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USE OF ELECTRIC POWER

IN

MANUFACTURING AND MINING INDUSTRIES

IN

CANADA

1937

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This report, issued during the past eight years, has attempted to show the evolution of power machinery in manufacturing and mining industries in Canada toward electric drive and particularly toward electric motors driven by power generated in central stations. With no coal mined in the chief manufacturing provinces of Ontario and Quebec and with a large supply of water power within economic transmission distance of manufacturing and mining centres in these and in most of the other provinces, this trend has been more pronounced than in many countries. The trend has been measured by the ratio of electric motor capacity to total power equipment installed in these industries, the central electric station industry being excluded as one of the manufacturing industries.

This ratio of electric motor rating to total power equipment indicates this evolution, but the movement towards electric drive is slightly exaggerated because of the practice in mills, factories, etc., of installing motors at each machine or group of machines with a total capacity greater than would be necessary if only one large motor were used or if a steam engine and belts and shafting were used. In the early annual industrial censuses no segregation was made of electric motors operated on power purchased from central electric stations and on power produced within the establishment making the report. Consequently, 1923 is the first year for which total power employed can be compiled without duplication.

During the fourteen years between 1923 and 1937 there has been very little net increase in the use of water power in manufacturing industries outside of the central electric station industry which is not included as a manufacturing industry. Steam engines increased in capacity only 50.6 per cent. Internal combustion engines more than doubled, however they still constitute only a small percentage of the total, but electric motors almost trebled in capacity. Those operated on power purchased from central stations increased by 226.5 per cent, whereas electric motors operated by electricity generated by the industries increased only 68.8 per cent. In 1923 the motors operated by central station power were the major part of all power equipment and consequently, with the greater rate of increase than other modes of power, by 1937 they were almost double the capacity of all water wheels, steam engines and internal combustion engines used by manufacturing industries. The details of the capacities in 1923 and 1937 are as follows:

POWER EQUIPMENT IN MANUFACTURING INDUSTRIES

	Capacity		Per Cent of Increase
	1923	1937	
	H.P.	H.P.	P.C.
Water wheels	587,191	650,557	10.8
Steam engines	554,191	854,703	50.6
Internal combustion (gas and oil) engines	46,829	98,223	109.7
Total	1,188,211	1,583,483	33.3
Electric motors on purchased power	958,692	3,129,790	226.5
Total power	2,146,903	4,713,273	119.5
Electric motors on power produced in the industries	357,136	602,955	68.8
Total Electric Motors	1,315,828	3,732,745	183.7

The ratio of electric motor capacity to total power employed has increased steadily, the recessions being few and small. The saturation point will be reached somewhere below 100 per cent because direct hydraulic drive or steam or internal combustion engines always will be used in some plants in preference to electric motors. The increase in the ratio has been considerably less since 1929 than during the preceding six years, the increase being 4.5 points from 1929 to 1937 as against 13.4 points from 1923 to 1929. Commencing with 1935 reports data were gathered on spare or idle equipment. For each of the years 1935 - 6 - 7 the percentage of total equipment not in regular use was approximately the same, slightly under six per cent. The equipment in regular use is more informative than total figures and when data for several years are available these tables will be compiled on the basis of equipment in regular use. In the meantime, comparisons are possible only for total equipment in the operating plants. Although equipment in idle plants might be considered as idle or spare equipment in the industry or group of industries, it is not included in these tables as reports are received only from plants in operation during the year. With increased business the idle equipment would probably be reduced but the bringing into operation of idle plants will not necessarily affect the proportion of equipment in regular use and the proportion idle.

Table 3 indicates that while the transfer to electric drive from other forms of power has been taking place in all groups of industries, many of them were highly electrified in 1923. The power employed in the pulp and paper industry is by far the greatest of any industry, constituting 35 per cent of the total for all manufacturing industries in 1923 and 38 per cent in 1937, and the growth in the use of electric drive in this industry from 447,847 horse power in 1923 to 1,520,134 horse power in 1937 has been an important factor in the increase for the industries as a whole. Deducting this industry from the total shows an increase in electric drive from 62.2 per cent in 1923 to 79.2 per cent in 1937, as against 81.3 per cent to 92.2 per cent with the pulp and paper industry included.

Table 4 shows the power equipment in regular use in manufacturing plants operating during 1937. The data in this table differ from those shown in reports prior to 1936 in that idle equipment is excluded here except for the group totals where totals including and excluding idle equipment are shown. Under each group are shown only the industries having large power installations. Many other industries not listed use electric drive almost exclusively. The consumption of electricity is also shown for each industry listed. This is broken down into "purchased from central stations" and "generated by the industries". The former is also divided between that used for lighting and power purposes and for other purposes, which includes electricity used in electric furnaces, electric boilers, electro-chemical processes, etc. Electric boilers, particularly in pulp and paper mills take the major portion of this class of electricity and in most cases it is

surplus or off-peak power that is purchased for this purpose. The total consumption for these other purposes was 8,480,588,000 kilowatt hours of purchased power, or approximately half of the total quantity purchased. A portion of the power generated in the industries also is used for other than lighting and driving machines but a comprehensive break-down is not available.

The mining industries are even more highly electrified than the manufacturing industries, the ratio increasing from 76.3 per cent in 1936 to 79.7 per cent in 1937, thus exceeding the manufacturing industries for the first time. Data for the mining industries are shown in Tables 2 and 7.

Tables 8, 9, 10 show for the years 1925 and 1926 to 1937 for each of the nine groups of manufacturing industries the horse power of equipment installed, the number of employees in these same industries, and the average horse power per employee. This average increased steadily up to 1929 and with the reduction of employees from 1929 to 1933 the average increased more rapidly, due to idle equipment and to increasing use of mechanical power. In 1937, when only six per cent of the equipment was reported as idle or reserve equipment, the average horse power per employee was 7.1 compared with 4.2 in 1925. The significance of this increase is more apparent when horse power is converted to man power. One horse power hour of work is equivalent to approximately ten man hours of work.

A weakness in these comparisons is that no statistics are available on horse power hours worked by the power equipment nor man hours worked by the employees and undoubtedly there were more idle horse power hours than man hours. In years of approximately the same manufacturing activity the statistics, however, should indicate the relative use of mechanical power and man power.

