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THE FASTEST REGULAR TRAIN IN THE WORLD.

In our issue of September 3, 1898, we gave an illustrated description of the two trains which make the fastest long-distance runs without a stop, namely, the Empire State express, of the New York Central system in this country, and the Cornish express, of the Great Western system in England. The former runs a distance of 142·8 miles at the average speed of 53·58 miles an hour, and the English train covers 193·9 miles at the average speed of 53·36 miles an hour. Although these are the fastest regular trains for the distance, they are by no means the fastest trains in the world. The claim to this distinction is held by a truly remarkable train that runs daily during the summer months on the Philadelphia and Reading Railroad between Philadelphia and Atlantic City. The distance between Camden, the starting point, and Atlantic City is 55·5 miles. The road is a practically level one and the curvature is light. The trains are timed to make the run without a stop in 50 minutes at the rate of 66·6 miles an hour, a feat which is regularly and easily accomplished, for it is not unusual for the distance to be covered in considerably less time than this. On one occasion the trip was made in 47½ minutes—a speed of 70·1 miles an hour; while the record run of the season was made in 44·75 minutes, or at an average speed of 74·4 miles an hour. These are truly wonderful performances, and as mere feats of fast running, irrespective of the distance covered, they place the Atlantic City flier in an unquestionable position as the fastest regular train in the world.

Additional merit attaches to the run from the fact that the train is by no means a light one. On the day when the record was made it consisted of a combination car weighing 57,200 pounds, a Pullman car weighing 85,500 pounds, and four day coaches weighing 236,800 pounds, a total train load of 379,500 pounds.

EXPERIMENT THE TRUE BASIS OF ENGINEERING DATA.

One of the most valuable features in the address of Sir John Wolfe Barry, at the late meeting of the British Association, at Bristol, was his demand for a more searching investigation of the many unsettled questions in the Science of Engineering. It is a fact that among the excellent text books from which the young engineer has to choose, he finds that there are, even in this late day, widely divergent opinions as to the strength of materials and with regard to much of the fundamental data upon which all practical calculations have to be based.

The only reliable data is that which is established as the result of exhaustive experiment and widespread observation, in which every possible source of error has been eliminated. The proper plan of research is for the investigator first to determine clearly what is the nature of the information he is seeking, and then to put out of his mind all preconceived ideas and pet theories, seeking for the naked truth with a mind free as far as possible from all prejudice and bias.

As an instance of wrong conclusions arrived at by arguing on false and too hastily accepted premises, one of the most familiar and famous is that of Dr. Lardner, who stated in 1836 that the whole idea of ocean steam navigation on voyages as long as from Bristol to New York was, at that epoch, an abstract impossibility. His conclusions were based upon the false assumption that in proportion as the capacity of a vessel is increased, in the same ratio, or nearly so, must the mechanical power of the engines and the consumption of coal be augmented.

Another instance of hasty generalization is the excessive allowances for wind pressure which have frequently been adopted in designing important structures. The most notable case of this is the great Forth Bridge in Scotland, in which provision was made—in accordance with a regulation of the Board of Trade issued in 1880, immediately after the fall of the Tay Bridge—for a wind pressure of 56 pounds on every square foot of the structure. Experiments carried out during the building of the bridge to determine the actual amount of wind pressure at the site, experiments which extended (as they should do to have a real value) over several years, brought to light the fact that the maximum pressures recorded on small surfaces were never found to extend uniformly over larger surfaces. Thus a large wind gage of 300 square feet area registered pressures 38·7 per cent less than those registered on a much smaller gage under the same conditions. Experiments during the building of the Tower Bridge, London, established the same results in a yet more marked degree, for, using the bascules of the bridge, whose area is 5,000 square feet, as a great wind gage, it was found that while they registered an average pressure of 1 to 1·5 pounds per square foot for the whole surface, a small gage in the neighborhood, subject to the same conditions, showed a pressure of from 6 to 9 pounds. These experiments brought to light the unsuspected fact that for some reason, not well understood, a gale of wind presents areas of maximum pressures which are far in excess of the average pressure. The 56-pound unit imposed by the Board of Trade has unquestionably led to a weight of metal being worked into the Forth Bridge, to provide for wind strains, greatly in excess of the requirements of the case.

The above is only one of many instances in which the need of exact and scientifically ascertained physical data is keenly felt in engineering and other constructive work. A notable instance of this is our ignorance of the average strength of the different kinds of timber which are used in bridge or roof work, or for other purposes where it is desirable for purposes of economy or appearance to know the minimum amount of material that will serve the purpose. The Fernow investigations of American woods are a valuable contribution to science as far as they go, and it is sincerely to be hoped that the needed government appropriations will be forthcoming to enable them to be carried to completion.

An effort is being made in England to have created a Public Physical Laboratory, in which engineering data can be scientifically determined, and a government committee has reported favorably of its establishment. The value of such an institution cannot be called in question, and the establishment of such a laboratory in any country would provide a center to which the mass of results arrived at by detached investigators might be submitted, and where by its own careful and systematized work a standard of units might be prepared which would be accepted as final by our own mechanics, architects, and engineers.

AMERICAN SILK MANUFACTURES AND EXPORTS.

The announcement that the silk manufacturers of the United States are rapidly increasing the exportation of their products adds interest to some recently compiled statements by the Treasury Bureau of Statistics regarding the silk manufactures and importations and exportations of this country during the past few years. These figures show that the manufacture of silk in this country has increased enormously, that the imports of manufactured silk have meantime been greatly reduced, and the exportations of silk manufactures are now increasing very rapidly, the total exports for the present calendar year being more than 50 per cent in excess of the corresponding months of last year, and for the full year will be six times as much as in 1890.

