

ning works in England a hundred years ago and went to work at Pawtucket for Moses Brown, a worthy Quaker. Sixty years ago, New England had 400 factories and used 39,200,000 pounds of cotton per year. In 1860, the total number of factories in the Union was over a thousand (1,091); there were 120,000 looms, 5,000,000 spindles; the wages paid amounted to \$24,000,000, and the value of product to \$115,681,000. Within the ten years after 1860 there was but moderate progress apparent in the industry. During the civil war many of the mills were converted into woollen factories, and a tendency towards concentration had besides reduced the number of establishments. By the census of 1880, while the number of factories shows no increase, but rather a decrease from 1860, their capacity had been vastly added to. The number of looms, the number of spindles, the wages paid, the capital employed, had all been doubled compared with 1870. Thus:

	1870.	1880.
Factories.....	956	1,005
Looms.....	157,810	229,784
Spindles.....	7,132,415	10,713,677
Operatives.....	135,369	185,472
Capital.....	\$140,706,291	\$219,505,794
Wages, amount....	39,044,132	45,614,419
All materials.....	111,736,936	113,765,537
Products, value....	177,489,739	210,950,383
Raw cotton used, lbs	398,000,000	770,000,000

In the present year there are probably not less than 14,500,000 spindles in use all over the United States. In an article on the Cotton Industry of New England, contributed by George Rich to the *New England Magazine* for October, we find some very interesting particulars respecting the business. The factory population of those States has undergone several revolutions. "Originally it was composed almost wholly of the sons and daughters of New England farmers. But with the opening up of more congenial and remunerative employments this class deserted the factories and their places were taken by the Irish, English, and German immigrants." These saved their earnings and bought the small farms which the New England yeomen deserted for the boundless West. "They have been succeeded in turn by the French Canadians, and this race is now the predominating element in factory life."

The stirring city of Fall River, in Massachusetts, is devoted almost entirely to the cotton industry. It has about forty cotton corporations. In last week's issue of the *Boston Journal of Commerce*, is a list of 32 textile mills, the aggregate capital of which is \$18,778,000, which paid this year (ended October 31st) dividends ranging from 2 to 19 per cent., the average being a fraction over  $7\frac{1}{2}$  per cent. (7.5815). In the previous year the dividends of these companies to stockholders amounted to \$1,741,900, say 9.37 per cent. average, a falling off in earnings this year equal to one-fifth. Lowell, Lawrence, New Bedford, Holyoke, Chicopee are other Massachusetts towns which show great activity in cotton manufacture. There are, besides Pawtucket in Rhode Island, the cradle of the industry in America, Manchester in New Hampshire, Lewiston and Biddeford in Maine, which have good claims to distinction in this field of enterprise.

A wholesome, handsome, energetic,

English-looking lot of men were the pioneers and later proprietors in the New England cotton manufacture, according to the portraits which illustrate Mr. Rich's article. Samuel and John Slater, Patrick Jackson, Nathan Appleton, David Anthony, Oliver Chase, Abbott Lawrence, in a former generation; the Knights, the Davols, the Browns and Goddards of a later day, are among the kings in this department of textile industry.

The extent of some of these enormous works may be gathered from statistics given in the magazine quoted. At Manchester is the Amoskeag mill, first opened in 1831. It has now a capital of \$4,000,000, and operates 225,000 spindles and 7,500 looms. The Dwight mill at Chicopee has 120,000 spindles, the Lyman mill at Holyoke, whose capital is \$1,470,000, has 82,000. In Lowell are centred seven large corporations, with a capital stock of \$10,600,000. These are the Merrimac Manufacturing Company with 156,480 spindles and 4,607 looms, and producing 1,000,000 yards of dyed and printed cloth per week; the Hamilton Manufacturing Company, with 109,816 spindles and 3,131 looms, and a weekly productive capacity of 714,000 yards; the Appleton Company, with 50,280 spindles and 1,639 looms, and a weekly productive capacity of 350,000 yards; the Lawrence Manufacturing Company, with 120,000 spindles and 3,432 looms, and a weekly productive capacity of 696,526 yards; the Boott Cotton Mill, with 148,412 spindles and 4,000 looms, and producing weekly 775,000 yards; the Massachusetts Cotton Mill, with 126,648 spindles and 3,728 looms, and producing weekly 90,000 yards; and the Tremont and Suffolk Mills, with 114,000 spindles and 3,800 looms, producing weekly 560,230 yards. These seven mills consume weekly about 1,496,293 pounds of cotton. They employ 9,901 women and girls and 4,699 men and boys, and the wages paid each week aggregate more than \$83,000.