The index numbers of these two series using 1925 data as a base are shown in tables 11 and 12, and table 13 shows the index numbers of volume of production. (1) The volume of production is not affected by the changes in price but is affected directly by the use of man power, mechanical power and improved methods of manufacture. These index numbers have been charted and are shown on pages 14, 15, 16 and 17. For each group the production curve followed closely the employee curve in form but for the majority of the groups it was considerably above the employee curve and the divergence since 1932 and 1933 is quite pronounced. There are probably two factors in this movement for the years 1933 - 1937, first, increase in the work week and second, greater use of mechanical power. The power curves clearly show that greater quantities of power were available and quite evidently they were used. The production index is very complex and should be considered as only approximate and used only to indicate trends. The power and employee data should be coupled with respective hours worked which are not available and consequently these curves should be used also to indicate trends only. The data for 1937 show increases over 1925 as follows: power 119.5 per cent, employees 28.4 per cent, and production 61.4 per cent, and compared with the peak year 1929, power 21.8 per cent, employees a decrease of 2.7 per cent, and production an increase of 7.5 per cent.

As explained below, employees for 1925 to 1930 were somewhat increased compared with data for other years. Consequently, a reduction of 1929 employees to the 1937 basis would bring the employees for these years very close to the same figure. Thus, in 1937 the same number of employees as in 1929 produced 7.5 more goods and had available 21.8 per cent more power equipment to produce them with.

(1) For detailed description of method of computation see "The Quantity of Manufacturing Production in Canada, 1925 - 1929" by A. Cohen, B. Comm., Chief, General Manufacturing Branch, Dominion Bureau of Statistics.

A change in method of computing the number of employees for the years 1925-1930, inclusive, tended to increase the number for these years so that the peaks in 1929 are higher than if this change had not been made and the divergence from the power curves is consequently less. For the years 1923 and 1924 and again 1931 onwards the number of employees was computed by dividing the sum of the monthly counts by 12. Thus it represented the average man year positions. For the years 1925-1930, inclusive, the sum of the monthly counts for each plant was divided by the number of months the plant operated which would give the average monthly employment. This second method produced a much higher figure for seasonal industries, such as fruit, vegetable and fish canneries, and was probably an important factor in raising the employee curve above the power curve for Group 1, "Vegetable Products" and for the sharp rise in 1925 for Group 2, "Animal Products", and for some of the other groups. The change in method of computing employees would only cause breaks in the curves upward in 1925 and downward in 1931 and would not affect the slopes of the curves except at these points. It is impossible, however, to calculate the exact effect of the change.

The 1936 and subsequent data contain some revisions which have not yet been carried back to previous years. "Laundering" was dropped from group 3, "Textiles and Textile Products" and "Shipbuilding and Repairs" and "Aircraft" were transferred from group 9, "Miscellaneous Industries" to group 5, "Iron and its Products", and "Aerated and Mineral Waters" was transferred from group 7, "Non-metallic Products" to group 1, "Vegetable Products." These transfers are undoubtedly the main factors in the decline in group 9, "Miscellaneous Industries" as compared with 1935 data.

Table 1. POWER EQUIPMENT OF ALL MANUFACTURING[1] INDUSTRIES IN CANADA

SUMMARY					
Year	Total Power Employed	Electric Motors Operated			Electric Power Per Cent of Total
		By Central Electric Stn. Power	By Power generated in the Industries	Total Motor Capacity	
	H.P.	H.P.	H.P.	H.P.	P.C.
1923	2,146,903	958,692	357,136	1,315,828	61.3
1924	2,538,535	1,256,183	398,001	1,654,184	65.2
1925	2,888,164	1,547,754	434,678	1,982,432	68.6
1926	3,134,248	1,770,334	392,322	2,162,656	69.0
1927	3,287,582	1,924,687	386,555	2,311,242	70.3
1928	3,592,184	2,139,129	457,565	2,596,694	72.3
1929	3,867,979	2,393,684	496,036	2,889,720	74.7
1930	4,051,744	2,518,853	478,548	2,997,401	74.0
1931	4,114,677	2,587,411	539,800	3,127,211	76.0
1932	4,157,420	2,694,164	516,157	3,210,321	77.2
1933	4,147,831	2,671,440	502,706	3,174,147	76.5
1934	4,244,696	2,779,913	550,500	3,330,413	78.5
1935	4,346,775	2,874,693	512,396	3,387,089	77.9
1936	4,461,867	2,977,714	528,501	3,506,215	78.6
1937	4,712,279	3,129,790	602,955	3,732,745	79.2

[1] Excluding central electric stations and including idle and reserve equipment.

Table 2. POWER EMPLOYED IN THE MINING INDUSTRY/ IN CANADA

Year	Total Power Employed	Electric Motors			Electric Power — Per Cent of Total
		Operated by Central Electric Station Power	Operated by Power Generated in the Industry	Total Motor Capacity	
	H.P.	H.P.	H.P.	H.P.	P.C.
1923	301,316	118,835	53,860	172,695	57.3
1924	314,173	125,725	71,376	197,101	62.7
1925	323,882	147,191	64,126	211,317	65.2
1926	336,880	167,241	64,277	231,518	68.7
1927	380,460	202,702	62,067	264,769	69.6
1928	419,464	223,666	68,121	291,787	69.6
1929	450,261	238,974	75,069	314,043	69.7
1930	509,007	297,826	88,585	386,411	75.9
1931	520,638	313,567	79,259	392,826	75.5
1932	482,344	287,130	76,626	363,756	75.4
1933	533,779	322,361	47,407	369,768	69.3
1934	621,071	400,035	66,647	466,682	75.1
1935	688,470	446,247	74,687	520,934	75.7
1936	724,639	474,000	79,140	553,140	76.3
1937	850,489	577,703	101,526	678,229	79.7

/ Excluding non-ferrous smelting, salt, cement, clay products and lime, included with "Manufacturing."

