

THE LEATHER, RUBBER AND CANVAS GOODS TRADES.

GENERAL REPORT.

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RUBBER AND CANVAS GOODS TRADES.

The following general report deals with the trade in leather, rubber and canvas goods in the United States during the year 1908. It is the first of a series of reports which will be published by the Bureau of Economic Warfare, U. S. Department of Commerce, in the near future. The reports will be published in the following order: 1. The Leather, Rubber and Canvas Goods Trades; 2. The Textile Trades; 3. The Iron and Steel Trades; 4. The Coal and Petroleum Trades; 5. The Lumber and Paper Trades; 6. The Chemical and Allied Trades; 7. The Food and Drink Trades; 8. The Clothing and Apparel Trades; 9. The Miscellaneous Trades.

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Each of the trades included in the group forms the subject of a separate report, in which the detailed results of the 1924 Census of Production are set out, and such comparisons as are possible with the results of the Censuses for 1912 and 1907 are made. The object of the present general report is to bring together the principal results for the whole group of trades, and, in addition, to set out certain particulars (e.g., as to fuel consumption) which are more conveniently dealt with here than in the separate trade reports.

#### Principal results for 1924.

The number of separate returns received from firms engaged in the Leather, Rubber and Canvas Goods Trades group in 1924 was 3,948. About 800 firms to which schedules were sent did not furnish returns, but the great majority of these firms had very small establishments, and they included a number which were no longer carrying on business at the end of the censal year. On the basis of the information available, it is estimated that they did not employ more than about 1,800 persons in all and that their aggregate net output was probably not in excess of £300,000. These figures represent an omission of, at most, about 1·5 per cent. and 1·1 per cent. respectively of the total figures for the group; and the absence of returns from the firms in question does not materially affect the uses made of the figures in this general report.

The main particulars obtained for 1924 are set out in the following table:—

#### Leather, Rubber and Canvas Goods Trades.

##### Output in 1924.\*

Trade.	Gross output (selling value of goods made and value of work done). (1)	Cost of materials used and amount paid to other firms for work given out. (2)	Net output [excess of col. (1) over col. (2)]. (3)	Persons employed (except outworkers). (4)	Net output per person employed as shown in col. (4). (5)
	£'000	£'000	£'000	Number.	£
* Fellmongery .. .. .	5,264	4,313	951	2,753	345
Leather .. .. .	33,099	24,369	8,730	31,696	275
Saddlery, Harness, etc. .. .	6,708	3,565	3,143	21,628	145
Rubber .. .. .	24,024	12,236	11,788	48,087	245
Canvas Goods, etc. .. .	7,818	5,885	1,933	10,358	187
TOTAL—UNITED KINGDOM..	76,913	50,368	26,545	114,522	232
England and Wales .. .. .	68,754	44,793	23,961	101,208	237
Scotland .. .. .	7,839	5,302	2,537	12,905	197
Northern Ireland† .. .. .	320	273	47	409	115

\* Not including the output of, nor the persons employed by, Railway companies, Local Authorities, etc.; particulars relating to these establishments are given in the reports on Public Utility Services, which form part of a separate volume. The value of the leather and canvas goods produced by such establishments is stated in the individual trade reports concerned (see pages 221 and 247 of this volume).

† In order to avoid the possible disclosure of information relating to individual firms, the particulars relating to the Leather Trade and the Rubber Trade in Northern Ireland have been included with those for England and Wales.

#### Comparability of results with those for 1912 and 1907.

The scope of the Census was not quite the same in the three censal years, and the comparability of the totals for 1924 is affected by the changes referred to in the following paragraphs:—

(1) The Censuses of 1907 and 1924 extended to all firms, however small, but in 1912 firms employing not more than five persons (excluding proprietors) were required to state only the average number of persons employed by them in the year. The exemption of the small firms in 1912 resulted in the exclusion of an important proportion of some of the trades in the Leather, Rubber and Canvas Goods group and, both for that reason and because the war interrupted the task of dealing with incomplete and incorrect returns, the information available for that year, for the group as a whole, is not sufficiently complete to warrant its use for detailed comparisons. For this reason the 1907 figures only are, except in respect of power equipment, taken for comparison with those for 1924 in this general report.

(2) The Census of 1907 covered Great Britain and the whole of Ireland, but that of 1924 applied only to Great Britain and Northern Ireland. Separate particulars for this group of trades were not published in the reports on the Census of Production carried out by the Government of the Irish Free State in respect of the year 1926, and the omission of that country from the scope of the 1924 Census does not materially affect comparisons between figures for that year and those for the earlier years.

(3) In any comparison of figures representing money values, the changes in the level of prices which occurred in the period between the first and third Censuses should be kept in mind.

