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SUCCESSFUL GERMAN AND BELGIAN COMPETITION WITH GREAT BRITAIN IN THE IRON TRADES.

There has been a remarkable development of the iron trades in Germany and Belgium in the last few years. The serious inroads which the competition of these countries is making upon fields, both at home and abroad, which were supposed to be firmly controlled by the English manufacturers have stirred up the British trade to make special inquiry into "the methods and conditions under which Continental manufacturers—more particularly those in Belgium and Germany—were enabled to compete so successfully with those in this country (Great Britain), not only here, but also in neutral markets."

It appears that the cost of raw material, such as coal and pig iron, differs very little in England, Germany, or Belgium; and that it is in the process of manufacture that the Continental firms show such superior economy. The extent to which these nations have been able to underbid the British manufacturer may be judged from the following figures: "In 1882 Great Britain produced 8,493,000 tons of iron, against only 3,380,000 tons produced in Germany. In that year the British produced 5,014,000 tons of finished iron and steel, or about double the output of Germany. Since then, however, the annual German production of pig iron has advanced to 5,380,000 tons, and the output of finished iron and steel to 5,927,000 tons, while the British production of pig iron has declined to 7,364,000 tons, and the British output of finished iron and steel has dropped to only a trifle over 4,000,000 tons; so that Germany is now producing a considerably larger quantity of finished products than is Great Britain. Belgium has not during this period made anything like the same relative progress as Germany, but the output of Belgian steel has, nevertheless, more than doubled during the last ten years, and the capacity of production is now three times what it was in 1880."

It appears that, as between England and Germany, there is not so great a difference in the wages, as is generally supposed. They are lower in Germany; but on the other hand there is a larger relative number of men employed in a German mill. One secret of their economy is seen in the fact that there are no highly paid head "mill contractors," as in an English mill; the oversight being left entirely to the engineer. As the result of its investigations the delegation report, "the general distribution of wages is more evenly balanced, and we do not find the extremes that obtain among English workmen."

RAPID TRANSIT IN NEW YORK CITY.

We note with pleasure that ex-Mayor Abram S. Hewitt, in his testimony before the Rapid Transit Commission, advocates an immediate extension of the elevated roads on the lines indicated by us in our last issue.

Mr. Hewitt is opposed to the construction of an underground road beneath Broadway, both on technical grounds and because of the unavoidable obstruction to traffic which must arise during its construction. He suggests the Elm Street route as being more feasible. At the same time, he affirms that whichever route be adopted, it will be at least five years before the scheme would be completed and in operation; and that it is imperative that some immediate scheme of relief be carried out to meet the pressing needs of the hour.

"Most of the difficulty," said Mr. Hewitt, "which exists to-day and which will exist during the next five years during the construction of this road would be met by an arrangement between the Rapid Transit Board with the Manhattan Elevated Company for additional tracks and express trains. To-day the most important consideration for New York City is not the construction of the road, but that the existing elevated structures should be strengthened, increased, and put in a condition to move the people up and down town at a rapid transit rate of speed. When I say this, I want it understood that I have no axes to grind and I do not hold a single share in the elevated or the New York Central Railroad. I say, however, that the elevated road should get every facility to increase their means of transportation."

We heartily agree with the ex-mayor in his conviction that the elevated system should get "every facility" in carrying out this sorely needed extension.

It seems to us that the question is purely one of expediency, and that it should be judged as such. The improvement of our transportation facilities is a matter of compromise, in which the benefits which will arise from the doubling of the elevated tracks are to be weighed against any inconveniences which might result therefrom. The existing roads are a disfigurement to the streets in which they run, it is true, but the mere addition of extra tracks and strengthening of the existing structures can scarcely make that disfigurement any more complete than it already is; and if the complete removal of one nuisance can be obtained at the cost of a slight increase in some other, common sense would suggest that the change be made.

If, on the other hand, the question is not one of pure expediency, there must enter into it, as Mr. Hewitt's words would suggest, an element of sentiment or prejudice. The elevated system is, or at any rate has been, an enormously profitable investment, it is true; but it has also been an enormous public convenience. If the general public, or the body that administers its affairs, is willing to submit to the present intolerable overcrowding, rather than contemplate a possible increase in the profits of the corporation which serves its needs, and is seeking to serve them more effectually, it is collectively guilty of the sin of cutting off the nose to spite the face—a species of folly which is supposed to be remotely possible in the individual, but never in a collective body of men.

A Large Gun Making Combination.

