According to the Census of Manufactures there were 74 plants engaged primarily in the manufacture of internal-combustion engines in 1939. Seven of the 74 plants employed fewer than 6 wage earners and were excluded from the present survey. Of the remaining 67 plants, data were obtained for 21. The sample of plants was selected as far as possible to be representative of the industry as a whole with respect to location, size of plant in terms of number of employees, and other characteristics. The earnings data shown in this report, in most instances, are based on a representative pay-roll period during March, April, or May 1942.

Characteristics of the Industry

Type of product.—This industry, as defined by the Census of Manufactures, includes establishments engaged primarily in the production of internal-combustion engines (except for aircraft and motor vehicles) including Diesel and semi-Diesel types. The importance of engines in modern warfare obviously precludes any wholesale conversion of the plants in this industry to the manufacture of other products.

Geographic distribution.—Nearly three-fifths of the plants in this industry are in the States of Wisconsin, New York, Ohio, Michigan, and Pennsylvania. Fourteen (nearly 15 percent of the total) are in Wisconsin, and these plants employed over a third of the workers in this industry according to the latest Census. Another fifth of the plants are in California and Missouri, and the rest are scattered

through 7 North Central and Eastern States. The geographic distribution of the plants and wage earners included in this survey corresponds closely to that shown by the Census.

The labor supply.—Of the total workers for whom detailed earnings data were compiled, it is estimated that about 30 percent were working at skilled jobs, 47 percent semiskilled, and 23 percent unskilled.

All but 1 of the 15 plants employing 200 or more workers were operating under agreements with unions; only 2 of the 6 plants employing 200 workers or less reported such agreements. Thirteen of these 16 union agreements were with nationally affiliated unions.

Only three of the plants studied employed women, and, of these, only two reported substantial numbers. Women were employed principally as bench assemblers, inspectors, clerks, winders, and operators of miscellaneous small machines.

Negroes were employed in five of the plants studied, but they constituted less than 1 percent of the total employment in three of these five plants, and 3 and 11 percent, respectively, in the remaining two.

Method of wage payment.—Incentive methods of wage payment were in effect in 8 of the 21 plants studied and nearly half of the workers in these 8 plants, or 25 percent of the workers in the plants studied, were paid on this basis.

All of the plants studied paid time and a half for all work over 40 hours per week, and 18 also applied this rate after 8 hours per day. This same rate was paid for all Saturday and Sunday work in 6 of the plants. In 10 plants double time was paid for all Sunday work.

Seventeen of the 21 plants included in the survey were operating more than 1 shift at the time they were studied; 5 were on a 2-shift schedule, and 12 were running 3 shifts (table 5). Four of these plants paid no differential rate for second- or third-shift work. Among the remaining 13 plants, the second-shift differentials ranged from 2.5 to 10 cents per hour and those for the third shift from 5 cents per hour to 15 percent above the base rate. The most common differential in use for second- and third-shift workers was 5 cents per hour.

TABLE 5.—*Wage Differentials for Second and Third Shifts in Plants Manufacturing Internal-Combustion Engines, March-May 1942*

Number of shifts worked	Number of plants	Differential paid for—	
		Second shift	Third shift
Plants with 1 shift only	4		
Plants with 2 shifts	2	No differential	
	1	2.5 cents per hour	
	1	3 cents per hour	
	1	5 cents per hour	
Plants with 3 shifts	2	No differential	No differential.
	4	5 cents per hour	5 cents per hour.
	2	10 percent over base rate	15 percent over base rate.
	1	3 cents per hour	5 cents per hour.
	1	10 cents per hour	10 cents per hour.
	1	10 percent over base rate, machine shop; 5 percent over base rate, foundry.	10 percent over base rate, machine shop; 5 percent over base rate, foundry.
	1	10 percent over base rate	10 percent over base rate.

Hourly Earnings and Weekly Hours

TREND FROM 1939 TO 1942

Average hourly earnings in the 21 plants covered in this survey increased about 23 cents between August 1939 and the spring of 1942 (table 6). A substantial part of this difference was due to extra payments for overtime work; the average workweek increased from 36.6 to 49.7 hours during this same period. It is estimated that regular earnings, excluding extra payments for overtime, amounted to about 69.7 cents per hour in August 1939 and 83.9 cents in March-May 1942—an actual increase of about 14.2 cents.

TABLE 6.—Average Hourly Earnings and Average Weekly Hours of Workers in 21 Internal-Combustion Engine Plants for Specified Periods, 1939-42¹

Year and month	Average hourly earnings	Estimated average hourly earnings exclusive of extra overtime earnings	Average weekly hours
August 1939.....	\$0.705	\$0.697	36.6
April 1940.....	.732	.697	42.8
August 1940.....	.733	.698	42.8
February 1941.....	.768	.704	47.2
August 1941.....	.852	.791	45.7
March-May 1942.....	.935	.839	49.7

¹ The data for 1 company were used with reduced weight in order to avoid overrepresentation of large plants.

One-third (7) of the plants surveyed showed current average hourly earnings, including extra payments for overtime, of \$1.00 or more per hour, while the averages for 4 were below 70 cents. One-third of the plants included in the survey averaged between 80 and 90 cents per hour.

OCCUPATIONAL DIFFERENCES

Hourly earnings for individual occupations (excluding apprentices) in the manufacture of internal-combustion engines ranged from \$1.347 for class A drop-hammer operators to 59.8 cents for class C chippers (table 7). More than 20 percent of the male workers were classified in occupational groups which showed averages of \$1.00 or more per hour. On the other hand, only 14 percent (excluding learners and apprentices) of the workers were classified in occupational groups which showed averages below 70 cents per hour. The numbers of women employed are too small to justify the computation of occupational averages; their combined average was 60.1 cents per hour.

TABLE 7.—Average Hourly Earnings¹ of Day-Shift Workers in Selected Occupations in Internal-Combustion Engine Plants, by Size of Community, March–May 1942

Occupation and class	Total plants		Plants in communities with population of—			
	Percent of workers	Average hourly earnings	Under 500,000		500,000 or over	
			Percent of workers	Average hourly earnings	Percent of workers	Average hourly earnings
All workers.....	100.0	\$0.840	100.0	\$0.802	100.0	\$0.954
Male workers.....	99.1	.842	98.9	.804	99.6	.955
Acetylene-burner operators.....	.1	(?)	.1	(?)	.....	.....
Apprentices, first year.....	1.0	.404	1.1	.364	.9	.546
Apprentices, second year.....	.7	.507	.7	.453	.6	.694
Apprentices, third year.....	.7	.556	.8	.547	.1	(?)
Apprentices, fourth year.....	.9	.716	1.1	.717	1.1	(?)
Assemblers, bench, class A.....	1.7	1.036	1.3	.988	2.9	1.100
Assemblers, bench, class B.....	4.7	.964	3.0	.895	9.5	1.032
Assemblers, bench, class C.....	2.1	.785	1.5	.700	3.4	.895
Assemblers, floor, class A.....	1.6	1.083	1.4	1.033	2.1	1.185
Assemblers, floor, class B.....	1.6	.900	2.0	.899	.4	.914
Assemblers, floor, class C.....	1.7	.771	2.0	.751	.9	.901
Balancing-machine operators.....	.1	.948	.1	.948	.....	.....
Blacksmiths.....	.2	.801	.2	.852	.1	(?)
Boring-mill operators, class A.....	1.6	1.057	1.4	1.012	2.2	1.140
Boring-mill operators, class B.....	1.4	.874	1.6	.828	1.0	(?)
Broaching-machine operators.....	.1	.761	.2	.749	(?)	(?)
Buffers.....	.1	(?)	.1	(?)	.....	.....
Bulldozer operators.....	.1	1.124	.1	1.144	(?)	(?)
Burrers.....	.3	.784	.2	.722	.3	.948
Carpenters, class A.....	.1	.867	.2	.805	.1	(?)
Carpenters, class B.....	.3	.850	.1	(?)	.8	.869
Carpenters, class C.....	.2	.757	.1	.772	.3	(?)
Carpenters, flask.....	.1	.758	.2	.758	(?)	(?)
Casting cleaners.....	1.3	.751	1.6	.755	.3	(?)
Chippers, class B.....	.5	.673	.6	.662	.2	(?)
Chippers, class C.....	.7	.598	.8	.571	.6	(?)
Coremakers, class A.....	.9	.985	1.0	.969	.6	1.076
Coremakers, class B.....	.3	.837	.7	.857	.....	.....
Coremakers' helpers.....	.3	.674	.3	.657	.2	(?)
Corepastors.....	.5	.904	.6	.904	.....	.....
Crane followers.....	.4	.719	.5	.689	.3	(?)
Crane operators.....	1.5	.767	1.7	.753	1.0	.849
Craters.....	.5	.796	.6	.789	.1	(?)
Cupola tenders.....	.1	.778	.1	.759	.1	(?)
Cupola tenders' helpers.....	.2	.664	.3	.664	.1	(?)
Drill-press operators, class A.....	2.4	1.006	1.7	.980	4.0	1.040
Drill-press operators, class B.....	3.0	.850	3.4	.832	1.6	.970
Drill-press operators, class C.....	1.5	.866	1.3	.846	2.1	.902
Drop-hammer operators, class A.....	.1	1.347	.1	(?)	.1	(?)
Electricians.....	.6	.873	.6	.826	.6	1.025
Firemen, stationary boiler.....	.4	.712	.5	.685	.3	(?)
Flask and pattern carriers.....	.2	.657	.3	.657	.....	.....
Foremen, working, class A.....	.7	1.225	.8	1.195	.5	\$1.388
Foremen, working, class B.....	.3	.932	.4	.968	.1	(?)
Foremen, working, class C.....	.3	.897	.4	.895	.1	(?)
Gear cutters, class A.....	.1	1.042	(?)	(?)	.5	1.026
Grinding-machine operators, class A.....	1.2	1.090	1.0	1.033	1.7	1.193
Grinding-machine operators, class B.....	1.4	.837	1.6	.806	.8	1.036
Heat treaters, class A.....	.1	.990	.1	.903	.2	(?)
Heat treaters, class B.....	.2	.720	.2	.720	.....	.....
Helpers, journeymen's.....	.8	.698	.8	.659	.9	.804
Helpers, machine operators'.....	.8	.725	.5	.630	1.8	.805
Inspectors, class A.....	.9	1.072	.9	.959	1.1	1.353
Inspectors, class B.....	2.1	.914	1.8	.862	3.0	1.012
Inspectors, class C.....	1.0	.705	1.1	.676	.8	.833
Janitors.....	1.4	.642	1.4	.620	1.4	.715
Job setters.....	.4	1.008	.4	.882	.4	1.090
Laborers.....	3.6	.620	3.6	.623	3.1	.743
Laborers, foundry.....	1.4	.620	1.6	.616	.8	.650
Lathe operators, engine, class A.....	2.3	1.065	2.0	1.014	3.1	1.170
Lathe operators, engine, class B.....	2.0	.857	2.3	.842	1.2	.944
Lathe operators, engine, class C.....	.3	.837	.4	.858	(?)	(?)
Lathe operators, turret, class A.....	1.2	1.070	1.0	.988	1.7	1.219
Lathe operators, turret, class B.....	2.9	.840	3.3	.829	1.8	.902
Lay-out men, class A.....	.3	.991	.2	.970	.6	1.013
Lay-out men, class B.....	.2	.866	.2	.866	.....	.....

See footnotes at end of table.

TABLE 7.—Average Hourly Earnings¹ of Day-Shift Workers in Selected Occupations in Internal-Combustion Engine Plants, by Size of Community, March-May 1942—Con.