#### Production.

It is difficult to find a satisfactory basis on which to compare production in the several trades in the same year, or in any trade or trades in different years. Obviously, no comparisons between trades could be based on the aggregate quantities of goods produced owing to their varied character, even if the necessary information were available for this purpose. The gross output values recorded in the Census of Production are affected in varying degrees by the duplication of goods or processes which they involve, and hence they do not form a practicable basis for comparisons. Some of the difficulties can be avoided by basing comparisons on net output, which, being arrived at by deducting, from the value of the gross output, the total cost of materials used and the amount paid to other firms for work given out to them, represents completely and without duplication the value added to the materials in the course of manufacture. The net output thus constitutes for any industry the fund from which wages, salaries, rent, royalties, rates, taxes, depreciation, advertisement and sales expenses, and all other similar charges have to be provided, as well as profits; and if the net output

for any trade is divided by the number of persons employed by firms in that trade, the resulting figure of net output per head furnishes a basis of comparison between the positions of different trades in the same year (or the same trade in different years) which takes account of differences in the numbers of persons employed and the continuity of their work. The use of net output per head as a basis of comparison was discussed at length in the Final Report on the First Census of Production (1907), where it was pointed out that "as the net output is the fund out of which all charges on industry, except the cost of materials as delivered at the works, are met, it will naturally vary with the amount of those charges" (page 12 of Cd. 6320). The conclusion reached was that "the average net output per head gives a somewhat fictitious representation of the condition of a trade" and that it constitutes only a rough measure on which to base comparisons (pages 14, 15). Hence, while it remains true that the net output for a trade represents a fact, i.e., the value added to materials by capital and labour, and constitutes the best available basis for the comparisons in view, the qualifications to which its use for this purpose is subject must be kept in mind.

*Net output per head in 1924 and 1907.*—The following table shows, for each of the trades included in the Leather, Rubber and Canvas Goods group, the net output per head of persons employed in 1924 and 1907 :—

*Net output per head of persons employed (excluding outworkers).\**

Trade.	1924.	1907.
Fellmongery .. .. .	345	83
Leather .. .. .	275	117
Saddlery, Harness, etc. .. .	145	71
Rubber .. .. .	245	124
Canvas Goods, etc. .. .	187	68
ALL TRADES .. .. .	232	102

\* It has been ascertained from the Census records that the exclusion of particulars relating to Southern Ireland from the 1907 figures would not materially affect the results shown.

The net output per head of persons employed increased by 127 per cent. for the group as a whole, the greatest increase (316 per cent.) being recorded in the Fellmongery Trade and the smallest (98 per cent.) in the Rubber Trade. Relatively to the group average, the net output per head in the Fellmongery Trade increased from 19 per cent. below the average in 1907 to 49 per cent. above the average in 1924, while that in the Rubber Trade fell from 22 per cent. above the average in 1907 to less than 6 per cent. above the average in 1924.

### Employment.

#### *Employment in 1924.*

*Classification of persons employed in a specified week.*—The following table classifies by sex, age and character of employment the numbers of persons (excluding outworkers) who were recorded as employed

in the various Leather, Rubber and Canvas Goods Trades in the week ended 18th October, 1924 :—

*Number of persons (excluding outworkers) employed in the week ended 18th October, 1924.*

Trade.	Operative staff.				Administrative, technical and clerical staff.			
	Males.		Females.		Males.		Females.	
	Under 18.	Total.	Under 18.	Total.	Under 18.	Total.	Under 18.	Total.
	In thousands							
Fellmongery .. .. .	0·1	2·1	* 0·3	0·3	9	297	9	64
Leather .. .. .	2·3	25·2	0·8	3·4	137	2,754	84	694
Saddlery, Harness, etc. .. .	1·5	9·0	3·0	9·7	89	2,662	126	776
Rubber .. .. .	2·3	22·7	4·3	18·1	506	5,110	342	2,331
Canvas Goods, etc. .. .	0·3	2·7	1·3	6·4	66	995	51	391
TOTAL .. .. .	6·5	61·7	9·4	37·9	807	11,818	612	4,256

\* Less than 50.

In the Canvas Goods, etc., Trades and the Saddlery, Harness, etc., Trades the numbers of female operatives employed were greater than the numbers of male operatives, and in the Rubber Trade the number of female operatives was only 20 per cent. less than the number of males.

*Monthly fluctuations in employment.*—In order to ascertain what fluctuations in employment there might be in the course of the censal year, firms were also required to state the actual numbers of the operative staff employed in one week in each month. The figures for individual trades are shown in the respective reports, and the following table gives the monthly aggregates for all the trades together :—

*Operative staff (excluding outworkers) in the Leather, Rubber and Canvas Goods Trades in 1924.*

Week ended.	Males.	Females.	Total.
12th January .. .. .	58,923	35,187	94,110
16th February .. .. .	59,770	36,064	95,834
15th March .. .. .	60,648	36,812	97,460
12th April .. .. .	60,970	37,350	98,320
17th May .. .. .	61,495	37,771	99,266
21st June .. .. .	61,682	37,830	99,512
19th July .. .. .	61,672	37,928	99,600
16th August .. .. .	61,273	37,498	98,771
13th September .. .. .	61,410	37,151	98,561
18th October .. .. .	61,702	37,930	99,632
15th November .. .. .	61,940	38,109	100,049
13th December .. .. .	61,974	38,284	100,258
AVERAGE FOR THE 12 MONTHS	61,122	37,326	98,448

With the exception of a slight decline in August and September, employment as a whole improved throughout the year; this decline affected the male operatives in July and August and the female operatives in August and September. The total number employed at the end of the year exceeded the number employed at the beginning of the year by 6,148, or 6.5 per cent., the increase being composed of 3,051 males and 3,097 females.