Several of the largest gun making establishments of the United States have combined to form what is to be called the American Ordnance Company, with Gen. Albert R. Ordway as president. The firms in the agreement are said to be the Driggs-Schroeder Ordnance Company, of Philadelphia; the American Projectile Company, of Lynn, Mass.; the Hotchkiss Company, and a torpedo company of Providence, R. I. It is stated that the Bethlehem Company, of Bethlehem, Pa., and the Gatling Gun Company, of Hartford, are also in the new combination. The company will have its headquarters in Washington, and a big plant for the manufacture of projectiles and guns will be started at once at Bridgeport, Conn. The reason given for the organization of the new company is that the separate companies are unable to cope successfully with the large European establishments, while a concentration of their capital will permit them to do so. The new concern will endeavor to obtain the trade of South and Central America and of the Asiatic governments.

Refinements of Measurements.

Refinements of measurements have gone to almost incredible limits. On lenses curvatures of 1-150,000 inch can be measured. In spectroscopic analysis of mere traces of different elements, fractional wave lengths are read to 1 2,500 millionth of an inch. Professor Dewar in his researches on liquid air attained a vacuum of 1-2,500 millionth of an atmosphere by filling a vessel with mercurial vapor and exposing it to a very low temperature, and Professor Boys, with the simplest possible arrangement of quartz fiber, torsional balance, and mirror, claims to have been able to just detect an attractive force of the 1-20,000 millionth of a grain. So much for minute weights and measures, and as regards angles the Darwin pendulum will indicate a movement of 1 300 of a second, which would be about the angular measurement of a penny piece at the distance of 1,000 miles. It is difficult to realize the minuteness of measurements like the preceding. The smallest gold coin of Great Britain, if drawn out into a wire 1-2,500 millionth of an inch diameter, would be long enough to stretch to the sun and back again ten thousand times, and yet the fundamental mystery of the constitution of atoms and molecules would be locked up in every infinitesimal portion of the length of that minute wire. "For the establishment of a truer and more comprehensive theory of elasticity," write the authors of the last important work on the subject, "we shall probably have to wait until we gain a wider acquaintance with the nature of intermolecular action."—Engineering Mechanics.

DR. MAX WOLF'S method of detecting minor planets by photography is described in a recent number of Nature. He uses a 6 inch portrait lens of 30 inches focal length in his telescope, which gives him a field of about 70 square degrees. To make sure that the trails of the planets are not defects in the plates, two photographs of each region are taken, with an exposure of two hours. A positive and a negative are put together with the films in contact where the trails appear as a continuation of each other. Another method is to look at the photograph through a stereoscope, the planet then appearing in relief. Dr. Wolf has never looked through the telescope at any of the many planets he has discovered by the photographic method.

Patents and Inventions.

The Connecticut Yankee still preserves his pre-eminence as an inventor. For the last few years more patents in proportion to population have been issued to Connecticut than to any other State. At present one man in every 993 inhabitants of Connecticut is an inventor.

It is a remarkable fact that 5,479 patents have been issued for devices used in wearing apparel. Many of them relate to the method of cutting and fitting, while others are concerned with peculiar devices employed to strengthen the material in certain parts of the garment.

Strange to say, the District of Columbia contains a remarkable number of inventors, one to every 1,379 of the population. This state of affairs may possibly be explained on the supposition that many inventors make a temporary home in the District for the purpose of forwarding the interests of their devices.

According to the Patent Office reports, there are 5,014 different kinds of patented beds and lounges on which "tired nature's sweet restorer, balmy sleep," may be courted.

The care of live stock has received close attention at the hands of the American inventor, 3,089 appliances having been devised for the comfort and convenience of domestic animals.

The natives of Germany come next in order to those of England in the matter of taking out patents in this country. The number of patents issued to subjects of the Kaiser is 582.

Massachusetts stands next to Connecticut in the number of its inventors in proportion to population. In the Bay State one man in every 1,335 of the population patents something every year.

That music hath charms to soothe the savage breast of the inventor is demonstrated by the fact that he has taken out 3,928 patents on musical instruments or the various parts thereof.

The bees of America have no reason to complain of neglect, there being 998 patent hives in which the busy bee, that, according to the poet, improves each shining hour, may store up its honey.

The butcher has 978 patents which may be employed or not, as he chooses, in his business. Most of them are devices used in the large pork packing establishments.

The manufacture of India rubber is protected by 1,864 patents.

The young American idea is taught to shoot by means of 793 patents issued upon as many educational appliances. The old-fashioned birch ruler or section of rubber hose used in education is not protected by a patent, and may be employed by any pedagogue.

More patents have been issued from our patent office to British subjects than to the natives of any other foreign country, the number being 689.

Since the invention of the first harvester this implement has been constantly improved, there being no less than 10,155 patents upon it or its parts.