Occupation and class	Total plants		Plants in communities with population of—			
	Percent of workers	Average hourly earnings	Under 500,000		500,000 or over	
			Percent of workers	Average hourly earnings	Percent of workers	Average hourly earnings
Male workers—Continued.						
Learners, machine operators	1.6	\$0.644	1.3	\$0.574	2.4	\$0.760
Learners, other	.6	.645	.8	.636	.1	(²)
Machinists, class A	.1	1.038	.2	.999	.1	(²)
Machinists, class B	.2	.851	.3	.838	.1	(²)
Metal-saw operators	.2	.820	.2	.804	.2	(²)
Milling-machine operators, class A	1.5	1.036	1.1	1.008	2.6	1.072
Milling-machine operators, class B	1.8	.872	2.1	.865	.7	.931
Millwrights	.5	.869	.5	.848	.5	.939
Molders, bench	.2	.875	.3	.874	(³)	(²)
Molders, floor	1.6	.980	1.8	.967	.8	1.075
Molders' helpers	1.0	.721	1.0	.739	.9	(²)
Molders, machine, class A	.4	1.053	.6	1.053		
Molders, machine, class B	.2	.789	.3	.789		
Packers	.4	.737	.3	.732	.5	.744
Painters, brush	.3	.693	.4	.675	.1	(²)
Painters, spray	.6	.864	.6	.826	.6	.973
Patternmakers, metal	.1	1.071	.2	1.071		
Patternmakers, wood	.8	1.110	.8	1.038	.8	1.344
Pipefitters	.4	.883	.4	.843	.4	1.004
Planer operators	.4	.977	.4	.904	.6	1.133
Pourers, class B	(²)	(²)	(²)	(²)		
Punch-press operators, class A	.1	.992	.1	.992		
Punch-press operators, class B	.1	(²)	.1	(²)		
Punch-press operators, class C	.1	.817	.2	.817		
Repairmen, machine	.9	.924	.8	.901	1.4	.960
Sandblasters	.1	.727	.2	.727		
Sand mixers, machine	.3	.642	.3	.637	.2	(²)
Screw-machine operators, class A	.6	1.023	.7	1.019	.3	1.053
Screw-machine operators, class B	.6	.897	.5	.873	.8	.945
Screw-machine operators, class C	.2	.738	.2	.701	.2	(²)
Shake-out men	.9	.677	1.0	.679	.5	(²)
Shaper operators	.2	.974	.2	.985	.2	(²)
Sheet-metal workers, class A	.1	.898	.1	(²)	.1	(²)
Sheet-metal workers, class B	.3	.867	.4	.856	.2	(²)
Stock clerks	6.0	.711	5.7	.692	6.9	.750
Testers, class A	1.3	1.039	.7	.990	3.1	1.072
Testers, class B	1.0	.829	1.2	.811	.5	.971
Testers, class C	1.0	.727	1.1	.703	.5	.878
Thread-milling-machine operators	.1	1.064	.1	1.002	.3	1.135
Time clerks	1.7	.699	1.6	.703	1.9	.688
Tool and die makers	.9	1.089	.7	1.032	1.7	1.157
Tool-grinder operators	.9	.862	.8	.808	1.3	.961
Truck drivers	.5	.727	.2	.708	1.4	.737
Truckers, hand	1.9	.651	2.4	.643	.3	(²)
Truckers, power, inside	.2	.699	.3	.692	(³)	(²)
Watchmen	1.8	.721	1.8	.691	1.9	.810
Welders, hand, class A	.4	1.001	.3	.935	.4	1.154
Welders, hand, class B	.7	.781	.9	.767	.2	(²)
Winders, class B	.1	(²)	.2	(²)		
Winders, class C	.1	(²)	.1	(²)		
Woodworkers	.1	.870	(²)	(²)	.4	(²)
Female workers	.9	.601	1.1	(²)	.4	(²)

¹ Averages are based on actual earnings exclusive of extra payments for overtime.

² Number of plants and/or workers too small to justify computation of an average.

³ Less than a tenth of 1 percent.

Any regional differences in wage levels which may exist in this industry cannot be analyzed on the basis of the data available. Plant-to-plant differences in unionization, method of wage payment, and other factors which affect wage levels are sufficiently important to obscure any such regional differences. Earnings in these plants did, however, appear to have a definite relationship to the size of

the communities in which the several plants are situated. The general average for the larger communities was more than 15 cents above that for the smaller places. This difference in average hourly earnings was apparently offset in part by the fact that the plants in the smaller communities were considerably larger than the plants in the larger cities. On the other hand, this difference would be somewhat reduced if the effects of differences in unionization and region could be taken into account; union agreements were found more frequently in the larger cities. It is not possible, on the basis of the data available, to determine the net effect of these factors on earnings levels.

Chapter IX.—EARNINGS IN MANUFACTURE OF TRACTORS

Summary

The study is based on data from 10 establishments, or about a third of the total reported by the latest Census of Manufactures. Six of the 10 plants included in the survey reported that over 50 percent of their production was for defense purposes during the first quarter of 1942. Of these, 3 plants classified their production as direct war materials.

Average hourly earnings increased from 79.3 cents in August 1939 to \$1.040 by the spring of 1942. However, these earnings were affected by the increase in the average workweek, which showed a rise of about 10 hours since August 1939; the actual increase in rates is estimated to be about 17 cents per hour.

Approximately 47 percent of the male workers for whom detailed earnings data were compiled were classified in the 60 occupations which showed average earnings of \$1.00 or more per hour. Apprentices constituted the only occupational group with an average below 60 cents per hour.

Scope of Survey

There were 30 plants in the United States manufacturing tractors, according to the 1939 Census of Manufactures. Of these, 3 reported fewer than 6 wage earners and were excluded from the scope of this survey. The remaining 27 plants employed an annual average of 31,271 workers, and approximately 30 percent were working in the 10 establishments included in this survey. The earnings data shown in this report, in most instances, are based on a representative pay-roll period during April, May, or June 1942.

Characteristics of the Industry

This industry, as classified for Census purposes, includes establishments engaged primarily in the manufacture of agricultural tractors, those used on construction work, and industrial tractors. Slightly less than three-fourths of the plants and nearly 98 percent of the workers in this industry are in the North Central area; in fact, approximately two-fifths of the plants and more than three-fourths of the workers in the total industry were in the two States of Illinois and Wisconsin in 1939. The remaining establishments (slightly more than one-fourth of the total) are scattered through the Middle Atlantic and Western States, with about 13 percent in each of these regions. The plants and employees included in the present survey are distributed in approximately the same manner.

Production of war materials.—The majority of the plants in the tractor industry did not report any production of materials directly connected with the defense program before the latter part of 1941. By

that time, 9 plants reported the production of defense materials, and 4 of the 9 were manufacturing direct war materials.

By the first quarter of 1942, 6 of the 10 plants included in this survey reported more than 50 percent of their sales as defense materials; of these, 3 plants reported their principal products as direct war materials. Of the remaining 4 plants, 3 were devoting less than 50 percent of their facilities to the war effort, and one plant reported no direct defense production at all. The extent to which tractors are used in essential civilian activities as well as indirectly in the war effort makes wholesale conversion of this industry unlikely.

A limited amount of plant conversion to the manufacture of products for which they were not formerly equipped did, however, take place in 4 of the 10 plants studied. Three of these plants reported the purchase of new machinery, and, of these, 2 had constructed additional building space. Data on the nature of technological changes in the fourth plant are not available.

The labor supply.—Of the male workers for whom detailed earnings data were compiled, about 38 percent were classified as skilled workers. Semiskilled workers made up approximately 39 percent of the total, and the remaining 23 percent were reported as unskilled.

The employment of women, exclusive of central-office personnel, is rare among these companies. Only 2 of the 10 plants employed women and the total was very small; most of them were coremakers.

Six of the plants employed Negro workers who constituted a little more than a half of 1 percent of the total workers reported by the 10 plants; 4 plants employed none at all. Most of the Negro workers were engaged as laborers, shake-out men, and pourers.

Of the 10 plants, 5 had agreements with nationally affiliated labor unions, and 2 more were operating under agreements with independent labor unions. In all cases except one, the union agreements were found in the larger plants, i. e., those employing more than 500 workers. The one organized plant which had fewer than 500 workers was one of the establishments which had an agreement with an independent union.

Method of wage payment.—Only the larger plants studied (those employing 500 workers or over) made use of incentive methods of wage payment. In 6 of the 10 plants studied, incentive systems were in effect, and nearly 50 percent of the employees in these 6 plants were paid on this basis. These workers amounted to about 42 percent of the total studied.

All the plants paid time and a half for all work above 40 hours a week, and 9 applied this rate to any work over 8 hours a day. Three plants also paid this rate for all work on Sunday, and 2 of these applied the rate to holiday work as well. Double time was in effect in 6 plants; one plant paid double time for all work on Sunday, and the other 5 applied this same rate for both Sunday and holiday work.

Three plants paid no premiums for work on the evening or night shift, although all the plants except one were operating 3 shifts (table 8). The other 6 plants operating 3 shifts paid differentials ranging from 3 to 10 cents an hour, and 2 paid higher rates for work on the third or night shift than those which applied to the second or evening shift.

TABLE 8.—Wage Differentials for Second and Third Shifts in Tractor Plants, April–June 1942

Number of shifts worked	Number of plants	Differential paid for—	
		Second shift	Third shift
Plants with 2 shifts.....	1	5 cents per hour.....	
Plants with 3 shifts.....	3	No differential.....	No differential.
	1	3 cents per hour.....	3 cents per hour.
	1	do.....	4 cents per hour.
	1	do.....	5 cents per hour.
	2	5 cents per hour.....	Do.
	1	10 cents per hour.....	10 cents per hour.

Hourly Earnings and Weekly Hours

TREND FROM 1939 TO 1942

Employment in the plants included in this survey increased by nearly 60 percent between August 1939 and the spring of 1942. Hourly earnings, including extra payments for overtime work, averaged 79.3 cents in August 1939, but at the time the present survey was made, they had risen to \$1.040 (table 9). However, when the continued rise in the length of the average workweek is considered, the increase in average hourly earnings is somewhat lessened because of the exclusion of payments for overtime work. It is estimated that the elimination of such amounts would reduce the average hourly earnings for the latest period to 95.7 cents; on this basis it appears that the rise in wage rates between August 1939 and the spring of 1942 amounts to about 17 cents, or slightly more than 20 percent.

TABLE 9.—Average Hourly Earnings and Average Weekly Hours of Workers in 10 Tractor Plants for Specified Periods, 1939–42

Year and month	Average hourly earnings	Estimated average hourly earnings exclusive of extra overtime earnings	Average weekly hours
August 1939.....	\$0.793	\$0.784	36.5
April 1940.....	.834	.811	39.9
August 1940.....	.791	.779	37.8
February 1941.....	.858	.842	38.3
August 1941.....	.931	.904	40.3
April–June 1942.....	1.040	.957	46.7

PLANT AVERAGES

All but 3 of the plants surveyed showed average hourly earnings, including extra overtime payments, between 95 cents and \$1.20. Four plants in this category paid earnings which averaged above \$1.05. Of the 3 plants with averages below 95 cents, one was between 80 and 85 cents, and the other two plants between 60 and 70 cents. The plants which averaged more than 95 cents were found in every case except one to be the larger plants (those employing over 500 workers), and 2 of the 3 plants paying average hourly earnings below 95 cents employed fewer than 500 workers.

The numbers and characteristics of the plants and workers studied are insufficient to warrant regional comparisons of average hourly earnings. As mentioned above, the industry is highly concentrated in the North Central area, with only a few plants in other areas.

OCCUPATIONAL DIFFERENCES

Sixty occupational groups for which detailed earnings data were collected averaged \$1.00 or more per hour, exclusive of overtime and shift premiums. These groups include about 47 percent of the total employees for whom detailed data were compiled. In this group, hand coremakers, whose earnings averaged \$1.219 per hour, were the highest paid (table 10). The average hourly earnings of the entire group of workers for whom detailed data were compiled amounted to 95.7 cents per hour. This relatively high level of earnings undoubtedly reflects the fact that bonus and piece-work systems were in effect in all of the larger plants studied. In fact, more than two-fifths of all the workers studied were paid under an incentive system.