The average numbers employed were divided between males and females in the proportion of 621 to 379.

#### Employment in 1924 and 1907.

The following table shows the average numbers of male and female operatives (wage earners), and administrative, technical and clerical staff (salaried persons), in each of the Leather, Rubber and Canvas Goods Trades in the two censal years. Outworkers are not included. The average numbers shown in this table and in the table on page 175 have been determined in the manner explained in Note (19) on page xii.

#### Average numbers (excluding outworkers) employed in 1924 and 1907 in the several Leather, Rubber and Canvas Goods Trades.

Trade.		Operatives (wage earners).		Administrative, technical and clerical staff (salaried persons).		Total.
		Males.	Females.	Males.	Females.	
Fellmongery .. .. .	1924	2,068	324	297	64	2,753
	1907	1,579	39	138	8	1,764
Leather .. .. .	1924	24,785	3,463	2,754	694	31,696
	1907	25,237	1,431	2,095	147	28,910
Saddlery, Harness, etc. .. .	1924	9,015	9,175	2,662	776	21,628
	1907	12,864	6,114	3,160	410	22,548
Rubber .. .. .	1924	22,516	18,130	5,110	2,331	48,087
	1907	13,041	8,515	2,209	274	24,039
Canvas Goods, etc. .. .	1924	2,738	6,234	995	391	10,358
	1907	2,703	4,143	552	65	7,463
ALL TRADES .. .. .	1924	61,122	37,326	11,818	4,256	
	1907	55,424	20,242	8,154	904	
TOTAL .. .. .	1924	98,448		16,074		114,522
	1907	75,666		9,058		84,724

The total numbers employed in the group increased between 1907 and 1924 by 29,798, or 35 per cent., the largest relative increases being in the Rubber Trade (100 per cent.) and the Fellmongery Trade (56 per cent.). In the Saddlery, Harness, etc., Trades, employment decreased by 4 per cent., while the proportion of female operatives rose from 32 per cent. to over 50 per cent.

*Classification of average numbers employed.*—The following table shows the distribution, according to sex, age and character of

employment, of the average number of persons (excluding outworkers) employed in the Leather, Rubber and Canvas Goods group of trades in 1924 and 1907:—

#### Average numbers (excluding outworkers) employed in all Leather, Rubber and Canvas Goods Trades in the two censal years.

Sex and age.	1924.		1907.	
	Operative staff.	Total staff.	Wage earners.	Total staff.
<i>Males:—</i>				
Under 18 .. .. .	6,457	7,264	6,419	7,118
Over 18 .. .. .	54,665	65,676	49,005	56,460
TOTAL .. .. .	61,122	72,940	55,424	63,578
<i>Females:—</i>				
Under 18 .. .. .	9,194	9,806	4,802	4,967
Over 18 .. .. .	28,132	31,776	15,440	16,179
TOTAL .. .. .	37,326	41,582	20,242	21,146
<i>Males and females:—</i>				
Under 18 .. .. .	15,651	17,070	11,221	12,085
Over 18 .. .. .	82,797	97,452	64,445	72,639
TOTAL .. .. .	98,448	114,522	75,666	84,724

*Sex and age distribution of operatives.*—Male labour predominated in the Leather, Rubber and Canvas Goods group in both years: in 1924, 90 per cent. of the excess of males over females was accounted for by the Leather Trade. The increase in the numbers of females was 84 per cent. (91 per cent. for females under 18) while the increase in males was little more than 10 per cent. (0.6 per cent. for males under 18). The proportion of young persons of both sexes differed little, however, at the two Censuses, being a little under 15 per cent. in 1907 and a little under 16 per cent. in 1924.

*Administrative, technical and clerical staff.*—The increase in the administrative, technical and clerical staff in 1924 (described in 1907 as salaried persons) was 7,016, or 77 per cent. Of this increase, males accounted for 3,664 and females for 3,352. The increase in males probably signified an increase in management and sales staffs; the increase in females probably related largely to clerical staff, reflecting a widespread adoption of more detailed accounting methods, and to clerical labour associated with selling organisation.

The proportion of males in the administrative staff in 1907 was 90 per cent. and of females, 10 per cent., as compared with 73½ per cent. and 26½ per cent. respectively in 1924.