The Pacific Mills are the largest in Lawrence. These were started in 1852, and make largely prints and cotton. The mills contain 180,000 cotton spindles, 4,000 looms, and thirty printing machines. The Pacific mills carry a capital of \$2,500,000. The Atlantic mills, which were started in 1846, stand next, with a capital of \$1,000,000. Sheetings and shirtings are their specialty, and 101,344 spindles and 2,001 looms are operated.

#### THE METRIC SYSTEM.

An interested reader of the article on beet sugar which appeared in last week's issue desires to be informed what is meant by the expression in the fifth paragraph, "the average yield of sugar beets in that country (Germany) was, in 100 kilogrammes, 286 per hectare." A partial explanation was given in the succeeding words, "equal to about 425 bushels per acre," but we assume that our correspondent desires to be more fully informed about the terms used. A plainer rendering of the passage from Mr. Falkenbach's report would have been, 28,600 kilogrammes per hectare; and as a kilogramme is equal to about 2.15

pounds avoirdupois and a hectare is about  $2\frac{1}{2}$  acres (2.471), it follows that 12,731 tons or 25,462 pounds of beets were grown to the acre.

The terms used both pertain to the metric system adopted by the French at the beginning of the present century and largely used elsewhere in Europe. The basis of this system is the "metre," a measure of length equal to 39.37 English inches. Other terms are used for standard quantities or measurements of land, of liquid, &c. The subdivisions and multiples of the metre appear in the following table. The Roman numerals deci, centi, milli, are prefixed to all the measures to express 10ths and 100ths and 1,000ths, while the Greek numerals deca, hecto, kilo, myria, express 10, 100, 1,000, or 10,000 metres or grammes.

	English inches.	English feet.
Millimetre	.03937079	
Centimetre	.3937079	
Decimetre	3.937079	
Metre	39.37079	= 3.28089
Decametre	393.7079	= 32.8089
Hectometre	3937.079	= 328.089
Kilometre	39370.79	= 3280.89
Myriametre	393707.9	= 32808.9

Derived from the metre are the litre for measuring liquids and grain, the are for measuring land, the gramme for estimating weight. The litre is the unit of capacity, both dry and liquid. It is the volume of a cubic decimetre (nearly 4 inches), and is equal to 0.2200967 of a British Imperial gallon. As in the metre, its subdivisions are the decilitre, one-tenth; the centilitre, one-hundredth; the millilitre, one-thousandth of a litre. Similarly, 10 litres are a decalitre; 100 a hectolitre; 1000 a kilolitre. The hectolitre is the common measure for grain and is equal to nearly  $2\frac{1}{2}$  Imperial bushels. German exporters of leather, &c., use the kilogramme as a measure of weight; Belgian and other merchants use the hectolitre for grain.

The unit of French land measure, the are, is a square, the sides of which are each 10 metres (or 32.809 feet) long, and which therefore contains 100 square metres, or 1076 English square feet. There are 10 ares in a decare; the next higher and the most common term used to describe quantities of land is the hectare of 100 ares, which is equal to 2.47 English Imperial acres.

Kilogramme and kilometre are probably the words of the metric system with which English or American readers are most familiar; the former is already described above, the latter is equal to 1093 English yards and a fraction. The gramme is the unit of weight in this system. It is equal to 15.43234 grains troy weight. A table is appended:

	Grains Troy.	Pounds Avoirdupois.
Centigramme	.1543234	= .000220462
Decigramme	1.543234	= .000220462
Gramme	15.43234	= .00220462
Decagramme	154.3234	= .0220462
Hectogramme	1543.234	= .220462
Kilogramme	15432.34	= 2.20462
Myriagramme	154323.4	= 22.0462
Quintal	1543234	= 220.462

We remark that the quintal here mentioned is of course the metrical quintal. Before 1801 the French quintal equalled 100 livres, and corresponded to the English "hundred weight," so that the new weight is more than twice as heavy as the old one.