Mississippi stands next to South Carolina in the scarcity of inventions, there being in the former State only one inventor to every 21,857 of its population.

Window shades have received extensive attention at the hands of the inventor, there being 2,435 patents upon them and the devices to keep them in place.

South Carolina patents less inventions in proportion to its population than any other State. There is only one inventor to every 25,581 of its population.

The American farmer will probably be surprised to learn that there are 10,122 different models of plows in the Patent Office, on all of which patents have been issued.

The natives of Canada do not scruple to take out patents in Washington; 296 have been granted by our Patent Office to our cousins on the other side of the St. Lawrence.

The greatest number of patents issued in any one line has been for devices employed in carriages, wagons and other vehicles. The total number of patents in this line is 20,096.

The ordinary reader will probably be surprised to learn that 1,137 patents have been taken out either on different kinds of alcohol or on different devices for its manufacture.

The new woman may choose any one of 1,506 different kinds of crinoline and corsets, all of which have been patented.

The painter of this country is aided by 2,043 patents, covering his paints, brushes and other materials and appliances.

The granger of America need be at no loss for a harrow, 4,691 patents having been issued on these aids to agricultural toil.

On stoves and furnaces 18,340 patents have been issued, covering every part of these indispensable articles of comfort.

The manufacture of charcoal and coke is encouraged by the issuance of 178 patents on the processes or machinery employed.

Rhode Island contains a large number of inventive geniuses, the proportion being one inventor to every 1,753 of its population.

Photography is not so fully represented in the Patent Office as might be supposed, there being only 1,481 patents in this art.

Advertising devices have received much attention at the hands of the inventors, there being 1,922 patents taken out in this line.

The man who loses an arm or a leg, a hand or a foot, has 421 different varieties of artificial limbs or members at his command.

The American housewife ought to make good preserves, for this art is covered by 1,541 patents, either of appliances or of methods.

The annealing and tempering of metals have called for much attention, no less than 736 devices for these purposes having been patented.

The irrigation problem, together with the necessity of having water in every room in the house, has called forth 7,707 patented appliances.

Lamps and their various parts have received much attention from the inventor, there being 8,211 patented appliances in this line of lighting.

The manufacture of the staff of life is carried on by the use of 764 devices employed to make it or used as material in its manufacture.

Every American wears shoes, but not every American knows that 9,348 patents have been taken out on the machinery used in making them.

The processes of grinding and polishing surfaces of metal, stone, wood or glass may be accelerated by the employment of any one of 2,598 patents.

The problem of fencing farm land and city lots has received extensive attention, there being no less than 6,807 patents upon fencing devices and posts.

The vegetables of this country may be cut or crushed in our kitchens by the aid of 2,005 patent machines.

The art of printing is covered by 5,833 patents, either of machines or special devices employed in the work.

The inventors of artificial stone and the manufacturers of lime and cement have taken out 1,159 patents.

The surgeons of this country transact business with their patients by the aid of 3,335 patent appliances.

It seems strange, considering the delicate processes employed in the manufacture of jewelry, that there should be only 1,106 patents in this line.

There is no State or Territory in the Union to some of whose citizens patents have not been granted.

The great department stores and elevators of our cities may choose any one of 1,167 cash or goods conveyors.

The fire extinguisher is represented in the Patent Office by 1,023 different models, each covered by papers patent.

Montana has an unusual number of inventors for a new State. There is one to every 1,738 of its population.

Buttons, buckles and other devices for fastening straps or clothing have been patented to the number of 11,795.

There have been 3,717 patents issued for devices or machines employed by the carpenter.

There are 2,487 different varieties of fire escapes and ladders to be used in emergencies.

Soda water and other cooling beverages are manufactured according to 278 patented methods. The steam engines of this country need not lack for valves, 2,465 of these having been patented.

The Patent Office has issued 3,075 patents for inventions, contrivances, and discoveries in telegraphy. The fisherman has at his command 2,667 patented devices for attracting or capturing the finny tribe.

According to the reports of the Patent Office, there are 4,389 different varieties of patented chairs. The number of patent medicines is not so great as might be supposed, there being only 1,332 in the reports.

Harness making has received the earnest attention of the inventor, there being 7,400 patents in this line. The erection of fireproof buildings is encouraged by 455 patents, taken out for materials or methods.

Over 25,000 inventions for the manipulation of metals have been patented in our government office. Butter making is encouraged by 4,435 patents, either on devices employed or methods of manufacture.

There is no leading country in the world whose natives have not taken out patents in the United States. Woodworking tools have developed 4,235 patents, of which one is an auger which bores a square hole.

Of mechanical motors there are 1,775 known to the officers of the Patent Office. There are 1,351 patents which may be employed in the manufacture of glass.