*Outworkers.*—In addition to the persons employed in factories and workshops, employment was sometimes given to outworkers (i.e., persons who worked in their own homes on materials given out

to them by their employers). The following table shows the average numbers of such outworkers employed in the Leather, Rubber and Canvas Goods group in 1907 and 1924:—

Trade.	1924.			1907.		
	Males.	Females.	Total.	Males.	Females.	Total.
Saddlery, Harness, etc...	32	75	107	99	175	274
Rubber .. .. .	—	—	—	63	257	320
Canvas Goods, etc. ..	9	69	78	22	500	522
TOTAL .. .. .	41	144	185	184	932	1,116

### Wages in 1924.

The following table summarises the information contained in the reports on the separate trades as to the amount of wages paid by firms in those trades in 1924. The particulars of wages shown in column (5) of the table are those ascertained by the Ministry of Labour as a result of the voluntary enquiry undertaken by that Department into wages and hours of labour in the United Kingdom in 1924. The numbers of operatives shown in column (1) are those returned to the Census of Production as employed by the firms concerned in the week ended 18th October, 1924. The proportion of each trade represented by the firms that furnished particulars of their wage-bills is shown in columns (2) and (4) on the bases of numbers of operatives employed and of net output, respectively.

Trade.	Firms furnishing returns of wages.					
	Operatives employed.		Net output.		Wages paid.	
	Number.	Proportion of trade total.	Amount.	Proportion of trade total.	Amount.	Proportion of net output.
	(1)	(2)	(3)	(4)	(5)	(6)
		Percent.	£'000	Percent.	£'000	Percent.
Fellmongery .. .. .	1,329	54	459	48	153	33·4
Leather .. .. .	20,455	72	6,376	73	2,729	42·8
Saddlery, Harness, etc...	8,701	47	1,447	46	762	52·7
Rubber .. .. .	31,101	76	9,484	80	3,544	37·4
Canvas Goods, etc. ..	4,945	54	1,156	60	410	35·4
TOTAL .. .. .	66,531	67	18,922	71	7,598	40·2

### Mechanical Power.

The power equipment of factories consists in the first instance of the prime movers installed in the works, part being used to apply power mechanically and part to actuate generators for the production of electrical energy. Only a portion of that electrical energy is used for power, i.e., to drive electric motors, the remainder being used for lighting, heating and manufacturing processes. In addition, many factories derive part or all of their power from electricity purchased and used for driving electric motors.

*Power equipment of the various Leather, Rubber and Canvas Goods Trades in 1924, 1912 and 1907.*—The particulars furnished at the three Censuses regarding prime movers and electric generators in factories in the Leather, Rubber and Canvas Goods group of trades are shown in the following table. Particulars of electric motors were not obtained in 1907, and particulars relating to 1924 and 1912 only can be given.

The summary figures of power equipment secured at the 1912 Census are included in this and the following paragraphs, though they are omitted from some of the individual trade reports. The exclusion in that year of firms employing not more than five persons and the incompleteness of many of the returns rendered the results secured for the most part ineffective for purposes of comparison. The figures relating to power equipment are, however, likely to have been affected in a less degree than other aggregates by the omission of the small enterprises. The main interest of the figures given for 1912 lies in the indication which they afford of the increase that has occurred since that year in the use of electricity, particularly purchased electricity, as a source of power. The omission of small firms in 1912 may have had a particular importance in reference to this feature.

The absence of the Irish Free State from the 1924 Census (see page 171) is not thought to have any material effect on the comparisons made in the following tables.

### Power equipment of the several Leather, Rubber and Canvas Goods Trades.

Trade.	Prime movers.			Electric generators.		
	1924.	1912.	1907.	1924.	1912.	1907.
	Thousand H.P.			Thousand Kw.		
Fellmongery .. .. .	2·4	1·0	0·7	0·5	*	—
Leather .. .. .	35·8	23·8	22·6	9·2	2·2	1·6
Saddlery, Harness, etc...	2·3	2·7	2·2	0·6	0·7	0·4
Rubber .. .. .	51·7	35·8	27·4	21·9	6·9	4·4
Canvas Goods, etc. ..	1·9	1·8	2·0	0·6	0·2	0·1
TOTAL .. .. .	94·1	65·1	54·9	32·8	10·0	6·5

\* Less than 50 Kw.

Trade.	Electric motors driven by electricity generated in same works.		Electric motors driven by purchased electricity.		All electric motors.	
	1924.	1912.	1924.	1912.	1924.	1912.
	Thousand H.P.		Thousand H.P.		Thousand H.P.	
Fellmongery .. .. .	0·8	0·1	1·1	0·1	1·9	0·2
Leather .. .. .	12·2	1·5	33·7	3·6	45·9	5·1
Saddlery, Harness, etc...	0·6	0·4	3·1	0·7	3·7	1·1
Rubber .. .. .	36·5	8·6	60·2	7·3	96·7	15·9
Canvas Goods, etc. ..	0·4	0·2	4·6	1·1	5·0	1·3
TOTAL .. .. .	50·5	10·8	102·7	12·8	153·2	23·6

The distribution of the power equipment recorded in 1924 among the three geographical areas covered by the Census was as follows :—