TABLE 10.—Average Hourly Earnings ¹ of Male Day-Shift Workers in Selected Occupations in Tractor Plants, April-June, 1942

Occupation and class	Percent of workers	Average hourly earnings	Occupation and class	Percent of workers	Average hourly earnings
All workers.....	100.0	\$0.957	Grinding-machine operators, class A.....	2.0	\$1.145
Acetylene-burner operators.....	.2	.856	Grinding-machine operators, class B.....	.8	1.047
Apprentices, first year.....	.2	.512	Grinding-machine operators, class C.....	.1	.922
Apprentices, second year.....	(²)	(²)	Heat treaters, class A.....	1.1	.985
Apprentices, third year.....	.1	.702	Heat treaters, class B.....	.7	.893
Apprentices, fourth year.....	.1	1.509	Helpers, journeymen's.....	1.1	.714
Assemblers, bench, class A.....	.8	1.009	Helpers, machine operators.....	.4	.861
Assemblers, bench, class B.....	1.0	.947	Inspectors, class A.....	1.8	1.048
Assemblers, bench, class C.....	.1	.898	Inspectors, class B.....	1.6	.937
Assemblers, floor, class A.....	2.9	1.059	Inspectors, class C.....	2.5	.861
Assemblers, floor, class B.....	.8	.929	Janitors.....	1.6	.733
Assemblers, floor, class C.....	1.3	.962	Job setters.....	.6	1.099
Balancing-machine operators.....	.1	1.137	Laborers.....	7.2	.732
Blacksmiths.....	.1	1.000	Laborers, foundry.....	2.4	.827
Boring-mill operators, class A.....	1.1	1.117	Ladle liners.....	.1	.931
Boring-mill operators, class B.....	.2	1.084	Lathe operators, engine, class A.....	1.4	1.161
Boring-mill operators, class C.....	.6	.998	Lathe operators, engine, class B.....	1.9	1.060
Broaching-machine operators.....	.2	.916	Lathe operators, engine, class C.....	.3	.932
Buffers.....	.1	1.154	Lathe operators, turret, class A.....	2.6	1.103
Bulldozer operators.....	.1	1.041	Lathe operators, turret, class B.....	1.6	1.045
Burrers, class B.....	.3	.944	Lathe operators, turret, class C.....	.4	.886
Burrers, class C.....	.3	1.007	Lay-out men, class A.....	.2	.986
Carpenters, class A.....	.5	.917	Lay-out men, class B.....	1	.952
Carpenters, class B.....	.1	.797	Learners, journeymen.....	.2	.771
Carpenters, class C.....	.2	1.135	Learners, machine operators.....	1.8	.605
Casting cleaners.....	.8	1.195	Learners, other.....	1.7	.685
Chippers, class B.....	.1	.888	Machinists, class A.....	.2	1.063
Chippers, class C.....	.1	1.219	Machine operators, all-round.....	.4	.870
Coremakers, hand.....	1.4	1.219	Metal-saw operators.....	2	1.002
Coremakers, machine.....	.2	(²)	Milling-machine operators, class A.....	1.3	1.102
Coremakers' helpers.....	.1	(²)	Milling-machine operators, class B.....	1.8	.972
Corepasters.....	.4	1.179	Milling-machine operators, class C.....	.2	(²)
Crate operators.....	.6	.911	Millwrights.....	.9	.993
Crate operators.....	.2	.921	Molders, bench.....	.4	1.187
Cupola tenders.....	.1	1.092	Molders, floor.....	.8	1.069
Cupola tenders' helpers.....	.2	1.070	Molders' helpers.....	.2	1.019
Drill-press operators, class A.....	2.8	1.075	Molders, machine.....	.9	1.177
Drill-press operators, class B.....	1.9	1.011	Packers.....	1.1	.817
Drill-press operators, class C.....	2.5	.989	Painters, brush.....	.3	.770
Electricians.....	1.0	1.060	Painters, dip.....	.1	.967
Elevator operators.....	.1	.741			
Firemen, stationary boiler.....	.2	.903			
Firemen, working.....	1.7	1.042			
Foremen, working.....	.7	1.106			
Gear cutters, class A.....	.9	1.080			
Gear cutters, class B.....	.9	1.080			
Gear finishers.....	.8	1.045			

See footnotes at end of table.

TABLE 10.—Average Hourly Earnings¹ of Male Day-Shift Workers in Selected Occupations in Tractor Plants, April–June, 1942—Continued

Occupation and class	Percent of workers	Average hourly earnings	Occupation and class	Percent of workers	Average hourly earnings
Painters, spray.....	0.7	\$1.078	Solderers, class B.....	0.1	\$1.147
Patternmakers, metal.....	.4	1.195	Solderers, class C.....	.1	(^a)
Patternmakers, wood.....	.2	1.154	Stock clerks.....	4.9	1.806
Pipefitters.....	.3	.997	Straighteners.....	.3	1.154
Planer operators.....	.1	.883	Testers, class A.....	.4	1.078
Platers.....	.1	.979	Testers, class B.....	.2	1.077
Pourers, class B.....	.4	.960	Testers, class C.....	.3	.921
Power-shear operators.....	.2	1.069	Thread-milling-machine operators.....	.2	1.049
Punch-press operators, class B.....	.6	1.044	Time clerks.....	1.1	.711
Punch-press operators, class C.....	.3	1.024	Tool and die makers.....	2.1	1.143
Repairmen, machine.....	2.4	1.013	Tool grinder operators.....	1.4	.984
Repairmen, product.....	.5	1.000	Truck drivers.....	.2	.883
Riveters, pneumatic.....	.1	.938	Truckers, hand.....	2.2	.763
Sandblasters.....	.3	.912	Truckers, power, inside.....	1.7	.847
Sand mixers, machine.....	.2	1.147	Tumbler operators.....	.3	1.124
Screw-machine operators, class A.....	.1	1.143	Upsetters.....	.1	1.144
Screw-machine operators, class B.....	.2	1.141	Watchmen.....	1.4	.795
Screw-machine operators, class C.....	.1	.918	Welders, hand, class A.....	1.0	1.145
Shake-out men.....	.6	1.056	Welders, hand, class B.....	.7	.982
Sheet-metal workers, class A.....	.3	1.030	Welders, machine.....	.3	1.065
Sheet-metal workers, class B.....	.2	.921			

¹ Averages are based on actual earnings exclusive of extra payments for overtime work.

² Less than a tenth of 1 percent.

³ Number of plants and/or workers too small to justify computation of an average.

With the exception of first-year apprentices, none of the occupational group averages was below 60 cents per hour. Only two groups, machine-operator learners and other learners, who averaged 60.5 and 68.5 cents, respectively, showed averages below 70 cents. Eleven occupational groups, which included less than 16 percent of the total workers, were classified in occupations averaging between 70 and 80 cents per hour. The most important of these, numerically, were laborers, hand truckers, janitors, watchmen, and journeymen helpers. The number of female workers is insufficient to justify the computation of occupational averages.

Chapter X.—EARNINGS IN MANUFACTURE OF MISCELLANEOUS METALWORKING MACHINERY

Summary

Virtually all of the 38 plants included in this survey were in direct war work, but relatively little plant conversion had occurred.

Employment in these plants more than doubled between August 1939 and the spring of 1942, and average earnings increased about 11 cents per hour. It is estimated that at least half of this rise in earnings is a result of increases in extra payments for overtime and night work. Exclusive of such extra payments, hourly earnings of day-shift workers in the more important occupations averaged 82.1 cents. Approximately a fourth of the workers studied were classified in the 22 occupational groups which showed average earnings above \$1 per hour.

Scope of Survey

Reports of the latest Census of Manufactures (1939) show 178 plants "primarily engaged in the manufacture of machinery for the shaping, pressing, or forging of metal, where the shaping action of such machines is not dependent upon a cutting tool."⁵ The present survey includes 38 plants, or slightly more than a fourth of the 143 establishments which employed an average of 6 or more workers in 1939. Over half the plants and employees in this industry are found in the North Central States, with the concentration heaviest in Ohio, Illinois, and Michigan. Most of the remaining plants are in the Middle Atlantic and New England States; New York, New Jersey, Pennsylvania, Connecticut, and Massachusetts are the more important. The plants selected for study are distributed in essentially the same manner.

The earnings data shown in this report are based, in most instances, on a representative pay-roll period during April, May, or June 1942.

Characteristics of the Industry

Type of product.—The machinery manufactured by plants classified in this industry is of many different types. The more important are presses, tools, rolling machinery, and forging equipment. In view of the wide variety of products involved, these plants cannot be regarded as a highly homogeneous group. This fact is, incidentally, reflected in the occupational characteristics of the plants studied.

As in the case of machine tools, which were discussed in chapter VII of this bulletin, relatively little conversion has been necessary in this industry because it was already making products important in the war effort. The changes that have been made are minor in comparison with those which some of the other industrial divisions have undergone. Typical is the plant in which facilities for making can machinery have

⁵ I. e., Census industry No. 1749.

been converted to the production of equipment for the manufacture of shells. Virtually all of the plants in this industry are directly involved in the war program; over two-fifths of those studied were assigned high priority ratings as early as 1940.

The labor force.—Detailed earnings data were compiled for about 70 percent of all the workers employed in the 38 plants studied; this group constitutes 80 to 90 percent of the day-shift workers. Slightly more than a third (34.1 percent) were working at jobs regarded as skilled, 40.8 percent were doing semiskilled work, and the remaining fourth (25.1 percent) were unskilled workers. This skill distribution conforms closely to that for the machinery industries as a group.

Aside from the central-office personnel, practically all of the women employed in these 38 plants were found in 1 large establishment; a few women were reported by 3 other plants. Most of them were working as bench assemblers, drill-press operators, inspectors, and winders. Negroes constituted about 1 percent of the total employment in the plants studied, but they were found in only 9 of the 38 plants; only 2 plants reported more than 6 Negro workers each.

Eight of the plants studied were operating under agreements with nationally affiliated unions; 4 had agreements with the Congress of Industrial Organizations, 3 with the American Federation of Labor, and 1 with the Mechanics Educational Society of America. The union plants were principally those of medium size; none of the plants with fewer than 50 workers was organized, and only 1 of the 3 largest reported a union agreement. In addition to these 8 plants, 4 reported agreements with independent unions.

Method of wage payment.—The great majority of the workers in this industry are paid on the basis of straight hourly rates. Only 4 of the plants studied reported incentive systems and about two-fifths of their employees were paid piece or bonus rates; these workers constituted less than 3 percent of the total studied in the 38 plants.

About a fourth (10) of the plants paid no extra amounts for overtime beyond minimum statutory requirements, i. e., time and a half over 40 hours per week. Twenty-seven applied this rate to all work above 8 hours in 1 day. Six plants paid time and a half for all Saturday work and 1 applied this rate after noon on that day. Of the 15 plants making special provisions for additional pay on Sundays, 7 paid time and a half and 8 paid double time. One plant paid double time for all work in excess of 11 hours in 1 day; another used a similar method but the limit was 12 hours.

Sixteen of the plants were operating 2 shifts at the time this study was made. Eight paid no premium for second-shift work, and the remainder added various amounts on a flat or percentage basis (table 11). Of the 13 plants operating 3 shifts, 3 paid no premium to workers on either late shift. Seven plants paid essentially the same bonuses to workers on both late shifts; an additional 5 cents per hour was the most common amount. One plant paid no premium for second-shift work, but added a half hour's pay to the earnings of third-shift employees. The remaining 9 plants were operating a single shift.

TABLE 11.—*Wage Differentials for Second and Third Shifts in Miscellaneous Metal-working-Machinery Plants, April-June 1942*

Number of shifts worked	Number of plants	Differentials paid for—	
		Second shift	Third shift
Plants with 1 shift only.	9		
Plants with 2 shifts.....	8	No differential.....	
	1	5 cents per hour.....	
	1	5 cents per hour up to 75 cents; 10 cents per hour over 75 cents.	
	1	8 cents per hour.....	
	2	10 cents per hour.....	
	2	5 percent over base rate.....	
	1	7.5 percent over base rate.....	
Plants with 3 shifts.....	3	No differential.....	No differential.
	1	do.....	8 hours' pay for 7.5 hours' work.
	4	5 cents per hour.....	5 cents per hour.
	2	do.....	10 cents per hour.
	1	10 cents per hour.....	Do.
	1	5 percent over base rate.....	5 percent over base rate.
	1	5 percent over base rate for unskilled; 10 percent for semi-skilled.	5 percent over base rate for unskilled; 10 percent for semi-skilled.

Hours and Earnings

TREND FROM 1939 TO 1942

It is not possible to present for this industry detailed data on the trend of earnings similar to those shown in previous reports in this series. Several firms were unable to supply complete information, and the particular intervals selected for study in this series happened in several instances to coincide with periods of unrepresentative plant operations. On the basis of such data as could be obtained, it is estimated that, in general, earnings increased by about 11 cents per hour between August 1939 and the spring of 1942 when the average was 91.3 cents. This figure is, however, inflated by extra payments for overtime work, since the average workweek rose from 39 to nearly 52 hours during this period. The actual increase in rates appears, therefore, to have been small, presumably not more than 5 to 7 cents per hour. Employment in these plants more than doubled during the same period.

