THE WORLD'S COTTON TRADE.

Statistics gathered by the Department of State, and soon to be distributed, make the cotton product of the several cotton-growing countries to exceed three and a half billion pounds a year. Of this amount there is furnished by the

United States	2,770,000,000	pounds.
East Indies	407,000,000	"
Egypt, Smyrna, etc.	269,000,000	"
Brazil	44,000,000	"
West Indies	16,000,000	"
Total	3,506,000,000	pounds.

The figures show that the United States produce nearly four-fifths of the cotton crop of the world, and we know that the yield is steadily and rapidly increasing. Its chief rival, though a long way behind, is as notably declining. In 1875 the area under cotton in India was 11,450,000 acres; in 1878 it was only 8,000,000. The yield to the acre in this country is nearly four times that in India.

According to an English authority, Mulhall ("Progress of the World," London: 1880), the value of cotton manufactures made by machinery is annually as follows:

United Kingdom	$561,170,000
United States	233,280,000
Germany	106,820,000
Russia	103,060,000
Other European countries	310,860,000
India	34,020,000
Total	$1,348,310,000

It is estimated that the number of yards of cloth made every year in the primitive way with hand looms exceeds that of machine-made goods. The hand woven cottons of China, for example, amount to over seven billion yards a year.

The latest trustworthy statistics of cotton manufactures obtained by the State Department show that the principal countries employ over one and a half million operatives, as follows:

	No. of Operatives.	No. of Spindles.
Great Britain	480,000	40,000,000
France	210,000	5,000,000
Germany	130,000	5,000,000
Russia	180,000	3,500,000
Other European countries	250,000	6,600,000
Total European	1,250,000	60,100,000
United States	181,000	10,800,000
India	80,000	1,250,000
Total	1,511,000	72,200,000

The American figures include some 10,000 overseers, clerks, mechanics, watchmen, etc. Deducting these, to place the estimates on an equality with those of Europe, the department finds that the English operative runs about 83 spindles, the American 64½, the French 24, the German 39, the Russian 19. Thus far it would seem that the English operative is more efficient than the American. This, however, is not true, as the following important facts will show: Every American spindle consumes annually 66 pounds of raw cotton, while every British spindle consumes only 32 pounds. Every American operative, therefore, works up about as much raw material as two British operatives, turns out $1.50 worth of goods to the British operative's $1 worth; and even in piece goods, where the superior quality and weight of the American goods are so marked, the American operative turns out 2¾ yards to the British operative's 2½. Moreover, the average price of British and American cottons exported during the year 1880, as given in the customs valuations of England and the United States, was as follows: Piece goods, plain—British, 5·52 cents per yard; American, 8·48 cents. Prints—British, 7·68 cents; American, 7·83 cents. This establishes the greater efficiency of the American operative. The difference in wages is somewhat against the American manufacturer in comparison with the English, but this is only to the greater benefit of the American operative. A comparison of wages of English and American operatives shows as follows: In Lancashire and in Massachusetts, per week: Spinners—English, $7.20 to $8.40; American, $7.07 to $10.30. Weavers—English, $3.84 to $8.64; American, $4.82 to $8.73. Average wages in Massachusetts of all employes: men, $8.30; women, $5 62; male children, $3.11; female children, $3.08. In Lancashire: men, $8; women, $3.40 to $4.30. Hours of labor in Lancashire, 56 per week; in Massachusetts, 60. Thus it is seen that, although English labor is somewhat cheaper than American, the greater efficiency of the American operatives and their longer hours of work equalize the whole question of labor, while the American operative is better paid than the English.

England commands the markets of the world, and is the only country, except Switzerland, that more than supplies the home demand.

The annual imports of cotton goods of the European countries are as follows: France, $21,000,000, against $11,500,000 exports; Germany requires 3,000,000 spindles more to supply her home demand; Russia imports $15,000,000, but it is probable that she will supply her home demand in a few years; Sweden, Norway, Denmark, and Belgium import $13,500,000; Holland exports $6,000,000 in excess of her imports; Switzerland exports $10,000,000 in excess of her imports, and is, besides England, the only European country independent of foreign manufactures; Spain, Portugal, and Italy import $20,000,000; Hungary, Greece, Turkey, and Roumania import $40,000,000. The present Asiatic, African, and Australian demand can be estimated by the exports of England to those countries plus the present comparatively small exports of the United States. Great Britain exports annually $310,000,000 worth of cotton goods, the output of 35,000,000 spindles, which is more than are run by all the other manufacturing nations combined. She exports to Asia annually $136,791,000, to Australasia $8,674,000, and to Africa $19,091,000.