Kitchenware, exclusive of stoves and ranges, is protected by 1,747 patents. Patent needles and pins are made to the number of 175 different varieties. The manufacture of sugar and salt is carried on by the aid of 2,401 inventions.

The necessity of preparing tobacco for the consumer has developed 2,274 patents. There are 3,307 patents for machinery or processes employed in paper making. The farrier is aided in his work by the inventor to the number of 1,234 patents.

The implements and materials used in buildings are protected by 7,792 patents. Trunks, valises and bag-

gage contrivances generally are protected by 1,323 patents. There are 636 patented fuel or methods of preparing wood, coal, and coke for use.

Over 16,000 patents have been issued for the various kinds of electrical appliances. There are 1,771 patents on the mechanism employed in sinking of artesian or oil wells. Railways and railway appliances are represented in the Patent Office by 8,334 models. The miller of this country is aided in his toil by 9,720 devices, all covered by patents.

The American mind may be amused by 4,453 different kinds of patented games and toys.

Inventors of military accouterments, harness and the like, have taken out 435 patents. The dentists of this country have at their command 1,283 patent instruments or processes.

The builder has a choice of 596 patent cranes or derricks with which to do his work. There are 1,549 machines or devices for the manufacture of cordage, twine and string. The manufacture of stationery may be carried on by the aid of 4,532 patented machines.

The American roof may be covered by any one of 665 patent roofings. For the propulsion of steamships 1,583 appliances have been patented. There are 2,298 different contrivances for the purpose of spinning thread.

Knives, forks and spoons are protected by patents to the number of 2,103. There are 5,883 models of different kinds of steam boilers in our Patent Office. There are patents for scrubbing brushes and brooms to the number of 3,184.

There are over 50,000 patents which in one way or another benefit the farmer.

There are 4,854 patents for the manufacture of furniture other than chairs. New Jersey has one inventor to every 1,557 of its population. There are 2,188 tools used, or which may be used, in stone working. Patents on explosives have been issued to the number of 500.

The builders of tall houses have 1,639 elevators to choose from. Papier mache goods have been patented to the number of 3,381. Of air and gas engines, 1,025 different varieties have been patented. Cannons, guns, pistols, and projectiles are protected by 268 patents. One thousand and ninety patents have been issued for paving.

There are 4,240 models of patented pumps in our Washington office. Watch and clock making is encouraged by 3,640 patents. There are 1,449 different appliances for drawing wire. Arkansas has one inventor in every 19,792 of its population.

There are 2,266 patents and models of sheet metal wire. There are 5,979 patent locks and latches for doors and gates. There are 4,299 different kinds of saws and sawing apparatus. North Carolina has one inventor to every 18,597 of its people.

The Patent Office has issued 7,633 patents on laundry appliances. There are 2,388 different kinds of velocipedes. The manufacture of gas is covered by 3,000 patents. The manufacture of felt is covered by 771 patents. Patented machines for bookbinding number 2,566. Boat building patents number 1,216. There are 1,580 patented knitting machines. The steam engine is covered by 8,237 patents. There are 1,523 different patented kinds of nails. There are 459 patents covering masonry work.—St. Louis Globe-Democrat.

The Valuable Dogwood.

Dogwood wands make excellent whipstocks and are used in some of the best whips. They are cut sometimes by coachmen in the suburbs and sent to town to be dressed and made up into whips. The stocks made of this wood are notable for their ornamental knobs at regular intervals, which are the truncated and rounded branches. These are imitated in some other whipstocks, but the imitation is a cause of weakness. The dogwood stocks are extremely tough and elastic, being comparable in elasticity with whalebone. The wood is used for butchers' skewers, and some philologists conjecture that the first syllable of the name is a corruption of "dag," meaning a spine or dagger. Dogwood, being particularly free from silex, is used by watchmakers and opticians in cleaning watches and lenses. The American Woodworker adds: Bitter bark of the dogwood is used as a substitute for the bark of the Peruvian quinine tree. Dogwood is notably of slow growth, and in all thickly peopled regions the tree is recklessly despoiled for the sake of its blossoms, so that the supply of the wood for commercial purposes is not large.

Few people realize the immense power that is required to propel a vessel of any kind when a speed above 20 knots is required. Take, for instance, the British torpedo boat chasers, which are mere racing machines, even from a naval point of view. The most perfect specimens of vessels of this class, which have attained 30 knots speed, carry 60 tons of coal, which is full one-quarter of their entire seagoing displacement. They burn 3½ tons of coal per hour. To attain the 3 knots over 27, which is the highest speed of ordinary torpedo boats, it was necessary to increase the fuel expenditure fully 50 per cent.—Marine Review.