Table 3. SUMMARY OF POWER EMPLOYED IN MANUFACTURING INDUSTRIES

Manufacturing Industries	1923 Power		1929 Power		1936 Power		1937 Power	
	Total H.P.	Per Cent Electric Motor	Total H.P.	Per Cent Electric Motor	Total H.P.	Per Cent Electric Motor	Total H.P.	Per Cent Electric Motor
1. Vegetable Products	257,176	65	326,346	74	342,123	76	347,002	76
2. Animal Products	80,895	72	101,268	72	126,807	74	133,647	76
3. Textile Products	107,850	83	168,614	81	221,830	85	211,729	89
4. Wood and Paper Products	1,146,571	50	2,022,839	69	2,227,328	73	2,420,436	74
5. Iron and its Products	213,705	89	529,162	100	681,038	88	719,265	86
6. Non-ferrous Metal Products	99,963	47	351,752	82	461,129	85	472,031	87
7. Non-metallic Mineral Products	131,780	83	210,804	88	237,163	82	239,898	82
8. Chemical and Allied Products	62,447	72	83,935	77	137,442	86	141,755	87
9. Miscellaneous	46,516	86	73,259	86	27,002	88	26,320	96
TOTAL	2,146,903	61	3,867,979	75	4,461,867	79	4,712,279	79

Table 4. POWER EQUIPMENT OF MANUFACTURING INDUSTRIES IN CANADA, 1937

(Equipment in Regular Use)

	Total Power Employed	Electric Motors Operated: By Central Electric Station Power	Electric Motors Operated: By Power Generated in the Industries	Electric Motors Operated: Total Motor Capacity	Electric Power Per Cent of Total	Consumption of Electricity: Purchased From Central Electric Stations for Power and Lighting	Consumption of Electricity: Purchased From Central Electric Stations for Other Purposes	Consumption of Electricity: Generated By the Industries	Consumption of Electricity: Total
	H.P.	H.P.	H.P.	H.P.	P.C.	(Thousands of Kilowatt Hours)			
Group 1. VEGETABLE PRODUCTS	(x 347,002	236,852	32,989	269,841	77.5	344,532	60,497	24,999	430,028
	(329,589	225,636	32,421	258,057	78.3				
Biscuits, confectionery, etc.	21,944	19,478	469	19,947	90.9	23,340	11	...	23,351
Bread & bakery products	16,504	15,025	241	15,266	92.5	30,395	12	...	30,407
Breweries	22,530	17,452	768	18,220	80.9	21,376	7,287	172	28,835
Flour and feed mills	109,908	57,799	3,712	61,511	56.0	102,130	...	20	102,150
Fruit and vegetable preparations	20,152	11,040	1,717	12,757	63.3	6,503	2	192	6,697
Rubber goods, footwear, etc.	63,805	61,121	907	62,028	97.2	97,072	48,598	1,567	147,237
Sugar refineries	21,675	6,975	16,273	23,248	100.0	12,635	...	8,129	20,764
Group 2. ANIMAL PRODUCTS	(x 133,647	98,182	2,877	101,059	75.6	194,539	574	2,417	197,530
	(126,759	95,494	2,817	98,311	77.6				
Butter and cheese	41,483	29,284	...	29,284	70.6	33,224	...	...	33,224
Leather tanneries	14,601	12,376	766	13,142	90.0	16,888	...	...	16,888
Slaughtering & meat packing	37,916	34,124	415	34,539	91.1	112,591	...	383	112,974
Group 3. TEXTILES AND TEXTILE PRODUCTS	(x 211,729	162,690	26,071	188,761	89.2	301,382	83,962	71,662	457,006
	(196,006	155,604	25,649	181,253	92.5				
Cotton yarn and cloth	89,980	71,088	13,305	84,393	93.8	134,217	37,279	38,191	209,687
Hosiery and knitted goods	17,579	10,458	4,112	14,570	82.9	20,510	...	4,762	25,272
Silk and artificial silk	18,399	15,029	3,313	18,342	99.7	69,834	46,682	11,804	128,320
Group 4. WOOD AND PAPER PRODUCTS	(x2,420,436	1,369,171	427,219	1,796,390	74.2	5,048,834	5,409,258	1,826,862	12,284,954
	(2,312,864	1,331,593	414,073	1,745,666	75.5				
Furniture	20,011	12,599	1,621	14,220	71.1	11,129	...	9,505	20,634
Planing mills, sash & door factories	47,413	26,929	1,408	28,337	59.8	17,431	...	1,334	18,764
Printing & publishing	28,085	27,069	221	27,290	97.2	31,309	442	33	31,784
Pulp and paper	1,804,941	1,171,237	348,897	1,520,134	84.2	4,897,298	5,395,234	1,743,786	12,036,318
Saw mills	321,772	27,207	56,980	84,187	26.2	23,548	11	65,349	88,908

Group 5. IRON AND ITS PRODUCTS	(x	719,265	536,623	82,262	618,885	86.0	560,338	398,982	56,164	1,015,484
	(	662,855	519,286	77,709	596,995	90.1				
Agricultural implements		20,541	17,723	...	17,723	86.3	18,368	...	...	18,368
Automobiles		44,993	14,860	24,700	39,560	87.9	17,627	...	38,468	56,095
Automobile supplies		37,795	36,191	...	36,191	95.8	42,996	...	...	42,996
Bridge and structural steel		28,108	26,674	978	27,652	98.4	10,578	...	...	10,578
Castings and forgings		50,699	48,634	1,026	49,660	98.0	42,155	385	540	43,078
Machinery		42,962	38,877	3,553	42,430	98.8	27,697	...	3,123	30,820
Primary iron and steel		207,026	133,937	32,920	166,857	80.6	206,521	360,641	6,338	573,300
Railway rolling stock		108,624	95,386	7,204	102,590	94.4	70,797	32,925	7,350	111,072
Ship building and repairs		40,856	32,829	2,250	35,079	85.9	9,686	...	110	9,797
Group 6. NON FERROUS METAL PRODUCTS	(x	472,031	396,799	14,258	411,057	87.1	1,218,002	1,269,138	250,592	1,738,632
	(	440,345	370,644	13,637	384,281	87.3				
Brass & copper products		25,640	24,387	358	24,745	96.5	21,993	8,186	54	30,233
Electrical apparatus & supplies		74,529	66,812	5,329	72,141	96.8	72,826	...	11,276	84,102
Non-ferrous metal, smelting and refining		325,555	264,824	7,950	272,774	83.8	1,105,813	1,259,810	239,262	2,604,885
Group 7. NON METALLIC MINERAL PRODUCTS	(x	239,898	191,016	6,516	197,532	82.3	380,972	368,325	6,060	755,357
	(	220,012	178,979	6,299	185,278	84.2				
Cement		71,985	69,964	756	70,720	98.2	61,046	...	...	61,046
Clay products from domestic clays		21,385	14,640	351	14,991	70.1	10,315	...	266	10,581
Coke and gas products		27,905	18,560	2,273	20,833	74.7	44,079	3,478	...	47,557
Petroleum Products		40,515	23,651	...	23,651	58.4	55,153	...	215	55,368
Group 8. CHEMICALS AND CHEMICAL PRODUCTS	(x	141,755	115,328	8,379	123,707	87.3	529,759	889,822	87,031	1,506,612
	(	128,292	105,834	6,966	112,800	87.9				
Acids, alkalies and salts		64,754	48,905	6,195	55,100	85.1	175,010	825,624	85,686	1,086,320
Fertilizers		21,890	21,880	...	21,880	100.0	300,647	...	...	300,647
Group 9. MISCELLANEOUS INDUSTRIES	(x	26,520	23,129	2,384	25,513	96.2	33,854	...	2,889	36,743
	(	24,007	21,770	2,012	23,782	99.1				
Ice, manufactured		10,641	10,591	...	10,591	99.5	22,223	...	...	22,223
TOTAL ALL INDUSTRIES	(x	4,712,279	3,129,790	602,955	3,732,745	79.2	8,612,212	8,480,588	2,328,676	19,421,478
	(	4,440,729	3,004,840	581,583	3,586,423	80.8				