PLANT AVERAGES

Average hourly earnings, including extra payments for overtime and night work, amounted to 91.3 cents-per hour for the 38 plants as a group. Five of the 38 showed plant averages below 75 cents per hour and 8 amounted to \$1 or more. The averages for slightly more than half the plants were between 80 cents and \$1 per hour.

Wide differences in the types of products manufactured by these plants obscure any variations in levels of earnings which may be associated with such factors as location and size of plant. Since union plants and incentive systems, both of which tend to influence earnings, are decidedly the exception among the plants studied, these factors are presumably unimportant.

The workers for whom detailed earnings data were compiled received an average of 82.1 cents per hour, exclusive of extra payments for overtime and night work. Since these workers constitute a substantial proportion of the total labor force in the entire 38 plants,

this figure is believed to be a fairly accurate index of actual wage levels. The corresponding rate for male workers was a little more than 1 cent above the general average—83.5 cents per hour. The average for women was 55.6 cents.

OCCUPATIONAL DIFFERENCES IN EARNINGS

About a fourth (24.6 percent) of the workers studied in detail were classified in the 22 occupational groups which showed average earnings above \$1 per hour, exclusive of premiums for overtime and night work (table 12). The highest average was received by floor molders—\$1.196 per hour. The largest single group in this category was made up of the class A floor assemblers who earned an average of \$1.020.

TABLE 12.—Average Hourly Earnings¹ of Day-Shift Workers in Selected Occupations in Miscellaneous Metalworking-Machinery Plants, April-June 1942

Occupation and class	Per- cent of work- ers	Aver- age hour- ly earn- ings	Occupation and class	Per- cent of work- ers	Aver- age hour- ly earn- ings
All workers.....	100.0	\$0.821	Male workers—Continued.		
Male workers.....	95.2	.835	Foremen, working:		
Acetylene-burner operators.....	.4	.890	Class A.....	1.0	\$1.166
Apprentices:			Class B.....	.6	.996
First year.....	.6	.666	Class C.....	.2	.897
Second year.....	.6	.660	Gear cutters:		
Third year.....	.2	.727	Class A.....	.3	.984
Fourth year.....	.1	.791	Class B.....	.3	.800
Assemblers, bench:			Grinding-machine operators:		
Class A.....	2.7	1.040	Class A.....	1.1	.978
Class B.....	2.2	.836	Class B.....	1.4	.740
Class C.....	3.6	.719	Class C.....	.1	.663
Assemblers, floor:			Heat treaters:		
Class A.....	3.3	1.020	Class A.....	.2	.986
Class B.....	2.8	.854	Class B.....	.3	.686
Class C.....	2.6	.699	Helpers:		
Blacksmiths.....	.3	1.062	Journeyman's.....	1.2	.757
Boring-mill operators:			Machine operators'.....	2.8	.683
Class A.....	1.9	1.145	Inspectors:		
Class B.....	1.0	.914	Class A.....	.8	1.082
Broaching-machine operators.....	.2	.843	Class B.....	.6	.769
Buffers.....	.7	.693	Class C.....	.4	.581
Burrers:			Janitors.....	1.6	.625
Class B.....	.3	.712	Job setters.....	.2	1.079
Class C.....	.4	.636	Laborers.....	3.4	.638
Carpenters:			Laborers, foundry.....	.8	.680
Class A.....	.2	1.052	Lathe operators, engine:		
Class B.....	.3	.797	Class A.....	3.1	1.072
Class C.....	.1	.707	Class B.....	2.5	.866
Casting cleaners.....	.9	.740	Class C.....	.5	.663
Chippers:			Lathe operators, turret:		
Class B.....	.2	.888	Class A.....	1.8	1.031
Class C.....	.1	.563	Class B.....	1.1	.767
Coremakers, hand.....	.3	1.149	Lay-out men:		
Coremakers' helpers.....	.1	.772	Class A.....	.4	1.161
Crane followers.....	.3	.838	Class B.....	.1	.948
Crane operators.....	1.4	.841	Learners:		
Craters.....	.6	.774	Journeyman and other.....	2.7	.572
Cupola tenders.....	.1	.898	Machine operators.....	4.1	.606
Drill-press operators:			Machinists:		
Class A.....	1.4	.955	Class A.....	.5	1.021
Class B.....	1.8	.761	Class B.....	.2	.851
Class C.....	1.2	.606	Metal-saw operators.....	.3	.719
Drop-hammer operators, class			Milling-machine operators:		
A.....	.1	1.178	Class A.....	1.5	1.029
Electrician.....	.8	.933	Class B.....	1.7	.739
Elevator operators.....	.1	.820	Millwrights.....	.6	.938
Firemen, stationary boiler.....	.3	.799	Molders:		
Flask and pattern carriers.....	.1	.770	Bench.....	.1	1.044
			Floor.....	.6	1.196

See footnotes at end of table.

TABLE 12.—Average Hourly Earnings¹ of Day-Shift Workers in Selected Occupations in Miscellaneous Metalworking-Machinery Plants, April-June 1942—Continued

Occupation and class	Per- cent of work- ers	Aver- age hour- ly earn- ings	Occupation and class	Per- cent of work- ers	Aver- age hour- ly earn- ings
Male workers—Continued.			Male workers—Continued.		
Molders—Continued.			Time clerks.....	1.0	\$0.681
Helpers.....	0.1	.723	Tool and die makers.....	1.5	1.129
Packers.....	.7	.730	Tool-grinder operators.....	.4	.962
Painters:			Truck drivers.....	.3	.794
Brush.....	.9	.723	Truckers:		
Dip.....	.1	.840	Hand.....	.9	.606
Spray.....	.3	.766	Power, inside.....	1.1	.782
Patternmakers, wood.....	.8	1.149	Watchmen.....	1.6	.692
Pipefitters.....	.3	.982	Welders, hand:		
Planer operators.....	2.9	1.054	Class A.....	.8	.973
Platers.....	.2	.970	Class B.....	.6	.798
Punch-press operators:			Welders, machine.....	.1	.951
Class A.....	.2	.893	Winders, class A.....	.1	.977
Class B.....	.2	.722			
Repairmen, machine.....	.5	.944	Female workers.....	4.8	.566
Sandmixers, machine.....	.1	(?)	Assemblers, bench:		
Screw-machine operators:			Class B.....	.8	(?)
Class A.....	.5	1.061	Class C.....	1.7	(?)
Class B.....	.5	.794	Drill-press operators, class C.....	.5	(?)
Class C.....	.4	.700	Grinding-machine operators,		
Shake-out men.....	.1	.673	class B.....	.1	(?)
Shaper operators.....	1.4	.871	Inspectors, class C.....	.7	.492
Sheet-metal workers:			Learners, machine operators		
Class A.....	.2	(?)	and other.....	.2	(?)
Class B.....	.3	.852	Packers.....	.2	(?)
Solderers, class B.....	.1	.888	Punch-press operators, class C.....	.1	(?)
Stock clerks.....	3.4	.700	Winders:		
Testers, class A.....	.1	.935	Class A.....	.2	(?)
Thread-milling-machine opera- tors.....	.1	1.060	Class B.....	.3	(?)

¹ Averages are based on actual earnings exclusive of extra payments for overtime.

² Number of plants and/or workers too small to justify the computation of an average.

With the exception of some groups of learners and apprentices, only 2 groups of male workers showed averages below 60 cents per hour. These were the class C chippers and class C inspectors which together formed only half of 1 percent of the total studied.

Class C inspectors constituted the only group of woman workers for which the data were sufficiently adequate to warrant the computation of an average. Their rate of 49.2 cents per hour was about 6 cents per hour below the average for all women whose earnings were studied in detail.

Chapter XI.—EARNINGS IN MANUFACTURE OF FOOD-PRODUCTS MACHINERY

Summary

In the summer of 1942, over two-thirds of the 63 plants included in this survey reported that their production had high priority ratings, and of these, 17 were manufacturing war materials. Sixteen plants, mostly the larger ones, were devoting 90 percent or more of their facilities to war production. In general, only minor technological changes appear to have been necessary.

Employment in the plants in this industry more than doubled between August 1939 and the summer of 1942, and average hourly earnings increased 17.8 cents (from 67.3 to 85.1 cents) per hour during the same period. This increase, however, was partly a result of additional overtime payments involved in the lengthening of the average workweek by over 8 hours; the actual increase in rates is estimated at about 11 cents an hour. On the basis of size of plant, hourly earnings varied from 77.4 cents in plants with 51 to 250 workers to 91.9 cents in those with 251 or more employees. Wages in the North Central region were about 6 cents per hour higher than in the Northeast. The industry is concentrated in these two sections.

About a seventh of the male workers for whom detailed earnings data were compiled were in occupations with average hourly earnings in excess of \$1 per hour; approximately a sixth were in groups averaging less than 60 cents an hour. Plants in small cities had about the same wage rates as those in the larger centers.

Scope of Survey

Reports of the latest Census of Manufactures (1939) show that in the United States 379 plants were "primarily engaged in the manufacture of machinery for use by the food-products and beverage industries in the preparation, canning, or packaging of foods."⁶ Of this total, 118 establishments reported fewer than 6 wage earners, and were excluded from the scope of this survey. The remaining 261 plants employed an average of 13,648 workers during 1939, and approximately a fourth were working in the 63 establishments included in this study. Somewhat less than half the plants (44.9 percent) and nearly three-fifths (56.0 percent) of the employees were found in the North Central States, with the heaviest concentration in Illinois and Ohio. Most of the remainder of the industry was in the Northeast, with New York the most important single State. This northeastern area included about a third of the industry's plants and employees. The earnings data shown in this report are based, in most instances, on a representative pay-roll period during May, June, or July 1942.

⁶ Census Industry No. 1751.

Characteristics of the Industry

TYPE OF PRODUCT

The types of machinery produced in this industry vary widely. The more important items of equipment (each type in itself often including impressive numbers and varieties of machines) are baking, dairy, bottlers', grain-mill, canning, ice-cream-making, and meat-packing machinery. To these products can be added an important group of small slicing, mixing, whipping, and food-chopping machines. It may be noted, however, that about a fifth of the national output of food-products machinery, parts, and equipment made in 1939 was in the form of secondary products of other industries.

PRODUCTION OF WAR MATERIALS

During 1940, the use of facilities in defense production was not a factor of any importance in this industry. By the end of that year, only 2 out of a sample of 63 plants were producing materials directly connected with the defense program; in 1941, the figure had increased to 6 plants, 1 of which was employing over 75 percent of its facilities in war work; in the same year 32 plants were given high priority ratings.

By the summer of 1942, 17 plants were manufacturing direct war materials, and the production of over two-thirds of the plants surveyed had some connection with defense. Of this group, 9 plants were devoting between 50 and 90 percent, and 16 plants 90 percent or more, of their facilities to war production. A greater percentage of the large than of the small plants appear to be employing substantial proportions of their facilities on war work; of the 9 plants with more than 250 workers included in the survey, war production absorbed over 50 percent of output by value in the case of 5.

For the most part, the plants in this industry employed their regular facilities to produce war materials, although some conversion proved to be necessary. The articles being produced varied widely from the usual output, and included ordnance supplies, tank turrets, aircraft-gun parts, gun mounts, and truck parts. The striking examples of conversion included one plant which changed its output from dairy equipment to radio-transmitter antennas, another from bakery equipment to shells, and a third from canning equipment to marine condensers.

THE LABOR FORCE

Detailed earnings data were compiled for about 70 percent of all the workers employed in the plants studied; this group amounts to between 80 and 90 percent of those on day shifts. A third (33.4 percent) of the employees for whom wage and occupational data were collected may be classified as skilled, 43.6 percent were doing semiskilled work, and the remaining 23 percent were unskilled workers.

The food-machinery plants included in this survey employed slightly smaller percentages of unskilled workers than are found in most of the establishments in related machinery-manufacturing industries.

This variation is probably due, at least in part, to the predominance of small plants in this industry and to the consequent lack of emphasis on mass-production techniques.