The imports of cotton manufactures to the United States are nearly three times as great as the exports. In 1880 they were:

	Imports.	Exports.
Piece goods, plain	$1,020,000	$5,835,000
Piece goods, printed	1,180,000	2,956,000
Hosiery, shirts, and drawers	7,515,000	
Jeans, denims	1,068,000	
All other manufactures	19,146,000	1,190,000
Totals	$29,929,000	$9,981,000

For the fical year ending June 30, 1881, there was an increase over 1880 of exports to the amount of $3,589,869.

The excess of imports consists of fancy goods, in the production of which the English mills excel. In piece goods the American mills supply the home demand and are exporting every year greater quantities. In 1880 we imported only 9,466,000 yards of plain piece goods, and exported nearly 69,000,000 yards; of printed piece goods we imported 9,346,000 yards and exported 38,000,000 yards. The imports of print goods are confined to specialties.

The present inability of American cotton manufacturers to divide the markets of the world with Great Britain is due, in the opinion of the Department of State, to the following advantages enjoyed by the British manufacturers:

1. Possession of the world's markets.

2. The system which has belted the world with entrepôts, chiefly colonial, for the reception and distribution of English goods.

3. A steam marine that covers every sea and gives direct and speedy communication with every port.

4. Vast capital, enabling the manufacturers to keep large stocks on hand and to give long credit.

5. A far-seeing and far-reaching spirit which impels the manufacturer to continue trading even when he loses, until he tires out the opposition.

The remedy, plainly, is to follow the British example. But there is another fact that must be considered. Great Britain sends goods to Africa and sells them for 4·51 cents a yard, to India for 4·84 cents, to China for 5·26 cents. All these are, of course, adulterated goods. It is estimated that out of the $280,100,000 worth of piece goods exported from the United Kingdom in 1880 not more than $60,000,000 worth were pure goods. Pure American goods cannot compete with these adulterated English goods so long as the buyers prefer the adulterated goods at the low prices. The question comes up, Shall our manufacturers adulterate their goods or shall they persistently try to introduce pure goods? The consuls are almost unanimous in their opinions that after a fair trial can be had the people of Africa and Asia will prefer American goods at higher prices.

What Invention May Do.

The possibilities of science when applied to the industrial arts are so very great that careful people hesitate to state them for fear of exciting ridicule. So, in articles which have recently been published in London as well as in New York, a humorous turn has been given to some of the possible results of inventions in these days.

Were an Englishman of the time of Elizabeth to have been told that water would be supplied to every house by means of pipes, that a combustible gas would be distributed in a similar manner from a central reservoir, that messages would be sent across continents and under oceans in a few minutes, he would have set down his informant as a lunatic, or, at best, the very wildest of dreamers. The man of to-day would be quite as incredulous if told what inventions and applications of science may do for the people of 1981.

One writer ventures to predict that in the twentieth century electricity will accomplish marvels which now seem too absurd to seriously set forth. Chops and steaks will be cooked by electric sparks so as to make the Frenchman's *cotelette à la minute* a reality. The fruits of the earth will be multiplied enormously by the use of electric light behind colored glass. Fruits and vegetables will be grown all the year round, winter and summer, day and night, so that the field which now produces a hundred bushels of any product will yield ten thousand. We now cook our food, but take our air and water raw, and through these two elements come all the disorders and contagions which afflict humanity. In the future water will be distilled and prepared for human use, and thereby purified from all germs of disease, while air will not be breathed by human beings until it has been cleared of all noxious qualities, after which it will be admitted to the glass-covered streets and dwellings in which the man of the future will live. Houses and places of business will be situated in immense inclosed edifices, the air of which will not only be rendered wholesome, but delightful to the sense of smell. Summer and winter, so far as extreme cold or extreme heat is concerned, will be abolished, as the temperature can be controlled by artificial means, and all parts of the globe will become equally inhabitable. Day will have no attractions over night, for the artificial lights will be more pleasing than any which the great luminary of day can give us. Then, of course, the air will be navigated, which will help to change the appearance of the surface of the earth, for the great cities will then be situated on healthful hilltops, instead of on the insalubrious plains below. With the great motors shortly to be discovered, huge mountain chains which obstruct man's progress in any direction can be leveled, while the ice packs around the two poles can be liquefied and made navigable.

