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JAPAN AND THE INTERNATIONAL PATENT UNION.

The good work that has been done by the American Commission on international patent regulations will show fruit in the entrance of Japan into the International Patent Union, an event which is to take place in the near future. Although Japan has a patent system of her own under which the native inventors are fully protected, the government has hitherto refused to afford protection to foreign inventors. This has worked a particular hardship with respect to a country whose people are so strongly imitative as the Japanese. A foreign visitor to Japan is astonished to find the factories and workshops of that country filled with clever imitations of American and European tools and appliances. While the Japanese are not wanting in originality, they excel in their powers of adaptation and imitation, and it has hitherto been a decided hardship to American manufacturers to see their very best and latest devices put into such extensive use with no resulting benefit to themselves. Bad as it has been in the past, the matter would have become yet more vexatious in view of the prospective growth of trade between this country and Japan. After July of this year patent protection will be afforded to foreigners on strictly the same terms as those given to natives, and that enterprising country will present an attractive field to inventors in this country.

AMERICAN ORDNANCE FOR RUSSIA.

It was recently announced in The New York Commercial that the Russian government had decided to expend a large amount of money, amounting to many millions of dollars, in the purchase of artillery from American manufacturers of ordnance. If this should prove to be correct, it would only be in keeping with the line of policy pursued by Russia of late years, and particularly during the past twelve months, in accordance with which she has placed a large part of her orders for naval and military material abroad, and a considerable portion of it with American builders and manufacturers. Messrs. Cramp & Sons have now upon the stocks a first-class battleship and cruiser for the Russian navy, and although it is true that their ordnance is to be supplied from abroad, we have felt satisfied that it was only a matter of time when we should begin to supply guns as well as ships to foreign nations. Indeed, in the matter of small ordnance, our reputation was made more than half a century ago, and the uniformly good quality of the heavy artillery now turned out by our army and navy shows that our skill is not confined to the smaller class of weapons.

THE THIRD-RAIL SYSTEM ON THE NEW YORK ELEVATED RAILROADS.

Following upon many months of rumor come two definite statements by the President of the Manhattan Elevated Railway Company, made at a meeting of the Executive Committee, to the effect that the company has purchased the ground for its electric power house and that a contract has been given for 9,000 tons of third rail. The site for the power house measures 204 x 570 feet, and affords abundant space to install electrical power sufficient for the whole of the present system and a future growth of fully fifty per cent.

It is scarcely possible to overestimate the importance, from an electrical point of view, of this move on the part of New York's greatest system of transit. In view of the length of the track, the number of trains run and passengers carried, this will form the most important system of rapid electric transportation in the world and the comparison of operating the road by separate steam locomotives and by power generated at a great central station will afford valuable data on this subject. The third-rail system of electric traction has been in successful operation for some time on the Berlin Hartford branch of the N. Y., N. H., and Hartford Railroad, a full account of which will be found in the SCIENTIFIC AMERICAN for June 12 and 26, 1897. It has not yet been decided whether the system as installed on the elevated roads will be operated by means of trains drawn by electrical locomotives or by the multi-

ple unit system, in which the cars can be run either singly or in trains. In any case the traveling public of this city will be the gainers both in speed and comfort of travel, while the abolition of the smoke, steam and ashes of the locomotives will prove a grateful relief to the residents of this city.

THE CANADIAN NIAGARA POWER COMPANY.

The great Niagara Power Company on the American side, with its present installation of 40,000 horse power and its provision for 60,000 horse power more, is not to be confused with the Canadian Niagara Company on the opposite shore, whose original charter called for the installation of 250,000 horse power. Under a new agreement the monopoly held by the latter company has lately been surrendered in return for several concessions. In place of making a fixed yearly payment, the company will make payments in proportion to the power which it develops. For the first 10,000 horse power it is to pay the Ontario government \$15,000 per annum; on the next 10,000 horse power, \$1 per horse power per annum; 75 cents for the next 10,000 horse power, and for the remaining power up to 100,000 horse power 50 cents per horse power per annum. The engineer of the Montreal Harbor Commission has recently made a very careful survey of the amount of water power at the Falls and his report shows that with the scheme of the Canadian Niagara Power Company to erect a plant capable of developing 120,000 horse power completed, it would be possible to obtain the further development of fully five times that amount above the Fallson the Canadian side without reducing the volume of water that passes over the Horseshoe Falls sufficiently to detract from their scenic grandeur.

QUESTIONABLE TUNNEL SCHEMES.

There is a veritable epidemic of tunnel discussion occurring just now in the daily press, and while the schemes are in a few cases legitimate, and the tunnels, if carried through, will doubtless be profitable, in the case of others it is difficult to conceive any reason except the sentimental one for their suggestion. The mooted tunnels beneath the East River, and possibly one tunnel beneath the Hudson River, are legitimate schemes; there is a decided call for them, and they should command ready financial support.

Among the tunnels that are of questionable value are those proposed between Great Britain and Ireland and between Great Britain and France. The English tunnel from Dover to the French coast would be from twenty to twenty-five miles in length, according to the nature of the approaches. It was ably advocated and financed by Watkins, the great English railroad magnate, work was begun, and at one time it seemed likely to be completed. Construction was stopped, however, by order of the government, on the ground that its completion would destroy England's insular position and would constitute strategically a menace to her safety. This reason alone will probably prevent its construction for many a decade to come.