Area.	Prime movers.	Electric generators.	Electric motors driven by	
			Electricity generated in same works.	Purchased electricity.
England and Wales .. .. .	Th. H.P. 87.9	Th. Kw. 32.0	Th. H.P. 50.0	Th. H.P. 87.6
Scotland .. .. .	6.2	0.8	0.5	14.9
Northern Ireland .. .. .	—	—	—	0.2
TOTAL .. .. .	94.1	32.8	50.5	102.7

*Classification of power equipment of the Leather, Rubber and Canvas Goods group.*—The next table, which relates to the power equipment of all the trades taken together, classifies the prime movers according to kinds, the electric generators according to the description of prime movers by which they were driven, and the electric motors according as they were actuated by purchased electricity or by electricity generated in the same factory or works.

Power equipment.	1924.	1912.	1907.
	Th. H.P.	Th. H.P.	Th. H.P.
<b>PRIME MOVERS :—</b>			
Reciprocating steam engines .. .. .	53.0	49.8	45.6
Steam turbines .. .. .	20.6	1.8	†
Gas and oil engines .. .. .	19.8	12.8	8.3
Water power .. .. .	0.7	0.7	1.0
Other power .. .. .	—	—	†
TOTAL .. .. .	94.1	65.1	54.9
<b>ELECTRIC GENERATORS :—</b>	Th. Kw.	Th. Kw.	Th. Kw.
Driven by—			
Reciprocating steam engines .. .. .	13.2	7.4	6.0
Steam turbines .. .. .	15.1	1.3	*
Gas and oil engines .. .. .	4.4	*	} 0.4
Water power .. .. .	0.1	1.3	
Other power .. .. .	—	—	
TOTAL .. .. .	32.8	10.0	6.4
<b>ELECTRIC MOTORS :—</b>	Th. H.P.	Th. H.P.	Th. H.P.
Driven by—			
Electricity generated in same works .. .. .	50.5	10.8	} (Not ascertained)§
Purchased electricity .. .. .	102.7	12.8	
TOTAL .. .. .	153.2	23.6	..

\* Less than 50 Kw.

† Less than 50 H.P.

§ The total amount of electrical energy recorded as purchased for all purposes in 1907 was 1,581,000 Board of Trade units (kilowatt-hours) and it would appear that the quantity generated by the dynamos operated by the firms in this group of trades may have amounted to about 8,500,000 Board of Trade units.

*Power equipment in use and not in use in 1924.*—The firms that made returns to the Census for 1924 were required to distinguish between the prime movers, electric generators, and electric motors ordinarily in use in the course of the year, and those that were in reserve or idle. The proportion not in use should not be taken as a direct measure of the inactivity of trade during the year. While some of the engines, generators, and motors were not in use on account of lack of orders for goods, some were idle because they were normally in reserve against a breakdown or sudden rush of trade, and others may have been in various stages of obsolescence, awaiting the time for being dismantled. The particulars recorded as to power ordinarily in use and not in use in 1924 are given in the following table :—

*Power ordinarily in use and not in use in the Leather, Rubber and Canvas Goods Trades in 1924.*

Trade.	Prime movers.		Electric generators.		Electric motors.	
	(a) Ordinarily in use ; (b) not in use.	Percentage not in use.*	(a) Ordinarily in use ; (b) not in use.	Percentage not in use.*	(a) Ordinarily in use ; (b) not in use.	Percentage not in use.*
	Th. H.P.		Th. Kw.		Th. H.P.	
Fellmongery .. .. .	{ (a) 2.0 (b) 0.4	} 16.5	{ 0.5 †	} 5.1	{ 1.7 0.3	} 13.6
Leather .. .. .	{ (a) 30.1 (b) 5.7		{ 7.7 1.5		} 16.9	
Saddlery, Harness, etc. .. .. .	{ (a) 2.2 (b) 0.1	} 4.0	{ 0.6 —	} —		{ 3.3 0.3
Rubber .. .. .	{ (a) 43.4 (b) 8.3		} 16.0		{ 18.2 3.7	} 16.7
Canvas Goods, etc. .. .. .	{ (a) 1.4 (b) 0.5	} 26.4		{ 0.4 0.2	} 40.6	
TOTAL .. .. .	{ (a) 79.1 (b) 15.0		} 15.9	{ 27.4 5.4		} 16.8

\* Based in each case upon the actual figures returned. † Less than 50 Kw.