x Including equipment held idle or in reserve, which is comparable with totals in previous reports.

Table 5. POWER EMPLOYED IN MANUFACTURING INDUSTRIES, BY PROVINCES, 1937.

(In Regular Use)

Provinces	Total Power Employed	Electric Motors Operated			Electric Power	Consumption of Electricity			
		By Central Electric Station Power	By Power Generated In the Industries	Total Motor Capacity	Per Cent of Total	Purchased from Central Electric Stations		Generated By the Industries	Total
						For Power & Lighting	For Other Purposes		
	H.P.	H.P.	H.P.	H.P.	P.C.	(Thousands of Kilowatt Hours)			
Prince Edward Island	3,844	691	...	691	18.0	426	...	...	426
Nova Scotia	171,270	96,757	11,509	108,266	63.2	225,084	2,185	39,687	266,956
New Brunswick	200,976	103,833	45,122	148,955	74.1	370,558	42,460	158,423	571,441
Quebec	1,637,895	1,223,035	117,696	1,340,731	81.9	4,807,618	4,901,794	573,118	10,282,530
Ontario	1,712,501	1,166,802	276,919	1,443,721	84.3	2,973,564	2,051,169	1,191,796	6,216,529
Manitoba	125,415	108,483	2,044	110,527	88.1	370,841	215,846	2,050	588,737
Saskatchewan	35,879	22,474	115	22,589	63.0	84,475	...	210	84,685
Alberta	68,666	41,313	4,253	45,566	66.4	43,637	328	3,538	47,503
British Columbia and Yukon	484,283	241,452	123,925	365,377	75.4	995,819	6,966	359,854	1,362,639
CANADA	4,440,729	3,004,840	581,583	3,586,423	80.8	9,872,022	7,220,748	2,328,676	19,421,446
INCLUDING IDLE AND RESERVE EQUIPMENT									
Prince Edward Island	4,021	787	...	787	19.6				
Nova Scotia	177,480	98,018	11,584	109,602	61.8				
New Brunswick	232,931	111,381	45,534	156,915	67.4				
Quebec	1,719,749	1,262,972	121,635	1,384,607	80.5				
Ontario	1,827,681	1,220,648	293,514	1,514,162	82.8				
Manitoba	128,861	110,831	2,044	112,875	87.6				
Saskatchewan	38,203	23,153	115	23,268	60.9				
Alberta	71,609	42,659	4,253	46,912	65.5				
British Columbia and Yukon	511,748	259,341	124,276	383,617	75.0				
CANADA	4,712,283	3,129,790	602,955	3,732,745	79.2				

Table 6. POWER EQUIPMENT - IN REGULAR USE AND INCLUDING IDLE AND RESERVE EQUIPMENT, 1937.

MANUFACTURING INDUSTRIES

	TOTAL POWER EMPLOYED		ELECTRIC MOTORS OPERATED BY						ELECTRIC POWER		CONSUMPTION OF ELECTRICITY			
			Central Station Power		Power Generated in the Industries		T o t a l		Per Cent of Total		Purchased from Central Electric Stations		Generated By The Industries	Total
	In Regular Use	Including Reserve Equipment	In Regular Use	Including Reserve	In Regular Use	Including Reserve	In Regular Use	Including Reserve	In Regular Use	Including Reserve	For Power & Lighting	For Other Purposes		
	H.P.	H.P.	H.P.	H.P.	H.P.	H.P.	H.P.	H.P.	P.C.	P.C.	(Thousands of Kilowatt Hours)			
1. Vegetable Products	329,589	347,002	225,636	236,852	32,421	32,989	258,057	269,841	78.3	77.5	344,532	60,497	24,999	430,028
2. Animal Products	126,759	133,647	95,494	98,182	2,817	2,877	98,311	101,059	77.6	75.6	194,539	574	2,417	197,530
3. Textiles and Textile Products	196,006	211,729	155,604	162,690	25,649	26,071	181,253	188,761	92.5	89.2	301,382	83,962	71,662	457,006
4. Wood and Paper Products	2,312,864	2,420,436	1,331,593	1,369,171	414,073	427,219	1,745,666	1,796,390	75.5	74.2	5,048,834	5,409,258	1,826,862	12,284,954
5. Iron and its Products	662,855	719,265	519,286	536,623	77,709	82,262	596,995	618,885	90.1	86.0	560,338	398,982	56,164	1,015,484
6. Non-ferrous Metal Products	440,345	472,031	370,644	396,799	13,637	14,258	384,281	411,057	87.3	87.1	2,477,812	9,328	250,592	2,737,732
7. Non-metallic Mineral Products	220,012	239,898	178,979	191,016	6,299	6,516	185,278	197,532	84.2	82.3	380,972	368,825	6,060	755,857
8. Chemicals and Chemical Products	128,292	141,755	105,834	115,328	6,966	8,379	112,800	123,707	87.9	87.3	529,759	889,822	87,031	1,506,612
9. Miscellaneous Industries	24,007	26,520	21,770	23,129	2,012	2,384	23,782	25,513	99.1	96.2	33,854	...	2,889	36,743
TOTAL	4,440,729	4,712,279	3,004,840	3,129,790	581,583	602,955	3,586,423	3,732,745	80.8	79.2	9,872,022	7,220,748	2,328,676	19,421,446