At the time the present survey was made, women, aside from office personnel, constituted less than 4 percent of the factory workers studied. All of the 315 women listed were found in 8 plants, where they comprised 12 percent of the total working force. Most of them were working as bench assemblers, drill-press operators, inspectors, and winders. One firm employed 4 women as hand coremakers.

Negroes were employed in 14 plants in which they constituted 3.8 percent of all employees; they accounted for 1.5 percent of total employment in the 63 plants studied. Three-fifths of all the Negroes found were working in 2 Ohio plants. Their principal occupations were as laborers and janitors, although the one plant which employed two-fifths of the Negroes included in this survey reported their being engaged as foundry workers, shake-out men, and coremakers' and molders' helpers.

Only 11 of the 63 plants included in this survey had agreements with nationally affiliated unions. Seven of these union agreements were with the American Federation of Labor and 4 with the Congress of Industrial Organizations. In addition, there were independent labor unions in 7 plants. The 45 remaining plants in the survey were not unionized. Unions were found in plants of all sizes, but there were only 6 organized plants in the group of 29 with fewer than 50 employees each. Of the 9 plants with over 250 workers each, 4 were unionized, and these employed over half the workers in all plants of that size group. None of the 4 southern plants included in the survey had an agreement with a national union.

METHOD OF WAGE PAYMENT

Largely because of the lack of standardization resulting from the wide variety of products manufactured in this industry, all of the 23 plants with fewer than 50 workers paid on a straight hourly rate basis; this method also applied to all but 1 of the plants with fewer than 100 employees. In the 63 plants as a group, however, about a sixth (16 percent) of the workers were paid under some incentive system. In the 10 plants which made use of such systems—and in which almost a half (47 percent) of the workers in all the plants studied were employed—about a third (35 percent) were paid on an incentive basis.

Two-fifths (28) of the establishments paid no extra overtime rates in excess of the statutory requirements, i. e., time and a half for all work over 40 hours a week. Thirty-one plants paid the same rate for work in excess of 8 hours in 1 day, and in 12 plants this rate was paid for all Saturday work. Eight establishments paid on this same basis for holiday work, and 10 paid time and a half for Sunday operation. In one case, time and a half was paid for all work before or after regular working hours. Double-time rates were effective on Sunday in 10 establishments; in 7 cases the same rate applied on holidays.

Of the 63 plants studied, 24 operated on a single-shift basis, 25 operated 2 shifts, while 14 reported 3 shifts (table 13). In the group of 25 plants reported as operating 2 shifts, 6 paid no shift differential, 5 paid 5 cents, and 9 gave a bonus which amounted to about 10 cents per hour. One firm paid an 8-hour rate for a 7.5-hour second shift;

another gave second-shift workers a \$25 war bond each second month. Fourteen establishments worked both a second and a third shift, 5 of which paid no shift differential. Six plants paid the same bonus for both shifts—one of 3 cents, four of approximately 5 cents, and one of 10 percent above the regular rate.

TABLE 13.—*Wage Differentials for Second and Third Shifts in Food-Products-Machinery Plants, May–July 1942*

Number of shifts worked	Number of plants	Differentials paid for—	
		Second shift	Third shift
Plants with 1 shift only.....	24		
Plants with 2 shifts.....	6	No differential.....	
	5	5 cents per hour.....	
	5	10 percent over base rate.....	
	3	10 cents per hour.....	
	1	8 hours' pay for 7.5 hours' work.....	
	1	2½ to 5 cents per hour.....	
	1	\$25 war bond each 2 months.....	
	1	1 hour additional pay.....	
	1	10 percent over base rate, with a 10-cent maximum.....	
Plants with 3 shifts.....	1	11½ percent over base rate.....	No differential.
	5	No differential.....	5 cents per hour.
	3	5 cents per hour.....	3 cents per hour.
	1	3 cents per hour.....	10 cents per hour.
	1	5 cents per hour.....	5 percent over base rate.
	1	5 percent over base rate.....	7½ percent over base rate.
	1	do.....	10 percent over base rate.
	1	10 percent over base rate.....	15 percent over base rate.
	1	do.....	

Employment, Hours, and Earnings

TREND FROM 1939 TO 1942

Comparable data on employment for selected periods in 1939–42 are available for 57 of the 63 plants studied. Employment in these establishments more than doubled during this period—the increase was from 3,128 in August 1939 to 6,342 in May–July 1942 (table 14). Average hourly earnings (including extra overtime payments), which amounted to 67.3 cents in August 1939, had increased to 85.1 cents by May–July 1942, a gain of 17.8 cents.

During the same period, the average workweek in these plants had lengthened 8.4 hours, from 40.6 to 49.0, a change which progressively inflated hourly rates by increased premiums for overtime. The elimination of such extra payments is estimated to reduce the average hourly earnings for the latest period by 8 cents, or to about 76.9 cents. Exclusive of the effect of premium overtime payments, hourly rates increased by an estimated 11.7 cents, or nearly 18 percent, during the 3-year period. The 6 plants for which comparable data covering the earlier periods were not available employed nearly 600 workers, but the addition of wage data for these plants reduces the average hourly earnings for the latest period by only 0.4 cent.

TABLE 14.—*Employment, Average Hourly Earnings and Weekly Hours of Workers in 57 Food-Products-Machinery Plants for Specified Periods, 1939-42*

Year and month	Total wage earners ¹	Average hourly earnings	Estimated average hourly earnings, exclusive of extra overtime earnings	Average weekly hours
August 1939.....	3, 128	\$0. 673	\$0. 652	40. 6
April 1940.....	3, 675	. 675	. 652	41. 0
August 1940.....	3, 767	. 685	. 654	42. 5
February 1941.....	4, 171	. 715	. 680	43. 0
August 1941.....	5, 198	. 770	. 719	45. 0
May-July 1942.....	6, 342	. 851	. 769	49. 0

¹ Data for 5 companies used with reduced weight to avoid overrepresentation of large plants.

PLANT AVERAGES

Nearly a third (20) of the plants surveyed showed average hourly earnings, including extra payments for overtime, of 90 cents or more, and, of these, 7 widely scattered establishments had an average of \$1 or more. At the other extreme there were 11 plants which showed average hourly earnings below 65 cents; of the 31 plants surveyed in the North Central region, only 2 fell in this group, while slightly over a fourth of those in the Northeast and 3 of the 4 Southern plants were in this category.

Although there is a tendency for average hourly earnings to vary directly with plant size, the relationship is not uniform in this industry. Thus, average earnings in plants employing over 250 workers were 11.4 cents above the average of 80.5 cents per hour in plants with fewer than 51 workers, but in plants having between 51 and 250 employees, the rate was 77.4 cents, or about 3 cents below earnings in the smaller plants. This fact is probably due in part to the organization of many of the small plants on a job basis in which higher proportions of skilled workers are employed. This tendency for medium-sized plants to pay less than the smaller ones was marked only in the North Central States. The apparent wage advantage of workers in the largest plants was, of course, due in part to the prevalence of incentive payment among such plants.

While the combined average (87.4 cents) for the 31 plants in the North Central region was 5 cents above the rate of 82.4 cents per hour for the 22 plants in the Northeast, this difference cannot be considered as conclusive. Such variations in regional rates are obscured by other and more important factors in an industry extremely heterogeneous with respect to products, methods of plant operation, and systems of wage payment. Allowance should also be made for the fact that of the 11 unionized plants included in the survey only 2 were in the Northeastern States.

OCCUPATIONAL DIFFERENCES IN EARNINGS

Occupational averages for male workers (excluding apprentices) in the manufacture of food-products machinery ranged from 47.4 cents for class C burrs for \$1.168 for class A hand coremakers, excluding premiums for overtime and night work (table 15). The

general hourly average for all workers in the occupations studied in detail was 77.3 cents; if woman workers are not included, the figure is raised to 77.8 cents.

TABLE 15.—Average Hourly Earnings ¹ of Day-Shift Workers in Selected Occupations in Food-Products-Machinery Plants, by Regions, May-July 1942

Occupation and class	Northeastern and North Central States		Northeastern States		North Central States	
	Number of workers	Average hourly earnings	Number of workers	Average hourly earnings	Number of workers	Average hourly earnings
All workers.....	4,394	\$0.773	1,938	\$0.737	2,456	\$0.801
Male workers.....	4,324	.778	1,912	.741	2,412	.809
Acetylene-burner operators.....	8	.760	8	.760		
Apprentices, first year.....	44	.463	19	.406	25	.507
Apprentices, second year.....	27	.566	10	.465	17	.631
Apprentices, third year.....	16	.608	10	.557	6	.690
Apprentices, fourth year.....	3	(²)	2	(²)	1	(²)
Assemblers, bench, class A.....	89	.914	39	.900	50	.925
Assemblers, bench, class B.....	114	.762	59	.725	55	.802
Assemblers, bench, class C.....	111	.582	60	.531	51	.636
Assemblers, floor, class A.....	150	1.021	39	.970	111	1.039
Assemblers, floor, class B.....	172	.787	66	.750	106	.811
Assemblers, floor, class C.....	142	.592	47	.598	95	.589
Blacksmiths.....	19	1.016	8	.823	11	1.172
Boilermakers.....	9	(²)	9	(²)		
Boring-mill operators, class A.....	54	1.063	21	1.123	33	1.024
Boring-mill operators, class B.....	32	.785	16	.845	16	.726
Broaching-machine operators.....	5	(²)	1	(²)	4	(²)
Buffers.....	72	.766	10	.776	62	.764
Burrers, class B.....	14	.588	4	.715	10	.535
Burrers, class C.....	21	.474	13	.474	8	.474
Carpenters, class A.....	6	(²)	3	(²)	3	(²)
Carpenters, class B.....	26	.775	18	.779	8	.767
Carpenters, class C.....	21	.661	19	.668	2	.599
Casting cleaners.....	12	1.056	1	(²)	11	1.098
Chippers, class B.....	17	.797	2	(²)	15	.776
Chippers, class C.....	10	.547	10	.547		
Coremakers, hand, class A.....	23	1.168			23	1.168
Coremakers' helpers.....	5	.706			5	.706
Crane followers.....	5				5	(²)
Crane operators.....	20	(²)	2	(²)	18	.841
Craters.....	47	.733	21	.642	26	.807
Cupola tenders.....	7	(²)			7	(²)
Cupola tenders' helpers.....	6	(²)			6	(²)
Drill-press operators, class A.....	65	.903	34	.925	31	.878
Drill-press operators, class B.....	89	.715	51	.718	38	.712
Drill-press operators, class C.....	74	.588	45	.582	29	.597
Electricians, class A.....	25	.943	14	.856	11	1.055
Firemen, stationary boiler.....	9	.700	4	.608	5	.774
Foremen, working, class A.....	49	1.167	20	1.144	29	1.166
Foremen, working, class B.....	25	.942	3	.858	22	.953
Foremen, working, class C.....	12	.758	3	.720	9	.772
Gear cutters, class A.....	5	.992			5	.992
Gear cutters, class B.....	3	(²)	1	(²)	2	(²)
Grinding-machine operators, class A.....	27	1.019	12	1.050	15	.996
Grinding-machine operators, class B.....	34	.696	17	.690	17	.701
Grinding-machine operators, class C.....	11	.577			11	.577
Helpers, journeymen's and other.....	66	.662	22	.691	44	.650
Helpers, machine operators'.....	80	.659	46	.645	34	.678
Inspectors, class A.....	24	.978	11	.954	13	1.000
Inspectors, class B.....	19	.794	8	.741	11	.838
Inspectors, class C.....	23	.534	19	.505	4	.654
Janitors.....	73	.550	26	.514	47	.570
Job setters.....	28	.965	22	.934	6	1.069
Laborers.....	167	.590	79	.592	88	.588
Laborers, foundry.....	33	.723			33	.723
Lathe operators, engine, class A.....	137	.955	67	.930	70	.978
Lathe operators, engine, class B.....	129	.768	56	.733	73	.796
Lathe operators, engine, class C.....	32	.701	31	.709	1	(²)
Lathe operators, turret, class A.....	58	1.002	28	.998	30	1.007
Lathe operators, turret, class B.....	63	.756	36	.704	27	.827
Lathe operators, turret, class C.....	8	.658	8	.658		
Lay-out men, class A.....	20	.944	4	1.050	16	.917
Lay-out men, class B.....	4	(²)	1	(²)	3	(²)

See footnotes at end of table.