*Power available for mechanical and electrical application in 1924.*—In order to ascertain the actual amount of power available in the several trades, and the proportion of that power applied electrically, the capacity of the prime movers used to actuate electric generators must be replaced by the capacity of the electric motors driven by the electricity so produced. How far it may be legitimate to add together the capacity of engines applying, or intended to apply, power mechanically, and the capacity of the electric motors, so as to obtain the power capacity of a factory using both forms of energy, will depend on the organisation of the factory. The information supplied furnishes no guidance as to the effective capacity of the power equipment, for, on the one hand, actual working capacity is not necessarily identical with the indicated horse-power, nor with that which an engine was originally built to develop, data which

served largely as the basis of returns; and, on the other hand, it cannot be assumed that an engine can run uniformly at its peak load, and some engine-power is generally provided as a reserve against breakdowns and not for regular use. In particular, a series of motors (whose aggregate capacity would be returned to the Census) may be installed to run on successive processes, some of which are carried on intermittently as the materials to be treated become available, so that the series always includes some units not actually in operation. In such cases the aggregate horse-power of the motors, being greater than the power called for at any moment, may be greater than the horse-power of the prime movers required to actuate the generators from which the series of motors is driven. Since, however, the mechanical power available per operative employed is regarded as significant of the efficiency of an organisation, an attempt has been made to provide such a measure, though the result can only be regarded as a rough indication claiming no high degree of precision.

In calculating this measure, the power allocated for driving electric generators has to be deducted from the total capacity of prime movers; for this purpose, 746 kilowatts of electrical energy are taken as the equivalent of 1,000 horse-power of mechanical energy, and an average loss of 10 per cent. is allowed in the conversion of mechanical into electrical energy, except in the case of steam turbines, which are usually bolted direct to the shafting of the generator. The power available to be applied mechanically is thus ascertained; and the electrical power available is the sum of the capacities of motors driven by purchased electricity and of those driven by electricity generated in the same works. Comparison with power available in 1907 is not possible, since the capacity of electric motors was not ascertained in that year.

The calculation relating to power available has been made on the basis of the power equipment installed and not on that recorded as being in use. For reasons already given, it must be recognised that the figures representing power available per operative employed are, to some extent which cannot be determined from the data available in the Census office, in excess of the average power utilisable.

The following table sets out the results of the calculation:—

*Power available in the several Leather, Rubber and Canvas Goods Trades in 1924.*

Trade.	Power for mechanical application.	Power for electrical application.	Total power.	Per head of average number of operatives employed.
	Th. H.P.	Th. H.P.	Th. H.P.	H.P.
Fellmongery .. .. .	1.7	1.9	3.6	1.5
Leather .. .. .	22.1	45.9	68.0	2.4
Saddlery, Harness, etc. .. .	1.4	3.7	5.1	0.3
Rubber .. .. .	21.3	96.7	118.0	2.9
Canvas Goods, etc. .. .	1.0	5.0	6.0	0.7
<b>TOTAL .. .. .</b>	<b>47.5</b>	<b>153.2</b>	<b>200.7</b>	<b>2.0</b>

In the aggregate the power available for electrical application and that available for mechanical application were roughly in the proportion of 3 to 1.

#### Fuel and Electricity in 1924.

All firms that received schedules were asked to furnish voluntarily particulars of their consumption of fuel (of specified kinds) and electricity (distinguishing that purchased from that generated in the works) under two headings, namely (i) for power (driving engines), and (ii) for heating or lighting the premises, manufacturing processes, etc. Firms whose aggregate net output was 71.1 per cent. of the net output of all firms in the Leather, Rubber and Canvas Goods Trades in 1924 furnished information in response to this request, though, as will appear later, many of them were unable to divide their particulars into the two categories indicated. The information returned was fairly equally representative of fuel consumption, of production of electricity, and of consumption of purchased electricity, the data supplied under these three headings respectively covering 75.1 per cent. of the capacity of all the prime movers (not hydraulic) in use in this group of trades, 72.3 per cent. of the capacity of the electric generators, and 72.4 per cent. of that of the electric motors driven by purchased electricity. The proportion of the trade for which particulars were furnished varied greatly, however, between one trade and another, as will be seen from the tables given below.

#### *Fuel consumption.*

In 1907, when firms were only asked to state their consumption of coal and coke without specification of purpose, the firms that furnished particulars had 60.4 per cent. of the net output of the group as a whole, and they recorded a consumption of 401,000 tons of coal and 18,000 tons of coke. The consumption recorded in 1924 by firms representing 71.1 per cent. of the net output of the group, included 545,000 tons of coal and 33,000 tons of coke.

The following table summarises the information which was received from firms regarding the quantities of different kinds of fuel which they consumed in 1924. These quantities are divided into (a) the amounts used for power purposes, i.e., driving engines, and (b) the amounts used for the lighting or heating of premises, manufacturing processes, etc., so far as the particulars furnished enable the classification to be made. It appears from the returns, however, that the basis of classification adopted by the various firms that furnished information was by no means uniform; and, apart from this, considerable quantities were reported for which no particulars of purpose could be assigned. These quantities are shown under heading (c) in the table.

*Consumption of fuel (so far as reported) in the several Leather, Rubber and Canvas Goods Trades in 1924.*

NOTES:—(1) The figures in italics below the name of the trade represent respectively (1) the percentage of the total net output of the trade represented by the firms giving information, and (2) the percentage of the total capacity of prime movers (not hydraulic) in use in the trade represented by the firms giving information.