Table 7. MINING INDUSTRIES

Metal Mining	453,215	494,418	362,773	385,062	57,961	65,560	420,734	450,622	92.8	91.1	970,588	31,835	153,083	1,155,506
Non-metal Mining	70,223	76,596	60,759	65,846	2,019	2,180	62,778	67,026	89.4	87.5	147,358	...	3,705	151,063
Sand, Gravel & Stone	47,703	50,965	31,529	32,870	1,930	1,930	33,459	34,800	73.0	68.3	24,812	1	1,317	26,130
Fuels	212,032	228,510	93,035	93,925	30,919	31,856	123,954	125,781	58.2	55.0	121,980	...	48,270	170,250
TOTAL	784,173	850,489	548,096	577,703	92,829	101,526	640,925	678,229	81.7	79.7	1,264,738	31,836	206,375	1,502,949

Table 8. MANUFACTURING INDUSTRIES

POWER EMPLOYED

H.P.

	1923	1926	1927	1928	1929	1930
1. Vegetable Products	257,176	267,643	280,170	309,611	326,346	313,527
2. Animal Products	80,895	96,151	101,650	104,166	101,268	105,833
3. Textiles & textile products	107,850	153,295	157,055	163,779	168,614	171,324
4. Wood and paper products	1,146,571	1,552,885	1,770,909	1,908,738	2,022,839	2,126,515
5. Iron and its products	213,705	422,356	451,576	488,521	529,162	576,609
6. Non-ferrous metal products	99,963	228,870	237,520	294,642	351,752	401,817
7. Non-metallic mineral pdts.	131,780	150,915	160,196	181,666	210,804	213,917
8. Chemical & allied products	62,447	63,635	65,898	71,401	83,935	87,382
9. Miscellaneous Industries	46,516	44,148	62,608	69,660	73,259	54,820
TOTAL	2,146,903	2,979,898	3,287,582	3,592,184	3,867,979	4,051,744

Table 9. EMPLOYEES

No.

1. Vegetable Products	65,395	73,908	78,300	83,764	88,858	84,182
2. Animal Products	61,517	67,843	68,381	67,777	67,670	57,657
3. Textiles & textile products	92,669	100,572	107,519	113,724	115,620	109,576
4. Wood and paper products	128,404	134,187	150,550	158,005	164,800	156,724
5. Iron and its products	88,071	103,510	106,293	119,199	132,281	119,987
6. Non-ferrous metal products	21,409	30,095	33,443	35,568	39,867	38,756
7. Non-metallic mineral pdts.	24,978	26,045	26,662	28,650	31,431	29,868
8. Chemical & allied products	15,149	14,345	14,559	16,130	16,694	15,503
9. Miscellaneous Industries	16,581	17,628	18,518	19,351	21,049	14,328
TOTAL	514,173	568,133	604,225	642,168	678,270	626,581

Table 10 AVERAGE HORSE POWER OF EQUIPMENT PER EMPLOYEE IN MANUFACTURING INDUSTRIES

	1923	1924	1925	1926	1927	1928
1. Vegetable Products	3.9	3.9	3.7	3.6	3.6	3.7
2. Animal Products	1.3	1.5	1.4	1.4	1.5	1.5
3. Textiles and textile products	1.2	1.5	1.5	1.5	1.5	1.4
4. Wood and Paper Products	8.9	9.5	10.3	11.6	11.7	12.1
5. Iron and its products	2.4	4.5	5.1	4.1	4.2	4.1
6. Non-ferrous metal products	4.7	4.8	8.0	7.6	7.1	8.3
7. Non-metallic mineral products	5.3	5.0	5.2	5.8	6.0	6.4
8. Chemical and Allied products	4.1	4.3	4.2	4.4	4.5	4.4
9. Miscellaneous Industries	2.8	2.8	2.7	2.5	3.4	3.6
TOTAL	4.2	4.8	5.1	5.2	5.4	5.6

MANUFACTURING INDUSTRIES

POWER EMPLOYED

H.P.

	1931	1932	1933	1934	1935	1936	1937
	322,401	326,829	326,666	332,052	331,361	342,123	347,002
	98,892	100,069	112,035	117,843	122,560	126,807	135,647
	186,952	189,915	215,907	219,938	240,549	221,830	211,729
	2,126,398	2,094,010	2,035,112	2,115,205	2,160,083	2,227,328	2,420,436
	589,261	623,888	626,730	637,718	660,491	681,038	719,265
	424,738	450,271	434,581	405,248	416,927	461,129	472,051
	212,179	209,484	219,612	231,586	222,555	237,165	259,898
	96,893	105,671	110,873	115,082	130,464	137,442	141,755
	56,963	57,283	66,315	70,024	61,785	27,007	26,520
	4,114,677	4,157,420	4,147,831	4,244,696	4,346,775	4,461,867	4,712,279

EMPLOYEES

No.

	77,706	72,390	73,095	77,464	79,285	87,071	94,258
	51,297	49,953	53,111	57,199	60,124	63,609	67,996
	105,473	102,116	106,235	115,695	120,699	114,966	121,677
	121,672	107,834	105,471	116,691	123,724	132,374	147,254
	96,927	74,214	70,947	81,782	95,426	107,203	127,148
	34,414	26,704	25,273	30,177	33,613	36,935	44,614
	24,895	20,342	19,296	21,959	23,342	21,974	23,837
	15,207	15,295	15,397	17,130	18,933	19,910	21,968
	12,821	11,155	10,361	12,091	12,270	10,317	11,699
	540,412	480,003	479,186	530,188	567,416	594,359	660,451

AVERAGE HORSE POWER OF EQUIPMENT PER EMPLOYEE IN MANUFACTURING INDUSTRIES

	1929	1930	1931	1932	1933	1934	1935	1936	1937
	3.7	3.7	4.1	4.5	4.5	4.3	4.2	3.9	3.7
	1.5	1.8	1.9	2.0	2.1	2.1	2.0	2.0	2.0
	1.5	1.6	1.8	1.9	2.0	1.9	2.0	1.9	1.7
	12.3	13.6	17.5	19.4	19.3	18.1	17.4	16.8	16.4
	4.0	4.8	6.1	8.4	8.8	7.8	6.9	6.3	5.7
	8.8	10.4	12.3	16.9	17.2	13.4	12.4	12.5	10.6
	6.7	7.2	8.5	10.3	11.4	10.5	9.6	10.8	10.1
	5.0	5.6	6.4	6.8	7.2	6.5	6.9	6.9	6.5
	3.5	3.8	4.4	5.1	6.4	5.8	5.0	2.6	2.3
	5.7	6.5	7.6	8.7	8.7	8.0	7.7	7.5	7.1

Table 11.