TABLE 15.—Average Hourly Earnings¹ of Day-Shift Workers in Selected Occupations in Food-Products-Machinery Plants, by Regions, May-July 1942—Continued

Occupation and class	Northeastern and North Central States		Northeastern States		North Central States	
	Number of workers	Average hourly earnings	Number of workers	Average hourly earnings	Number of workers	Average hourly earnings
Male workers—Continued.						
Learners, journeymen and other.....	64	\$0.527	44	\$0.498	20	\$0.591
Learners, machine operators.....	156	.554	94	.528	62	.594
Machinists, class A.....	76	.991	35	.925	41	1.045
Machinists, class B.....	69	.837	41	.823	28	.859
Metal-saw operators.....	20	.662	9	.654	11	.669
Milling-machine operators, class A.....	47	.992	26	1.001	21	.982
Milling-machine operators, class B.....	70	.741	49	.739	21	.745
Millwrights.....	27	.786	12	.815	15	.762
Molders, bench.....	21	1.002			21	1.002
Molders, floor.....	44	1.120			44	1.120
Molders' helpers.....	10	.679			10	.679
Molders, machine, class A.....	9	(?)			9	(?)
Packers.....	23	.610	20	.602	3	.663
Painters, brush.....	42	.696	16	.690	26	.713
Painters, spray.....	45	.770	31	.716	14	.892
Patternmakers, wood.....	28	.999	16	.924	12	1.097
Pipefitters.....	6	(?)	3	(?)	3	(?)
Planer operators.....	37	.951	16	.946	21	.955
Platers.....	10	.968	7	.946	3	1.029
Power-shear operators.....	9	.781	1	(?)	8	.816
Punch-press operators, class A.....	12	.662	3	.533	9	.906
Punch-press operators, class B.....	16	.746	10	.655	6	.890
Punch-press operators, class C.....	12	.654	6	.583	6	.724
Repairmen, machine.....	3	(?)	1	(?)	2	(?)
Riveters, pneumatic.....	5	(?)	1	(?)	5	(?)
Sand blasters.....	7	.648	1	(?)	6	.626
Sand mixers, machine.....	5	.745			5	.745
Screw-machine operators, class A.....	10	.998	2	(?)	8	.948
Screw-machine operators, class B.....	9	.783	1	(?)	8	.792
Screw-machine operators, class C.....	6	.613			6	.613
Shake-out men.....	13	.704			13	.704
Shaper operators.....	21	.872	8	.841	13	.892
Sheet-metal workers, class A.....	70	1.049	22	.995	48	1.073
Sheet-metal workers, class B.....	54	.751	26	.748	28	.755
Stock clerks.....	161	.671	63	.665	99	.674
Time clerks.....	21	.634	12	.535	9	.754
Tool and die makers.....	78	1.097	43	1.095	35	1.010
Tool-grinder operators.....	12	.817	4	.873	8	.788
Truck drivers.....	16	.716	7	.631	9	.786
Truckers, hand.....	23	.507	7	.475	16	.521
Watchmen.....	65	.588	26	.573	39	.598
Welders, hand, class A.....	70	.954	34	.942	36	.965
Welders, hand, class B.....	102	.759	32	.759	70	.759
Welders, machine.....	10	.962			10	.962
Woodworkers.....	11	.727			11	.727
Female workers	70	.438	26	.510	44	.396
Assemblers, bench, class C.....	18	.407	7	.464	11	(?)
Drill-press operators, class C.....	12	.549	11	(?)	1	(?)
Inspectors, class C.....	21	.446	8	.494	13	.416
Winders.....	19	(?)			19	(?)

¹ Averages are based on actual earnings exclusive of extra payments for overtime.

² Number of plants and/or workers too small to justify the computation of an average.

Twelve male occupational groups showed averages of \$1 or more per hour; these groups, comprising slightly more than 600 workers, include about a seventh (13.8 percent) of the total employees and over two-fifths (41.4 percent) of the skilled workers for whom detailed occupational data were compiled. By far the largest group earning an average of \$1 or more were the class A floor assemblers. Twelve occupational groups (excluding learners and apprentices), which include a sixth (16.7 percent) of the total workers, averaged less than

60 cents an hour. Of these, four groups of male workers were receiving under 55 cents, one of these groups—class C burrs—averaged less than 50 cents per hour.

As already stated in connection with general plant averages, any comparison of wage rates on a regional basis is not entirely conclusive because of variations in other characteristics of the industry. The several factors, the precise influence of which cannot be stated on the basis of the data available, may be of greater importance than the small difference in average hourly earnings between the North Central and Northeastern States.

Despite the fact that there was no uniformity among the individual occupations, average hourly earnings for the male workers as a group were nearly 10 percent (6.4 cents) higher in the North Central region than in the Northeast. Only 6.5 percent of the workers in the northeastern plants were found in the 6 occupational groups which showed averages of \$1 or more per hour. On the other hand, nearly a fifth (19.6 percent) of the employees in North Central plants were included in the 17 occupations for which the averages amounted to \$1 or more per hour. Averages for blacksmiths, time clerks, and class A punch-press operators were over 40 percent higher in the North Central States than in the Northeast. Of 70 occupational groups which contained sufficient numbers of workers to merit special study, the averages were higher in the North Central States for 50; for 19 of the groups the hourly earnings were over 10 cents per hour greater in that region. On the other hand, for 18 occupational groups, average earnings were higher in the Northeast; in only 3 cases, however, were the differences greater than 10 cents per hour.

Because of the extremely varied character of the industry, to which reference has already been made, there appears to be little variation in average wages between small and large cities. The influence of unionization on level of wages is also obscured by other factors. In the 10 widely scattered plants where incentive methods were in operation, average earnings were about 14 cents higher than in the remainder of the establishments where workers were paid on a straight hourly basis.

Occupational rates tended to vary with average number of workers employed per plant despite the fact that, as already noted, the relationship was by no means uniform. In order to compare occupational rates in large and small plants, it is obviously desirable to eliminate any regional wage differentials as far as possible. The data shown in table 16 are, therefore, limited to the 31 plants studied in the North Central States.

TABLE 16.—Average Hourly Earnings¹ of Day-Shift Male Workers in 31 North Central Food-Products-Machinery Plants, by Occupation and Size of Plant, May-July 1942

Occupation and class	Plants employing—			
	250 workers or less		Over 250 workers	
	Number of workers	Average hourly earnings	Number of workers	Average hourly earnings
Assemblers, bench, class A	25	\$0.938	25	\$0.911
Assemblers, bench, class B	30	.824	25	.774
Assemblers, bench, class C	42	.631	14	.651
Assemblers, floor, class A	46	.834	65	1.186
Assemblers, floor, class B	53	.710	53	.912
Assemblers, floor, class C	59	.564	36	.650
Buffers	17	.991	45	.678
Drill-press operators, class A	20	.825	11	.978
Drill-press operators, class B	24	.655	15	.805
Helpers, machine operators ¹	20	.600	14	.794
Janitors	27	.650	20	.698
Laborers	37	.617	51	.640
Lathe operators, engine, class A	44	.941	26	1.041
Lathe operators, engine, class B	56	.757	17	.867
Lathe operators, turret, class A	19	.989	11	1.037
Lathe operators, turret, class B	17	.825	10	.830
Learners, machine operators	37	.526	25	.695
Milling-machine operators, class A	12	.972	10	.995
Sheet-metal workers, class A	28	1.053	20	1.102
Stock clerks	68	.643	34	.677
Tool and die makers	20	1.019	15	1.212
Welders, hand, class A	27	.911	9	1.135
Welders, hand, class B	25	.823	45	.723

¹ Averages are based on actual earnings exclusive of extra payments for overtime.

The numbers of workers in many of the occupational groups are insufficient to permit any reliable comparison of rates within this region. There are, however, 23 groups which are believed to be adequate for this purpose. In 19 of these occupations, the average earnings of workers in the small plants are lower than the rates in the larger establishments. In 8 of the occupational groups for which comparisons are possible, the difference amounts to 15 cents or more per hour; there is a difference of 35 cents in the case of class A floor assemblers. In the 4 cases in which higher rates are paid in the smaller plants, the differences in 2—class A and B bench assemblers—amount to only a few cents. In the other 2 cases—buffers and class B hand welders—the rates are, respectively, 31 cents and 10 cents lower in the larger plants.

Only three occupational groups contained enough woman workers to warrant the computation of an average. Of these, the highest rate was for class C drill-press operators with a rate of 54.9 cents an hour (table 15). Class C inspectors were paid 44.6 cents per hour, and class C bench assemblers 40.7 cents. In the Northeastern States woman workers as a group received a considerably higher average wage than in the North Central States.

Chapter XII.—EARNINGS IN MANUFACTURE OF MECHANICAL POWER-TRANSMISSION EQUIPMENT

Summary

During the spring of 1942, 32 of the 45 plants included in this survey were either producing war materials or operating under high priority ratings; over two-fifths of all the plants studied were using more than 90 percent of their facilities in the war effort. Little technological conversion was necessary. Nearly half the plants studied were operating 3 shifts, and virtually four-fifths were working at least 2 shifts.

The number of persons employed in these plants during the spring of 1942 was about two and one-half times the figure for August 1939, and average hourly earnings increased 17 cents—from 73.1 cents to 90.1 cents per hour—during the same period. The lengthening of the average workweek by over 10 hours resulted in some inflation of average hourly earnings, however, because of extra payments for overtime; the actual increase in hourly rates is estimated at about 10 cents.

More than a fourth of the male workers studied were in the 19 occupations with average hourly earnings in excess of \$1.00 per hour; of the total male skilled workers, three-fourths were in these occupations. Aside from apprentices, helpers, and learners, the only occupational groups with average earnings below 60 cents per hour were class C chippers and class C engine-lathe operators; these occupations include less than 1 percent of the male employees studied.

Substantial variations in average hourly earnings were found between plants in different geographic regions; plants in small and large communities showed little variation in earnings levels. Woman workers averaged 56.7 cents per hour.

Scope of Study

Reports of the latest Census of Manufactures (1939) show that there were, in the United States, 218 establishments "primarily engaged in the manufacture of mechanical power-transmission equipment such as ball and roller bearings, gears made for sale separately, drives, shafts, etc." Of this total, 34 establishments reported an average of fewer than 6 wage earners, and were excluded from the scope of this study. The remaining 184 plants employed an average of 30,174 workers during 1939, and over a third were working in the 45 establishments included in this survey.

The manufacture of mechanical power-transmission equipment is characterized by a high degree of concentration, both geographically and by plant size. During 1939, slightly over two-thirds (66.1 percent) of the wage earners and nearly two-fifths (39.9 percent) of the plants were in the 4 States of Connecticut, Pennsylvania, Ohio, and Indiana. Slightly less than a half (45.9 percent) of the plants and somewhat more than half the workers (53.7 percent) were found in the Middle Atlantic and New England States; of the workers in this

northeastern region, one-half (50.0 percent) were found in Connecticut. Most of the remainder of the industry is in the East North Central region, with Ohio the leading State. This area included about two-fifths (42.7 percent) of the industry's plants and about the same proportion (41.4 percent) of the wage earners. The earnings data shown in this report are based, in most instances, on a representative pay-roll period during March, April, or May 1942.

Characteristics of the Industry

Type of product.—The production of ball and roller bearings and parts accounts for the major part of the output of this industry; in 1939, these items of equipment constituted nearly two-thirds (64.2 percent) by value of the entire output of the industry. The production of chain drives and gears was also important; other items were speed reducers, variable-speed drives, and parts and attachments. The plants studied are characterized by a high degree of specialization in manufacturing individual types of equipment used throughout the machinery trades. Of the total production of mechanical power-transmission equipment, nearly seven-eighths (86.6 percent) was produced by specialized companies leaving about one-eighth (13.4 percent) as the output of plants primarily engaged in other types of manufacturing. On the other hand, of the total output of plants producing mechanical power-transmission equipment mainly, about 5 percent consisted of products not classified in the industry.

Production of war materials.—Conversion of facilities to war production appears not to have been a major factor in this industry. Any shift on a wide scale would, indeed, hardly be expected, since the industry's peacetime products are used in great volume by plants producing war materials directly. Thus, the impact of the war on the mechanical power-transmission equipment industry has resulted chiefly in a great expansion without drastic changes in types of product.