There is now a strong effort being made to revive the Great Britain and Ireland tunnel scheme, and it seems that a largely attended meeting by the members of Parliament who have been interested in the scheme was held recently in the House of Commons. The proposed route is from County Antrim to a point near Portobello, Wigtownshire, on the Scotch coast. The distance is about twenty-five miles; the lowest depth is no less than 510 feet; and the estimated cost is \$60,000,000. Judging from previous works of this kind it is probable that the final cost would be nearer \$100,000,000 than \$60,000,000; but even if no engineering difficulties of insuperable character should present themselves, the new route is so far removed from the present main lines of travel that it is questionable if the completed tunnel could secure sufficient revenues to cover the interest on the cost of the undertaking.

THE PASSING OF THE CENTERBOARD.

Among many rumors which have come across the water regarding the cup challenger "Shamrock," there is none that is, on the face of it, more improbable than the statement that the English boat will carry a centerboard. The fate of this ingenious contrivance, as far as big yachts are concerned, was determined in 1893, when the keel boat "Valkyrie II." easily vanquished the centerboard "Vigilant" in a fifteen-mile thrash to windward, against a stiff breeze. The "Valkyrie II." was the first of the ninety-footers to be built upon the present fin-keel principle, just as the "Vigilant" was the last of the ninety-footers to carry a centerboard. In 1895 Herreshoff boldly abandoned this time-honored device in favor of the fixed keel, the "Defender" being the first keel "single-sticker" built for the defense of the "America" cup. It is not likely that Fife has returned to a form of construction which has been abandoned by the people who so long used it and so thoroughly understood its possibilities.

Apropos of keels and centerboards, it is satisfactory to know that the "Columbia," in the few trials which she has had with the "Defender," has shown, even before she has had time to be "tuned up," that she is a somewhat faster boat. The difference is not remarka-

ble, but it is there, and those who may feel disappointed that she has not shown a more marked superiority must remember that it is more difficult to make a gain of five minutes over a thirty-mile course in the present era of yacht designing than it was to make one of fifteen or twenty minutes a dozen years ago. In these competitive trials between the new and old cup-defenders we must remember that "Defender" is a phenomenally fast boat. In the only satisfactory race between her and "Valkyrie III." she won by nearly nine minutes, and "Valkyrie III." had even more easily disposed of "Ailsa," the Fife ninety-foot boat of that year. This would make "Defender" from fifteen to twenty minutes faster than "Ailsa." Now, "Columbia" will probably have about five minutes advantage off "Defender" on a thirty-mile course, and may, therefore, be taken to be from twenty to twenty-five minutes better than the last Fife ninety-foot yacht. To justify the confident expectations of the owner of the "Shamrock" that she will bring home the cup, she ought to beat "Britannia" (which was frequently vanquished by "Ailsa") by at least twenty to twenty-five minutes. Unless she does this in the trial races, we may regard the coming contest with considerable feelings of security.

RAILWAY MILEAGE OF THE WORLD.

In a recent issue of Archiv für Eisenbahnwesen is published the annual statistical table of the railroads of the world, a few of the figures of which will be interesting.

The total length of railroad in the world amounted in 1897 to 454,730 miles, and in the five years from 1893 to 1897 the total increase was 34,485 miles or 8.9 per cent. The same year the total length of railroad in the United States was 184,278 miles, an increase in five years of 3.6 per cent. North and South America and the West India Islands are credited with over one-half of the total mileage or 236,218 miles. Next to the United States among the great nations is the German empire, with a total of 29,880 miles, and then follows France with 25,673 miles, Russia with 25,003 miles, although, if we include the Trans-Caspian district of Russia and Siberia, Russia would come third with a total of 28,302 miles. Following France and Russia are Great Britain and Ireland, 21,390 miles; British India, 21,000 miles; Austria-Hungary, 20,908 miles; British North America, 16,684 miles; Italy, 9,714 miles; and the Argentine Republic, 9,422 miles. Belgium has the largest amount of railroad in comparison with its total area, the amount being 32.2 miles for each square mile of area.

In comparing the countries by the length of railroad compared with the amount of population that they serve, we find that the colony of South Australia stands first with 52.3 miles for each 10,000 people, this result, of course, being due to the comparative sparseness of the population. In the United States there are 26 miles to each 10,000 inhabitants. In the more densely populated districts of Europe the figures fall considerably, Germany having 5.2 miles for each 10,000 people. The small increase of 3.6 per cent in the total mileage for the United States is due to the fact that the years 1893 to 1897 were among the least active in railroad construction in the history of the country, the previous decade having been one of extraordinary increase, over 12,000 miles, or more than half the present total length of railroads in Great Britain, having been built in a single year.

THE LARGEST FLAG.

The largest flag in the world is to be exhibited under the auspices of the Daughters of the American Revolution. It was made during the Spanish-American war by Miss Josephine Mulford, of Madison, N. J. There are 325,000 stitches in the flag, one for each soldier and sailor engaged in the war. The flag is 100 feet long and 65 feet wide, and the blue ground measures 40 x 35 feet. The stripes are 5 feet wide and each star is 2 3/4 feet in diameter. There is also a sentimental interest connected with several of the stars of the flag, as they were made at places in the various States which are associated with the great events of American history. Thus, the Philadelphia star was partly made in the house of Betsey Ross, in the room in which she made the first American flag. Then it was worked upon at Carpenter's Hall, in the room where the first Continental Congress assembled, and partly while sitting in Hancock's chair in Independence Hall. The New Jersey star was made at Washington's Headquarters at Morristown; the Maryland star was made at Fort McHenry, in honor of Francis Scott Key; the Virginia star was made in the Lafayette room in Washington's Mount Vernon home; the New York star was partly made at Faunces' tavern, where Washington bade farewell to his officers, and it was finished on board the flagship "New York." Each of the forty-five stars is embroidered with the name of the State it represents and the date of admission into the Union. They are all arranged in chronological order. According to The New York Times, the flag is to be presented to the nation on the first anniversary of the signing of the recent Treaty of Peace.