MANUFACTURING INDUSTRIES

INDEX NUMBERS
(1923 = 100)

POWER EMPLOYED

	1924	1925	1926	1927	1928	1929	
1. Vegetable Products	100.6	103.7	104.1	108.9	120.4	126.9	
2. Animal Products	110.6	111.0	118.9	125.7	128.8	125.2	
3. Textiles and textile products	129.3	134.0	142.1	145.6	151.9	156.3	
4. Wood and paper products	106.0	114.9	135.4	154.5	166.5	176.4	
5. Iron and its products	164.2	216.2	197.6	211.3	228.6	247.6	
6. Non-ferrous metal products	104.0	222.8	229.0	237.6	294.7	351.9	
7. Non-metallic mineral products	92.0	95.8	114.5	121.6	137.9	160.0	
8. Chemical and allied products	95.9	93.7	101.9	105.5	114.3	134.4	
9. Miscellaneous industries	94.7	97.3	94.9	134.6	149.7	157.5	
TOTAL	111.0	127.3	138.8	153.1	167.3	180.2	

Table 12.

EMPLOYEES

1. Vegetable products	101.2	110.2	113.0	119.7	128.1	135.9	
2. Animal products	93.9	103.5	110.3	111.1	110.2	110.0	
3. Textiles and textile products	97.4	102.0	108.5	116.0	122.7	124.8	
4. Wood and paper products	99.3	99.6	104.5	117.2	123.1	128.3	
5. Iron and its products	88.9	102.3	117.5	120.7	135.3	150.2	
6. Non-ferrous metal products	101.2	129.5	140.6	156.2	166.1	186.2	
7. Non-metallic mineral products	96.8	98.0	104.3	106.7	114.7	125.8	
8. Chemical and allied products	91.1	92.1	94.7	96.1	106.6	110.2	
9. Miscellaneous industries	95.4	100.0	106.3	111.7	116.7	126.9	
TOTAL	96.4	103.2	110.5	117.5	124.9	131.9	

Table 13.

INDEX OF VOLUME OF MANUFACTURING PRODUCTION

1. Vegetable Products	109.2	120.8	127.7	137.5	151.1	135.3	
2. Animal Products	107.1	113.0	122.9	120.0	123.8	117.2	
3. Textiles and textile products	96.6	103.4	117.8	126.5	135.3	133.8	
4. Wood and paper products	98.1	106.0	119.9	129.1	142.0	152.9	
5. Iron and its products	80.5	95.1	121.7	125.2	138.1	157.8	
6. Non-ferrous metal products	108.5	122.8	137.2	158.3	176.1	190.3	
7. Non-metallic mineral products	95.8	98.3	112.5	122.5	138.9	163.1	
8. Chemical and allied products	102.3	109.5	119.0	127.0	139.6	143.3	
9. Miscellaneous industries	108.0	106.0	124.8	138.0	136.5	137.3	
TOTAL	98.2	107.5	122.2	130.2	141.9	150.2	

MANUFACTURING INDUSTRIES

INDEX NUMBERS
(1923 = 100)

POWER EMPLOYED

	1930	1931	1932	1933	1934	1935	1936	1937
	121.9	125.4	127.1	127.0	129.1	128.8	(1)133.0	134.9
	130.8	122.2	123.7	138.5	145.7	151.8	156.8	165.2
	158.8	173.3	176.1	200.2	203.9	223.0	(1)205.7	196.3
	185.5	185.5	182.6	177.5	184.5	188.4	194.3	211.1
	269.8	275.7	291.9	293.3	298.4	309.1	318.7	336.6
	402.0	424.9	450.4	434.7	405.4	417.1	(1)461.3	472.2
	162.3	161.0	159.0	166.7	175.7	168.9	180.0	182.0
	139.9	155.2	169.2	177.6	184.3	208.9	220.1	227.0
	117.9	122.4	123.1	142.6	150.5	132.8	(1) 58.1	57.0
	188.7	191.7	193.6	193.2	197.7	202.5	207.8	219.5

EMPLOYEES

	128.7	118.8	110.7	111.8	118.5	121.2	(1)133.1	144.1
	93.7	83.4	81.2	86.3	93.0	97.7	103.4	110.5
	118.2	113.8	110.2	114.6	124.8	130.2	(1)124.1	131.3
	122.1	94.8	84.0	82.1	90.0	96.4	103.1	114.7
	136.2	110.0	84.3	80.6	92.9	108.4	121.7	144.4
	181.0	160.7	124.7	118.0	141.0	157.0	(1)172.5	208.4
	119.6	99.7	81.4	77.3	87.9	93.5	88.0	95.4
	102.3	100.4	101.0	101.6	113.1	125.0	131.4	145.0
	86.4	77.3	67.3	62.5	72.9	74.0	(1) 62.2	70.6
	121.9	105.1	93.4	93.2	103.1	110.4	115.6	128.4

INDEX OF VOLUME OF MANUFACTURING PRODUCTION

	146.6	133.0	118.1	116.1	131.9	138.7	151.0	164.4
	113.6	103.2	102.2	106.1	115.4	121.7	131.6	136.9
	124.4	121.6	116.0	112.9	139.1	147.0	155.4	164.8
	141.5	117.9	104.6	107.1	125.3	137.9	151.4	168.6
	126.9	96.2	65.0	61.4	82.8	102.8	114.7	145.0
	179.7	171.1	137.7	134.8	165.7	190.0	214.1	257.8
	149.5	130.4	94.9	87.5	103.4	111.5	126.8	145.7
	126.5	116.9	111.5	118.1	133.9	147.4	158.1	181.3
	116.6	101.0	82.5	73.5	88.4	95.6	102.0	118.6
	136.2	118.3	100.1	100.2	118.0	130.2	142.5	161.4

(1) Affected by reclassification. See page 4.