In 1940 direct production of munitions and other defense materials was not a factor of much importance in this industry. By the end of that year only 2 of the 45 plants surveyed were producing materials directly connected with the defense program. This figure did not increase in 1941, but in that year 29 plants were given high priority ratings, as compared with 19 plants in 1940. In 1942, 1 of the 3 plants engaged in the production of direct war materials was using all of its facilities for war purposes; at the same time, 29 other establishments were operating under high priority ratings, owing to the importance of their regular products. In the case of 21 of these 32 plants, over 90 percent of output in the spring of 1942 consisted of either direct war materials or products made under high priority ratings. Only 13 plants reported no production directly connected with the war.

The labor force.—Detailed earnings data were compiled for about 70 percent of all the workers employed in the plants surveyed; this group amounts to between 80 and 90 percent of those on day shifts. Slightly over a third (36 percent) of the males for whom wage and occupational data were collected were working at skilled jobs, 40 percent were doing semiskilled work, and the remaining 24 percent were unskilled.

At the time the present survey was made, women constituted nearly a fifth (18.3 percent) of the factory workers. However, over 80 percent of all the female workers in the plants surveyed were found in 3 large establishments; in one very large plant about a third of the employees were women. About a third of the women in these 3 large establishments were working as class C inspectors in bearing departments. Other occupations in which female employees were found in substantial numbers were class B and C bench assemblers, learners, packers, and punch-press operators, class C. Nearly three-fourths (74.1 percent) were doing unskilled work, and a fourth (25.2 percent) were classified as semiskilled; in all the plants surveyed, only 13 woman workers out of a total of 1,884 studied were doing skilled work.

Negroes were employed in 10 plants, but they constituted only 1.4 percent of all employees in the plants surveyed; nearly three-fourths of the 381 Negroes found were working in 1 large midwestern plant. As in the case of many other industries, their principal occupations were those of laborers and janitors; one plant reported substantial numbers employed as heat treaters' helpers.

Eleven of the 45 plants included in this survey had agreements with nationally affiliated unions. Six of these agreements were with unions affiliated with the American Federation of Labor, and 5 with unions affiliated with the Congress of Industrial Organizations. In addition, there were independent labor unions in 4 plants, 3 of which were in large cities. The remaining 30 plants were unorganized. Union agreements were seldom found in small plants; of the 15 plants with fewer than 51 employees, only 2 were organized and all the establishments employing between 51 and 100 workers each were unorganized. In the 14 plants having over 250 workers each, the 8 that were unionized employed slightly more than half the workers in all plants in that size group.

Method of wage payment.—Widespread use of incentive methods of wage payment was found in the plants manufacturing mechanical power-transmission equipment, since many of the products are highly standardized and produced by means of mass-production techniques.

A third (15) of the plants surveyed made use of some incentive system, and somewhat over a fourth (28.2 percent) of the workers studied were paid on the basis of output. In the 25 plants employing fewer than 100 workers, all but 3 establishments paid on a straight hourly basis. Six of the 12 plants employing between 100 and 500 workers used some form of incentive system, as compared with 6 of the 8 establishments with over 500 workers; in plants of this size group, about a third (32.6 percent) of the workers were paid according to output.

A third (15) of the plants paid no extra overtime rates beyond minimum statutory requirements, i. e., time and a half for all work above 40 hours a week. Twenty-five plants also applied this rate to work in excess of 8 hours in 1 day. Nine plants paid time and a half for all Saturday work and 1 applied this rate after noon on that day. Nine establishments paid on this same basis for Sunday work, and 6 for holiday operation. In but one instance was double time paid for Saturday work, and in this case it applied only to the afternoon. This higher rate was effective for Sunday work in 11 establishments and in 6 cases double compensation applied on holidays.

The demand for the industry's products by war establishments has resulted in a rather high degree of utilization of the facilities of these plants making mechanical power-transmission machinery. Thus, nearly half (19) of the plants surveyed were operating 3 shifts, and practically four-fifths were working at least 2 shifts (table 17). In the group of 16 plants reported as operating 2 shifts, 8 paid no shift differential and 6 paid premiums of 5 to 10 cents per hour; 1 paid second-shift workers 4 cents per hour extra plus a paid 30-minute lunch period. Of the 19 plants operating 3 shifts, 6 paid no premium to workers on either late shift. Nine establishments paid the same bonuses to workers on both late shifts; the premiums in these plants ranged from about 4 cents per hour to 10 percent of base rates. Four plants paid additional differentials for the third shift, workers on the "graveyard" shift receiving 4 or 5 cents an hour, or 5 percent of the base rate, more than those on the second shift.

TABLE 17.—*Wage Differentials for Second and Third Shifts in 45 Mechanical Power-Transmission-Equipment Plants, March-May 1942*

Number of shifts worked	Number of plants	Differential paid for—	
		Second shift	Third shift
Plants with 1 shift only.....	10		
Plants with 2 shifts.....	8	No differential.....	
	4	5 cents per hour.....	
	1	8 cents per hour.....	
	1	4 cents per hour plus paid lunch period.....	
	1	10 percent over base rate.....	
	1	1 hour's pay extra.....	
Plants with 3 shifts.....	6	No differential.....	No differential.
	5	5 percent over base rate.....	5 percent over base rate.
	2	10 percent over base rate.....	10 percent over base rate.
	2	5 cents per hour.....	5 cents per hour.
	2	5 percent over base rate.....	10 percent over base rate.
	1	5 cents per hour.....	10 cents per hour.
	1	4 cents per hour.....	8 cents per hour.

Employment, Hours, and Earnings

TREND FROM 1939 TO 1942

Comparable data on employment for selected periods, 1939-42, are available for 39 of the 45 plants included in the survey. Employment in these establishments as a group in the spring of 1942 was about two and one-half times the figure for August 1939; the increase was from 6,461 workers to 15,704 (table 18). Average hourly earnings, which in August 1939 amounted to 73.1 cents (including extra payments for overtime and night work), had increased to 90.1 cents by March-May 1942, a gain of 17 cents.

TABLE 18.—*Employment, Average Hourly Earnings and Weekly Hours of Workers in 39 Mechanical Power-Transmission-Equipment Plants for Specified Periods, 1939-42*

Year and month	Total wage earners ¹	Average hourly earnings	Estimated average hourly earnings exclusive of extra overtime earnings	Average weekly hours
August 1939.....	6,461	\$0.731	\$0.713	39.4
April 1940.....	8,208	.748	.719	41.7
August 1940.....	9,032	.763	.719	44.0
February 1941.....	11,356	.813	.745	47.2
August 1941.....	13,458	.865	.785	48.5
March-May 1942.....	15,704	1.901	1.811	49.6

¹ Data for 2 companies used with reduced weight to avoid overrepresentation of large plants.

² Inclusion of the data from the 6 plants for which comparable information covering the earlier periods is not available would raise average earnings by less than 1 cent per hour.

During the same period, the average workweek in these plants had lengthened 10.2 hours, a change which progressively inflated hourly rates as a result of increased premiums for overtime. The elimination of such extra payments is estimated to reduce average hourly earnings for the latest period by 10 cents, or to about 81.1 cents. Exclusive of the effect of extra overtime payments, hourly rates increased by an estimated 9.8 cents, or 14 percent, during the period. The plants for which comparable data covering the earlier periods were not available employed 6,883 workers; the addition of wage data for these plants increases average hourly earnings for the latest period by only 0.8 cent.

PLANT AVERAGES

Average hourly earnings, including extra payments for overtime and night work, amounted to 90.9 cents for the entire 45 plants studied. For more than a third (16) of the establishments, the figure was 90 cents or more, and average hourly earnings were over \$1.00 in 10 plants; of the 21 plants surveyed in the Northeastern States, only 3 showed hourly averages of \$1.00 or more, while nearly a third (7 out of 23) of those in the North Central and Western States were in this category. At the other extreme were 8 establishments which showed average earnings below 75 cents. The averages for about half (22) of the plants in this survey were between 75 and 90 cents per hour.

OCCUPATIONAL DIFFERENCES IN EARNINGS

Average hourly earnings, exclusive of extra payments for overtime and night work, are available for 10,017 workers, who constituted the greater part of the day-shift workers in the plants surveyed. Occupational averages (excluding apprentices, helpers, and learners) in the industry ranged from less than 57 cents per hour for class C chippers and class C engine-lathe operators to \$1.246 for class A working foremen (table 19).

The general hourly average for all workers in the occupations studied in detail was 80.3 cents; this figure is 0.8 cent below the estimated average hourly earnings of 81.1 cents for the industry shown in table 18. The difference is due, at least in part, to the inclusion of shift differentials in the industry average. Average hourly earnings

for male workers amounted to 84.8 cents, or nearly 5 cents more than the combined average for both sexes. The women whose earnings were studied in detail averaged 56.7 cents per hour.

TABLE 19.—Average Hourly Earnings¹ of Day-Shift Workers in Selected Occupations in Mechanical Power-Transmission-Equipment Plants, by Region, March–May 1942

Occupation and class	United States		New England and Middle Atlantic States		North Central and Western States	
	Number of workers	Average hourly earnings	Number of workers	Average hourly earnings	Number of workers	Average hourly earnings
All workers.....	11,901	\$0.803	6,082	\$0.731	5,819	\$0.879
Male workers.....	10,017	.848	4,911	.782	5,106	.911
Apprentices, first year.....	56	.553	39	.472	17	.739
Apprentices, second year.....	41	.602	21	.636	20	.752
Apprentices, third year.....	26	.736	9	.723	17	.743
Assemblers, bench, class A.....	86	.898	37	.986	49	.831
Assemblers, bench, class B.....	173	.744	53	.822	120	.709
Assemblers, bench, class C.....	66	.761	45	.814	21	.645
Assemblers, floor, class A.....	102	1.025	76	1.056	26	.935
Assemblers, floor, class B.....	102	.807	47	.885	55	.740
Assemblers, floor, class C.....	62	.754	61	.797	11	.552
Balancing-machine operators.....	6	.830	2	(²)	4	(²)
Blacksmiths.....	6	.853	3	(²)	3	(²)
Boring-mill operators, class A.....	78	1.033	34	1.110	44	.973
Boring-mill operators, class B.....	28	.775	14	.704	14	.846
Broaching-machine operators.....	39	.779	5	.758	34	.782
Buffers.....	78	.828	27	.937	51	.770
Bulldozer operators.....	8	.781	5	(²)	3	(²)
Burrers, class B.....	23	.820	19	.815	4	(²)
Burrers, class C.....	44	.608	21	.610	23	.606
Carpenters, class A.....	9	1.069	2	(²)	7	.990
Carpenters, class B.....	13	.780	5	.860	8	.730
Carpenters, class C.....	30	.691	9	.681	21	.696
Casting cleaners.....	28	.657	10	.492	18	.748
Chippers, class B.....	10	.699	7	(²)	3	(²)
Chippers, class C.....	29	.568	14	(²)	15	.529
Coremakers, class A.....	14	.847	4	(²)	10	.860
Coremakers, class B.....	6	.773	—	—	6	.773
Coremakers' helpers.....	6	.477	4	(²)	2	(²)
Crane operators.....	29	.852	12	(²)	17	.804
Craters.....	20	.721	—	—	20	.721
Cupola tenders.....	7	.826	1	(²)	6	.848
Cupola tenders' helpers.....	18	.658	4	(²)	14	.651
Die setters.....	11	.988	10	.858	1	(²)
Drill-press operators, class A.....	55	.968	39	.973	16	.958
Drill-press operators, class B.....	142	.879	56	.976	86	.816
Drill-press operators, class C.....	57	.618	23	.678	34	.576
Electricians.....	48	.870	14	.808	34	.871
Firemen, stationary boiler.....	38	.724	14	.668	24	.756
Foremen, working, class A.....	66	1.246	38	1.213	28	1.292
Foremen, working, class B.....	54	.994	20	.930	34	1.063
Foremen, working, class C.....	29	.822	6	.718	23	.849
Gear cutters.....	154	.866	84	.953	70	.763
Gear finishers.....	13	.952	9	.981	4	(²)
Grinding-machine operators, class A.....	742	1.135	318	.869	424	1.334
Grinding-machine operators, class B.....	595	.970	277	.798	318	1.119
Heat treaters, class A.....	81	.905	21	.899	60	.908
Heat treaters, class B.....	91	.744	32	.712	59	.761
Helpers, journeymen's.....	214	.695	155	.680	59	.734
Helpers, machine operators'.....	305	.621	231	.585	74	.731
Inspectors, class A.....	175	.905	44	.920	131	.900
Inspectors, class B.....	240	.754	80	.707	160	.777
Inspectors, class C.....	288	.680	271	.679	117	.684
Janitors.....	188	.670	74	.616	114	.705
Job setters.....	262	1.099	144	1.043	118	1.168
Laborers.....	299	.625	160	.616	139	.635
Laborers, foundry.....	55	.668	—	—	55	.668
Lathe operators, engine, class A.....	199	1.080	77	1.015	122	1.121
Lathe operators, engine, class B.....	168	.801	40	.763	128	.813
Lathe operators, engine, class C.....	35	.566	20	.624	15	(²)
Lathe operators, turret, class A.....	265	1.088	112	1.074	153	1.098
Lathe operators, turret, class B.....	190	.904	83	.909	107	.900
Lathe operators, turret, class C.....	25	.743	23	.749	2	(²)
Lay-out men, class A.....	11	.996	4	(²)	7	.833
Learners, journeymen and other.....	201	.590	151	.585	50	.608
Learners, machine operators.....	290	.575	220	.567	70	.602
Machine operators, all-round.....	42	.861	16	.846	26	.871

See footnotes at end of table.