(2) The fuel consumed is, in each case, classified according to the purpose for which it was used, as follows:—(a) for power (driving engines); (b) for heating and lighting premises and for manufacturing processes, etc.; (c) for purposes not separately distinguished.

Trade.	Coal and slack.	Coke and breeze.	Heavy oils.	Light oils.	Gas† purchased.
	Th. tons	Th. tons	Th. galls.	Th. galls.	Th. therms.
Fellmongery .. .. .	(a) 4.9	0.2	—	0.2	14.0
(1) <i>67.6</i> ; (2) <i>80.3</i> ..	(b) 6.2	3.9	1.0	89.8	10.6
	(c) 2.7	0.5	68.0	—	7.0
Leather .. .. .	(a) 42.9	3.4	32.7	6.2	187.5
(1) <i>49.5</i> ; (2) <i>48.3</i> ..	(b) 36.2	5.0	1.3	80.9	117.5
	(c) 46.0	5.6	0.3	1.1	39.6
Saddlery, Harness, etc.	(a) 0.6	—	—	1.1	208.0
(1) <i>51.3</i> ; (2) <i>41.5</i> ..	(b) 3.4	3.0	1.4	41.5	265.1
	(c) 0.1	—	3.0	0.1	33.0
Rubber .. .. .	(a) 174.2	3.2	4.5	3.3	23.6
(1) <i>94.2</i> ; (2) <i>95.8</i> ..	(b) 162.2	5.5	104.5	421.1	552.3
	(c) 57.4	1.8	152.7	1.9	34.9
Canvas Goods, etc. ..	(a) 3.6	*	16.0	†	16.7
(1) <i>61.7</i> ; (2) <i>48.7</i> ..	(b) 2.9	0.8	56.1	31.7	67.1
	(c) 2.0	—	—	—	11.7
ALL TRADES .. .. .	(a) 226.2	6.8	53.2	10.8	449.8
(1) <i>71.1</i> ; (2) <i>75.1</i> ..	(b) 210.9	18.2	164.3	665.0	1,012.6
	(c) 108.2	7.9	224.0	3.1	126.2
GRAND TOTAL (ALL PURPOSES)	545.3	32.9	441.5	678.9	1,588.6

\* Less than 50 tons. † Less than 50 galls.

‡ The amount of gas purchased was, in some cases, returned in terms of cubic feet; in such cases 200 cubic feet have been taken as equivalent to 1 therm.

The difficulty of drawing conclusions and making generalisations on the basis of the figures shown in the preceding table is due primarily to the large quantities of fuel consumed for which no particulars of purpose could be specified by the firms that furnished information. The following table shows these quantities as percentages of the total of each class of fuel consumed in the various trades in the Leather, Rubber and Canvas Goods group:—

*Proportion of fuel consumption for purposes not defined.*

Trade.	Coal and slack.	Coke and breeze.	Heavy oils.	Light oils.	Gas* purchased.
	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
Fellmongery .. .. .	19.6	9.8	98.6	—	22.0
Leather .. .. .	36.8	40.1	0.9	1.2	11.5
Saddlery, Harness, etc.	2.4	—	67.5	0.2	6.5
Rubber .. .. .	14.6	17.3	58.3	0.5	5.7
Canvas Goods, etc. ..	23.0	—	—	—	12.2
ALL TRADES .. .. .	19.8	24.0	50.7	0.5	7.9

\* See footnote to preceding table.

Where the quantities of fuel consumed for purposes not distinguished form only small percentages of the total quantities reported, it may involve no great error to distribute them, e.g., in the proportions recorded for the purposes for which consumption was specified; but where the undistributed portion is important in proportion to the total consumption such a process might lead to erroneous conclusions.

In these circumstances it is not practicable to estimate with any degree of confidence the quantities of the different kinds of fuel used for power, and for other purposes, by the firms who replied to the question in the Census schedules on the subject. Any attempt to extend the particulars furnished so as to estimate the quantities of different kinds of fuel used by all the firms in each of the Leather, Rubber and Canvas Goods Trades would encounter other difficulties, even if distinction of purpose be ignored and attention be confined to the fuel used for all purposes combined. The table on page 182 shows that the firms that furnished information represented varying proportions of the several trades, and in only one case was the proportion, as measured by net output, higher than 70 per cent. Any assumption that the firms that did not furnish information distributed their consumption among the different kinds of fuel in the proportions represented by the practice of those firms that supplied particulars would be extremely hazardous in the absence of information regarding the general practice of the several trades.

For the foregoing reasons, therefore, the information given in the table referred to should not be used as being of more than face value without extreme caution.