The manufacture of silk in the United States, which in 1860 amounted to $6,607,771 in value, doubled in the following decade, being, according to the figures of the census of 1870, $12,210,662, more than trebled in the next decade, being in 1880, $41,033,045, and again doubled from 1880 to 1890, being in the latter year, $87,298,454. While a recent compilation by the secretary of the American Silk Association shows that in the five years since 1890 the rate of increase has even accelerated, making it probable that the silk production of the United States to-day amounts to nearly or quite $150,000,000 per annum in value.

Meantime the importation of manufactured silks has fallen rapidly, that of 1890 being $38,686,374, and that of 1898 only $23,523,110.

That the manufacture of silk goods in the United States has increased very rapidly within the past year is apparent. Importations of raw silk, which in the fiscal year 1897 were 6,513,612 pounds, were, in 1898, 10,315,161 pounds; and the total value of raw silk imported in 1898 was $31,446,800, against $18,918,283 in the preceding year. This enormous increase in the importation of raw silk is doubtless accounted for, not only by the activity in the great silk manufacturing centers of this country, but also by the recent announcement that numerous cotton factories in the New England and the Middle States have substituted silk manufacturing machinery for that formerly used in the manufacture of cotton goods now largely supplied by the mills located nearer to the cotton fields of the South.

The growth in the importations of unmanufactured silk, which of course measure the manufacture of silk, has been steady and rapid during the past thirty years. In 1868 they amounted to $2,520,404 in value; in 1878, $5,995,567; in 1888, $19,931,682; and in 1898, $31,446,800. In the single item of "silk raw, or as reeled from the cocoons" the importations of 1868 were 512,449 pounds; in 1878, 1,182,750 pounds; in 1888, 5,173,840 pounds; and in 1898, 10,315,161 pounds. During the earlier part of this period importers held their own in the contest for the field, but in the last decade have fallen practically out of the race. In 1868 the importations of manufactured silk were $17,777,627; in 1878, $19,837,972; in 1888, $33,350,999; in 1890, $38,686,374; and in 1898, $23,523,110.

Meantime our manufacturers have apparently begun giving their attention to the foreign market; their exports, which in 1878 were $19,032, having increased to $56.659 in 1888, $161,673 in 1893, and $297,074 in 1898. During the month of August, 1898, the exports were $27,251, against $21,400 in August, 1897, an increase of 30 per cent in a single year.

The success of American manufacturers in supplying the home demand and obtaining a foothold in the markets of the world is the more strongly marked since other nations have failed in their efforts to compete with the great silk manufacturing nation of the world, France. The statistical abstract of Great Britain just issued shows that the exportation of silk manufactures from the United Kingdom has fallen 50 per cent in the last decade, being in 1897, 1,338,161 pounds sterling in value, against 2,664,244 pounds st rling in 1888, while the official reports of the German government show that the silk exportations of that country have decreased in a like proportion, being $45,000,000 in 1889 and $26,000,000 in 1897, France alone having barely held her own in this line, her exports of silk manufactures in 1890 being $52,862,700, and in 1897, $52,283,700.

Silk manufacturing in the United States, while begun nearly a half century ago, seems to have developed almost exclusively in the last half of that period. Prior to 1870 the importations of raw silk for use in the manufactories in this country had never reached 1,000,000 pounds, while, as already stated, they were, in 1898, more than 10,000,000 pounds. During the civil war and in the years immediately following the manufacture of plain dress silks was begun, while at the present time brocaded silks and satins are manufactured on a large scale, and the manufacture of silk plushes and all varieties of upholstered goods has recently been successfully developed. In 1860 our manufacturers of silk supplied but about 15 per cent of the consumption in the United States; by 1870 they were supplying 30 per cent of the amount consumed in the United States; by 1880, more than 50 per cent; in 1890, 70 per cent; and to-day it is estimated that 85 per cent of the silk goods used in the United States are the products of our own factories.

The following table presents the number of silk manufacturing establishments in the United States and value of their products, shown by each census since 1860:

Year.	Number of establishments.	Value of products.
1860	139	$6,607,771
1870	86	12,210,662
1880	382	41,033,045
1890	472	87,298,454

The following table shows the imports of raw silk and value of manufactured silks during the past thirty years by five-year periods:

Year.	Imports of raw silk. (Pounds.)	Imports of silk manufactures.
1868	512,449	$17,777,627
1873	1,159,420	29,890,035
1878	1,182,750	19,837,972
1883	3,253,370	36,764,726
1888	5,173,840.	33,350,999
1893	7,422,430	38,958,928
1898	10,315,161	23,523,110

THE LATEST NEWS OF THE NOBEL BEQUEST.

Mr. Axel Danielson, a correspondent of Stockholm, Sweden, is keeping us informed as to the status of the Nobel bequest. He says that the case has been decided, or rather a compromise has been effected between the contesting parties. The relatives of the deceased will receive 3,800,000 Swedish crowns, a little more than $1,000,000, so that there still remains for the prizes the sum of 25,000,000 crowns, equivalent to $6,950,000. The income, computed at the rate of three per cent, will make the five prizes worth 150,000 crowns or $41,600 each. It is expected that the compound interest during the time, which will necessarily be long, that will elapse before the prizes can be awarded will increase the capital so as to cover the cost of managing the funds and the work entailed in properly distributing the prizes. It will be remembered that these prizes are to be awarded annually to persons making the most important discoveries in physics, chemistry, physiology or medicine. There is also to be a prize for the best literary contribution upon the subject of physiology or medicine, and also one for any person who has achieved the most or done the best things looking toward the promotion of the cause of peace throughout the world.