All this seems wild enough, but no doubt very great changes will occur. If food can be produced by improved methods, with less cost, the problem of poverty is solved. If machinery continues to replace handwork, the hours of labor must be shortened and its value increased; but to accomplish this, a social revolution will be needed by which labor-saving machines will be worked for the benefit of the laborer, and not in competition with him.—*The Hour.*

The Expansion of Water by Heat.

Herr P. Volkmann has in the *Annalen fur Physik und Chemie* compiled the results of Hagen, Matthiessen, Pierre, Kopp, and Jolly, on the expansion of water, and has obtained the following mean results for the volume and density of water at various temperatures:

Temp.	Volume.	Density.	Temp.	Volume.
0degr. C	1·000122	0·999878	15 degr. C.	1·000847
1 "	1·000067	0·999933	20 "	1·001731
2 "	1·000028	0·999972	25 "	1·002868
3 "	1·000007	0·999993	30 "	1·004250
4 "	1·000000	1·000000	35 "	1·007700
5 "	1·000008	0·999992	50 "	1·011970
6 "	1·000031	0·999969	60 "	1·016940
7 "	1·000067	0·999933	70 "	1·022610
8 "	1·000118	0·999882	80 "	1·028910
9 "	1·000181	0·999819	90 "	1·035740
10 "	1·000261	0·999739	100 "	1·043230

Poisonous Effects of Different Metals.

BY CH. RICHET.

In the following investigation the poisons were not injected subcutaneously, nor were they introduced directly into the veins, but small fishes, weighing about ten grammes each, were placed in poisonous water, from which very satisfactory results were obtained. The method is a very convenient one, and yields very accurate data. The rapidity of death depends upon the degree of concentration, and the limit of its poisonous effect was taken as the amount of poison contained in one liter of water in which it was possible for the fish to live for forty-eight hours.

The different metals were employed in the form of chlorates; the nitrates were found to be much more poisonous; while most of the sulphates were not sufficiently soluble, and hence could not be used for these experiments.

No. of Experiments.	Metal.	Limit of Poisonous Effect.
20	Mercury.	0·00029
7	Copper.	0·0033
20	Zinc.	0·0084
10	Iron.	0·014
7	Cadmium.	0·017
6	Ammonium (NH_4)?	0·064
7	Potassium.	0·10
10	Nickel.	0·125
9	Cobalt.	0·125
11	Lithium.	0·3
20	Manganese.	0·30
6	Barium.	0·78
4	Magnesium.	1·5
20	Strontium.	2·2
5	Calcium.	2·4
6	Natrium.	24·17

Thus it will be seen that, according to the previous table, potassium chloride is 250 times as poisonous as sodium chloride.—*Chem. Zeitung*, v. 876.

Why San Francisco Needs the Steam Buggy.

To the Editor of the Scientific American:

Your correspondent, W. C. K., under the heading, "Steam Buggies," in the SCIENTIFIC AMERICAN of November 26, calls attention to a subject of special interest to the inhabitants of large cities. Everybody is aware of the intolerable horse nuisance, caused by keeping carriages, wagons, etc., standing in the public streets. It is safe to say that at least half the death rate of cities is attributable to this nuisance.

Here in San Francisco the stench arising from neglected filthy streets is simply awful. And this is for the most part caused by horses. There are only three streets in this city that are kept in anything like a decent condition: these are Market, Kearny, and Montgomery streets.

Were the streets of an Eastern city allowed to remain in the same condition as those of San Francisco the population would soon be decimated by smallpox and other epidemics. But here, owing to a constant strong breeze blowing from the ocean, the noxious vapors are carried off as fast as they rise. To this alone is owing the freedom of this city from epidemics, as the members of the Board of Health—if such a body exists here—seem to take no interest in the matter. Between the horses and the Chinese, San Francisco is fast assuming the characteristics of an Asiatic city. The man who will invent a motor substitute for horses will be a benefactor to the human race.

SANITARIAN.

San Francisco, December, 1881.

Cold Storage.

The increasing use of cold storage for perishable food stuffs, which are apt to be scarce at certain seasons, is one of the characteristics of the time. Last summer, when fresh eggs were plentiful and cheap, a gentleman in Chenango Co., N. Y., stored in a mammoth cooler some five thousand barrels of eggs. Now they sell in this city as "fresh laid" eggs, at a large profit. As the eggs are removed the cooler is filled up with ducks and other fowl to be sold next spring.