*Production and consumption of electricity.*

For 1907 the Census returns showed that about 5,800,000 units of electricity were generated in establishments with dynamos of 4,406 kilowatt capacity, equivalent to 68 per cent. of the total capacity of 6,460 kilowatts in the Leather, Rubber and Canvas Goods Trades as a whole. In 1924, firms with generators (in use) of 19,740 kilowatt capacity (72.3 per cent. of the group total) recorded an aggregate of 52,400,000 units of electricity generated and consumed in their works. As regards purchased electricity, a return was obtained from all firms at the 1907 Census, and this showed a total of 1,581,000 units purchased for all purposes. In 1924 the information received showed that about 41,000,000 units were purchased by firms owning 72.4 per cent. of the electric motors (in use) driven by purchased electricity. While the figures form an inadequate basis for general estimates covering the entire group at both dates, they show clearly that a very large increase in the use of electrical energy took place in these trades, and appear also to be in harmony with the conclusion indicated on page 177 as to the increased



tendency to rely on electricity purchased from public supply undertakings rather than on the installation of generating plant in the works themselves.

The table on page 185 summarises the detailed information received from firms in the Leather, Rubber and Canvas Goods group of trades as to the generation and consumption of electricity in 1924. The figures, must, however, be regarded as subject to qualifications similar to those which apply to the particulars given on pages 181 to 183 respecting consumption of fuel; and, for the same reason, they cannot be appropriately used as the basis of generalised deductions. The percentages of the reported consumption of electricity for which no particulars of purpose could be given were as follows:—

*Proportion of consumption of electricity for purposes not defined.*

Trade.	Electricity.	
	Purchased.	Generated in own works.
Fellmongery .. .. .	22.0	62.7
Leather .. .. .	37.2	18.8
Saddlery, Harness, etc. .. .	26.7	36.2
Rubber .. .. .	12.2	0.2
Canvas Goods, etc. .. .	8.1	9.1
ALL TRADES .. .. .	18.5	1.3

The following table shows that the percentage of the electric generators in use in the trade that was represented by the information furnished regarding electricity generated, was, except in the Rubber Trade, considerably smaller than the percentage of the electric motors driven by purchased electricity that was represented by the information furnished regarding electricity purchased. This may be due in part to the predominance, among the firms replying to the voluntary question, of firms drawing the bulk of their electric power from public supply authorities and not from generators installed in their own works; but at the same time it may reflect the fact that, while all firms necessarily know the quantity of electricity they purchase, many do not record the quantity generated in their own works.

The particulars representing the average amount of electricity generated per kilowatt capacity, as shown in column (3) of the table, exhibit a wide range of variation. These variations doubtless correspond to some extent with differences in the continuity with which the electric generators were operated in the works of the firms that furnished information. The difficulty of basing general conclusions regarding the several trades as a whole on the data shown in the table applies not less to this particular aspect of the matter than to the others.

*Consumption of electricity (so far as reported) in the several Leather, Rubber and Canvas Goods Trades.*

NOTES:—(1) The figures in italics below the name of the trade represent respectively (1) the percentage of the total capacity of electric generators in use in the trade represented by the firms which stated the quantity of electricity generated in their works; and (2) the percentage of the total capacity of electric motors, driven by purchased electricity, in use in the trade represented by the firms which stated the quantity of electricity purchased by them.

(2) The electricity generated and the electricity purchased are, in each case, classified according to the purpose for which they were used, as follows:—(a) for power (driving engines); (b) for heating and lighting premises and for manufacturing processes, etc.; (c) for purposes not separately distinguished.

Trade.	Electricity generated in works of firms giving information.			Electricity purchased by firms giving information.		
	Capacity of electric generators (in use). (1)	Quantity of electricity generated. (2)	Average per kilowatt capacity of generators. (3)	Capacity of electric motors (in use) driven thereby. (4)	Quantity of electricity purchased. (5)	Capacity of electric motors (in use) driven thereby. (6)
	Th. Kw.	Thous. B.T. units.	B.T. units.	Th. H.P.	Thous. B.T. units.	Th. H.P.
Fellmongery .. .. .	0.13	(a) 50	985	0.32	(a) 362	0.89
(1) 29.2; (2) 86.1 ..		(b) —			(b) 11	
		(c) 84			(c) 105	
Leather .. .. .	1.50	(a) 1,592	1,382	4.77	(a) 5,675	14.28
(1) 19.5; (2) 47.8 ..		(b) 89			(b) 328	
		(c) 388			(c) 3,560	
Saddlery, Harness, etc. .. .	0.14	(a) 191	2,508	0.18	(a) 803	1.48
(1) 24.7; (2) 54.6 ..		(b) 36			(b) 217	
		(c) 129			(c) 372	
Rubber .. .. .	17.83	(a) 47,248	2,791	33.24	(a) 22,534	48.32
(1) 97.8; (2) 86.8 ..		(b) 2,435			(b) 2,031	
		(c) 79			(c) 3,418	
Canvas Goods, etc. .. .	0.14	(a) 56	472	0.10	(a) 1,234	2.58
(1) 38.3; (2) 63.9 ..		(b) 4			(b) 195	
		(c) 6			(c) 125	
TOTAL .. .. .	19.74	(a) 49,137	2,653	38.61	(a) 30,608	67.55
(1) 72.3; (2) 72.4 ..		(b) 2,564			(b) 2,782	
		(c) 686			(c) 7,580	