TABLE 19.—Average Hourly Earnings¹ of Day-Shift Workers in Selected Occupations in Mechanical Power-Transmission-Equipment Plants, by Region, March-May 1942—Con.

Occupation and class	United States		New England and Middle Atlantic States		North Central and Western States	
	Number of workers	Average hourly earnings	Number of workers	Average hourly earnings	Number of workers	Average hourly earnings
Male workers—Continued.						
Machinists, class A	112	\$1.057	58	\$1.052	54	\$1.063
Metal-saw operators	20	.726	7	.633	13	.775
Milling-machine operators, class A	68	1.082	35	1.044	33	1.131
Milling-machine operators, class B	81	.835	20	.942	61	.800
Millwrights, class A	71	.977	18	.871	53	1.014
Molders, bench	22	.807	7	(?)	15	.803
Molders, floor	43	.892			43	.892
Molders' helpers	21	.600	7	(?)	14	.656
Molders, machine, class A	39	.843	11	(?)	28	.879
Molders, machine, class B	36	.714	13	(?)	23	.748
Packers	104	.696	45	.687	59	.703
Painters, brush	14	.920	3	(?)	11	.934
Painters, spray	14	.741	2	(?)	12	.702
Patternmakers, wood	15	1.190	9	1.262	6	1.082
Pipefitters	28	.987	6	.867	22	1.020
Planer operators, class A	14	.974	4	(?)	10	.892
Planer operators, class B	9	.996	9	.996		
Platers	18	.795	9	.744	9	.850
Punch-press operators, class A	23	1.242			23	1.242
Punch-press operators, class B	81	1.002	46	.974	35	1.039
Punch-press operators, class C	25	.917	11	.790	14	1.020
Repairmen, machine	161	.977	78	.928	83	1.024
Sandblasters	6	.766	2	(?)	4	(?)
Screw-machine operators, class A	220	1.133	60	1.029	160	1.171
Screw-machine operators, class B	132	1.025	32	.948	100	1.050
Screw-machine operators, class C	112	.806	104	.811	8	.734
Shake-out men	24	.692	3	(?)	21	.640
Shaper operators	12	.867	6	.928	6	.801
Sheet-metal workers, class A	23	.937	2	(?)	21	.940
Sheet-metal workers, class B	12	.808	9	(?)	3	(?)
Stock clerks	406	.658	244	.618	162	.719
Testers, class A	13	.901	8	.926	5	.860
Testers, class B	17	.779	13	.785	4	(?)
Testers, class C	10	.654	8	(?)	2	(?)
Thread-milling-machine operators	15	.795	5	.702	10	.842
Time clerks	155	.603	144	.601	11	.638
Tool and die makers	160	1.110	94	1.079	66	1.163
Tool-grinder operators	134	1.015	53	.867	81	1.112
Truck drivers	25	.704	12	.634	13	.768
Truckers, hand	232	.628	135	.584	97	.691
Truckers, power, inside	33	.745	13	.673	20	.792
Tumbler operators	16	.690	9	.595	7	.798
Upsetters	27	1.047	6	(?)	22	1.015
Watchmen	209	.657	102	.566	107	.744
Welders, hand, class A	13	1.041	3	(?)	10	1.047
Welders, hand, class B	9	.790	1	(?)	8	.753
Woodworkers	12	.737			12	.737
Female workers						
Assemblers, bench, class A	1,884	.567	1,171	.520	713	.646
Assemblers, bench, class B	13	.708	2	(?)	11	(?)
Assemblers, bench, class C	91	.570	89	.565	2	(?)
Assemblers, bench, class C	215	.640	172	.610	43	.761
Drill-press operators, class B	6	.759	6	.759		
Drill-press operators, class C	12	.624			12	.624
Inspectors, class C	1,083	.578	526	.514	557	.638
Janitresses	12	.569	2	(?)	10	(?)
Learners, machine operators	62	.467	62	.467		
Learners, other	155	.429	155	.429		
Packers	102	.592	28	.490	74	.631
Punch-press operators, class C	63	.583	60	.579	3	(?)
Testers, class C	12	.548	11	(?)	1	(?)
Time clerks	58	.462	58	.462		

¹ Averages are based on actual earnings exclusive of extra payments for overtime.

² Number of plants and/or workers too small to justify computation of an average.

Nineteen occupational groups showed averages of \$1.00 or more per hour; these groups included slightly more than a fourth (27.0 percent) of all male employees and three-fourths (75.2 percent) of the skilled male workers for whom detailed occupational data were compiled. By far the largest of the groups earning an average of \$1.00 or

more per hour were the 742 class A grinding-machine operators who also constituted the largest single occupational class of male workers in the industry. Approximately a third of the male employees were in occupations paying less than 70 cents per hour and, of these, about half were in jobs paying less than 65 cents. Except for apprentices, helpers, and learners, less than 1 percent of the male employees were in jobs paying less than 60 cents per hour.

A fairly accurate basis for estimating regional differences is provided by the combined weighted averages shown in table 19. The hourly average (excluding extra payments for overtime) paid to the 6,082 employees studied in detail in the 22 plants in the Northeastern States was 73.1 cents. The corresponding average for 5,819 workers in 23 plants in the North Central and Western States was 87.9 cents or over a fifth above that paid in the Northeastern region. If male workers alone are considered, the average for the North Central and Western region is over a sixth above the corresponding figure for the Northeastern region.

There are 75 occupational classifications in which the average hourly rates paid in the two geographical sections may be compared. Those in the North Central and Western States combined were greater in 54 instances; in 29 cases they exceeded by 10 cents or more the averages paid in the Northeast. The averages in the North Central and Western States were higher by 20 cents or more in 7 occupations, while in only 1 occupational group was the northeastern rate higher by a similar amount. It may be noted that the general average for the North Central and Western States is affected considerably by the earnings of the 742 class A and B grinding-machine operators; their averages exceeded by 46.5 cents and 32.1 cents, respectively, those paid for similar work to the 595 employees in the Northeast. These substantial differences were apparently due in some measure to the high hourly rates paid in the East North Central metalworking centers, as compared with the much lower rates effective in New England, even in some of the larger plants. The frequency with which these two classes of grinding-machine operators occur is explained by the fact that the most important single product of the industry (i. e., bearings) involves substantial amounts of precision grinding.

The occupational averages tended also to vary significantly in relation to the average number of workers employed per plant. In comparing average rates in both large and small plants, it is desirable, obviously, to eliminate any regional wage differences wherever possible. The data shown in table 20 are limited, therefore, to the 23 plants studied in the North Central and Western States. For many classifications the numbers of workers are insufficient to permit reliable comparison of average hourly rates between plants of different size groups. There are 40 occupational groups, however, in which the numbers of male employees are believed to be adequate for this purpose. The average hourly earnings of the 3,186 employees in establishments with 500 or more workers amounted to 99.6 cents, over a fourth higher (22.4 cents) than the corresponding figure of 77.2 cents for the 1,920 workers in the smaller plants (table 20).

Average hourly rates were also higher in the larger plants for all of the 40 occupations for which comparisons are possible. In over half (23) of the occupational classifications, the difference was more than 10 cents per hour; for 8 groups the averages were higher by 20

cents or more. The greatest differences found were between the two numerically most important groups—class A and class B grinding-machine operators—whose averages were higher in the large plants by 34 cents and 32 cents per hour, respectively; the extent of the wage variations in these two classifications is largely due to the inclusion, in the "large plant" group, of one very large establishment which used incentive methods of wage payment.

Because of the varied character of the industry, there appears to be no general trend in the wage differences between plants in large and small communities. Although there is a difference of about 1.5 cents per hour between average earnings in organized and unorganized plants, the higher rates in the union plants were apparently due in part to their larger average size and to their geographical location; 8 of the 11 unionized plants were in the North Central and Western States where wage rates tended, on the average, to be higher.

TABLE 20.—Average Hourly Earnings ¹ of Day-Shift Male Workers in 23 Plants, North Central and Western States, by Occupation and Size of Plant, March–May 1942

Occupation and class	Average hourly earnings in plants employing—		Occupation and class	Average hourly earnings in plants employing—	
	500 workers or less	Over 500 workers		500 workers or less	Over 500 workers
Number of workers, ²	1,920	3,186	Janitors.....	\$0.606	\$0.733
Average hourly earnings ²	\$0.772	\$0.996	Job setters.....	1.093	1.180
Assemblers, bench, class A.....	\$0.753	\$0.993	Laborers.....	.527	.755
Assemblers, bench, class C.....	.625	.710	Lathe operators, engine, class A.....	1.046	1.188
Boring-mill operators, class A.....	.927	1.065	Lathe operators, engine, class B.....	.754	.900
Broaching-machine operators.....	.733	.854	Lathe operators, turret, class A.....	1.055	1.154
Electricians, class A.....	.824	.887	Lathe operators, turret, class B.....	.809	1.005
Firemen, stationary boiler.....	.719	.800	Learners, journeymen and other.....	.596	.659
Foremen, working, class A.....	1.276	1.344	Learners, machine operators.....	.586	.689
Foremen, working, class B.....	.953	1.088	Machinists, class A.....	.911	1.097
Grinding-machine operators, class A.....	1.054	1.396	Metal-saw operators.....	.744	.795
Grinding-machine operators, class B.....	.840	1.163	Milling-machine operators, class A.....	1.003	1.208
Heat treaters, class A.....	.879	.913	Milling-machine operators, class B.....	.753	1.000
Heat treaters, class B.....	.723	.771	Millwrights.....	.950	1.622
Helpers, journeymen's and other.....	.706	.753	Packers.....	.611	.740
Helpers, machine operators'.....	.607	.749	Repairmen, machine.....	1.005	1.028
Inspectors, class A.....	.868	.910	Screw-machine operators, class A.....	1.114	1.175
Inspectors, class B.....	.763	.782	Stock clerks.....	.646	.775
Inspectors, class C.....	.603	.717	Tool and die makers.....	1.048	1.214
			Tool-grinder operators.....	.911	1.154
			Truck drivers.....	.683	.841
			Truckers, hand.....	.618	.713
			Watchmen.....	.586	.817

¹ Averages are based on actual earnings exclusive of extra payments for overtime.

² Includes workers in occupations in addition to those listed.

A fifth of the workers in the industry are women; those for whom the data warrant the computation of averages received hourly earnings of 56.7 cents. Over half of all the women whose earnings were studied in detail were employed as class C inspectors; the 1,083 workers in that occupation received average hourly earnings of 57.8 cents. Apart from learners, the lowest rate for women, 46.2 cents per hour, was paid to time clerks. In the North Central and Western States rates paid to female employees were considerably higher than the corresponding averages in the Northeast; in every occupational group in which the numbers of plants and workers were sufficiently large to justify the computation of an average, the northeastern rates were lower.