MANUFACTURING INDUSTRIES

1923=100

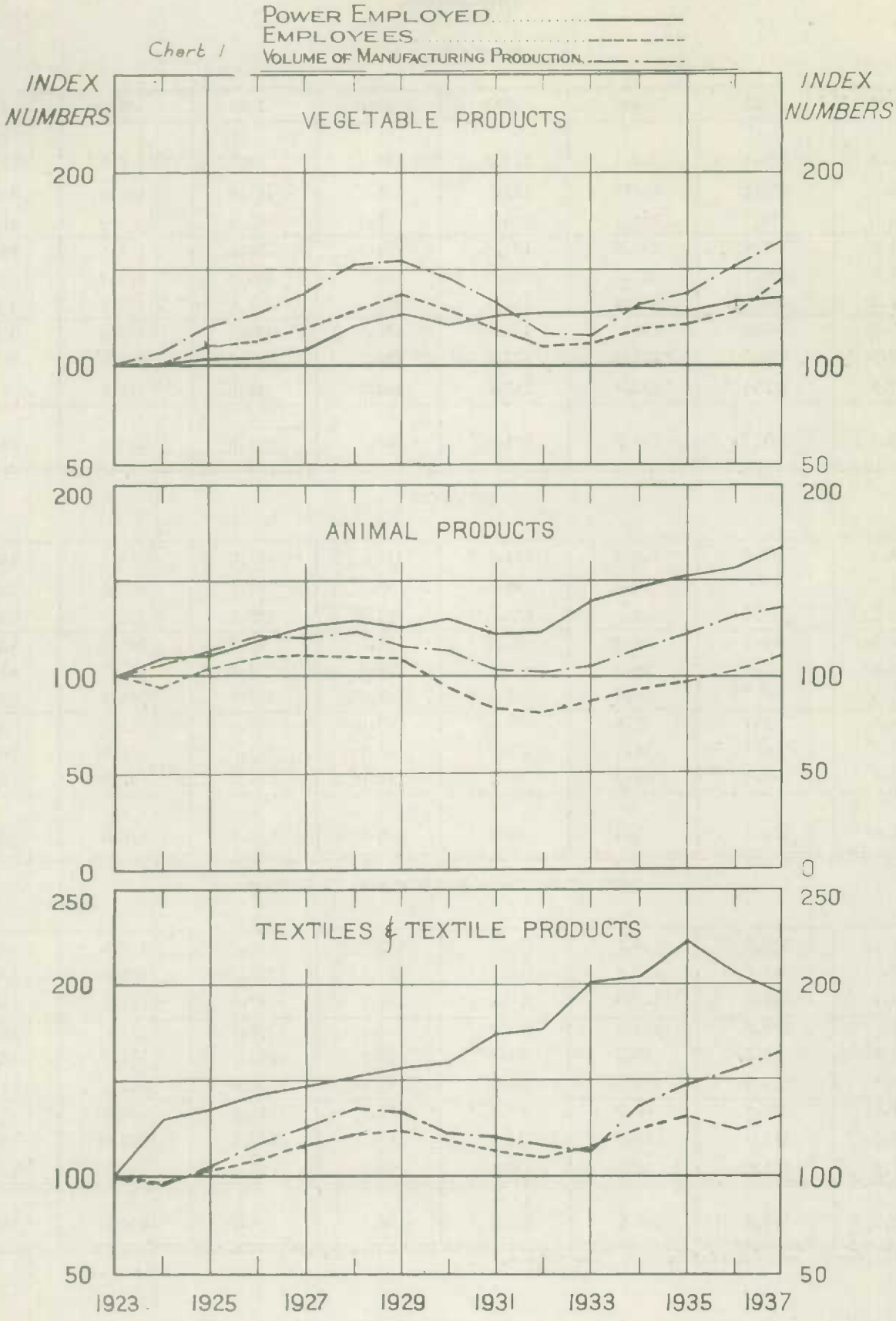


Chart 2

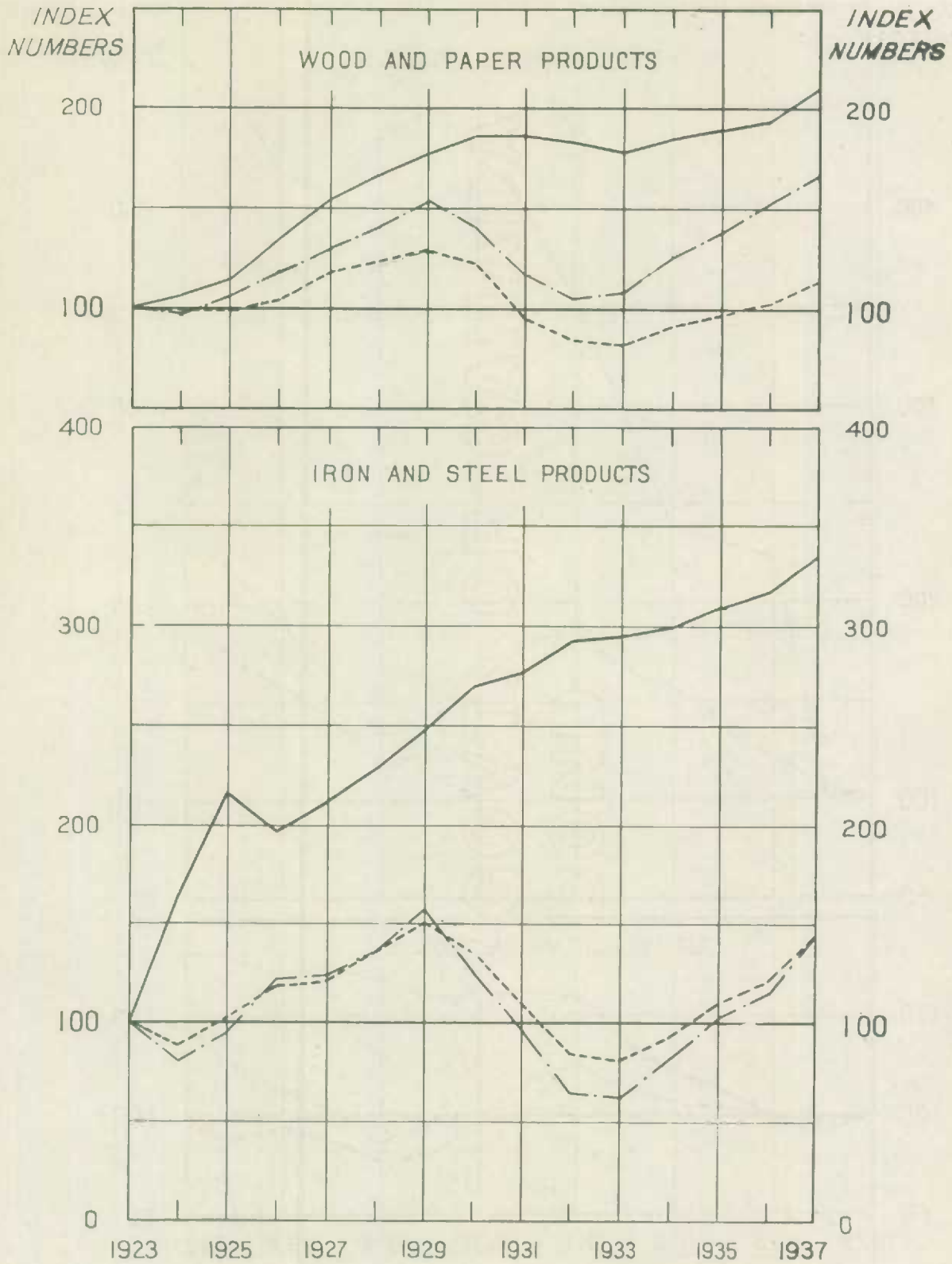
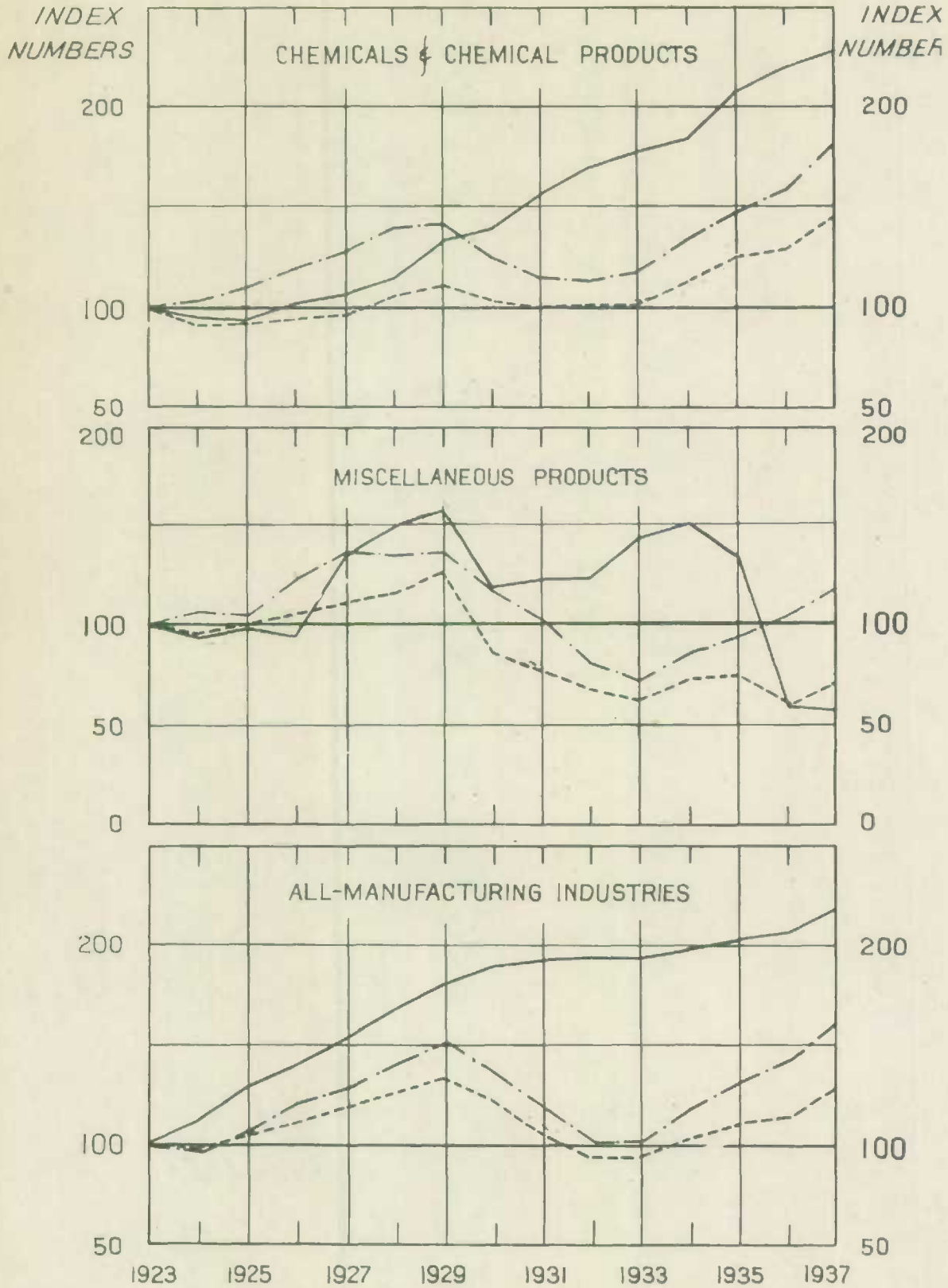

INDEX NUMBERS
WOOD AND PAPER PRODUCTS
200
100
400
IRON AND STEEL PRODUCTS
300
200
100
0
1923
1925
1927
1929
1931
1933
1935
1937

Chart 3


INDEX NUMBERS
NON-FERROUS METAL PRODUCTS
400
300
200
100
50
NON-METALLIC MINERAL PRODUCTS
150
100
50
1923
1925
1927
1929
1931
1933
1935
1937

Chart 4


INDEX NUMBERS
INDEX NUMBERS
CHEMICALS & CHEMICAL PRODUCTS
MISCELLANEOUS PRODUCTS
ALL-MANUFACTURING INDUSTRIES
200
100
50
0
1923
1925
1927
1929
1931
1933
1935
1937