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INDUSTRIAL INVASION OF GREAT BRITAIN.

It was a question only of time when the position of Great Britain as the greatest supply station for the engineering needs of the world would be challenged. In the past decade she has witnessed the steady inroads of American and Continental machinery upon territory which she had come to regard as exclusively her own, and now, in the closing years of the century, the industrial war has been carried into the tight little island itself with a vigor and persistency that cannot be gainsaid. The latest evidence of this is found in the successful tender of American firms for supplying the electrical equipment for the new system of tramways in the city of Glasgow. Coming so soon after the orders for American locomotives, and the widely advertised affair of the Atbara bridge, the Glasgow success has stirred up our British contemporaries to an acknowledgment of the serious nature of American and Continental competition.

The subject is discussed with much candor in a recent issue of *The Electrician* (English), which admits that without going beyond the consideration of electrical generating stations and tramways, it is evident that hardly a week passes without the news of a contract, often of considerable magnitude and importance, being awarded to an American or Continental firm of manufacturers, or its agents. Speaking of the colonial market, our contemporary is of the opinion that if the present tendency is not soon reversed, British machinery will in a very few years occupy the position filled by German machinery a quarter of a century ago, and it makes the rather startling statement that the amount of machinery sent over to the continent of Europe threatens to become small compared with that imported into Great Britain.

In endeavoring to explain the situation, manufacturers have been fertile in excuses. The great strike of 1897-98 has been blamed as the predisposing cause, since the accumulation of work prevented the home manufacturers from accepting contracts, which were thus given out in other countries. As a matter of fact, however, instead of increasing their plants, British manufacturers believed that the activity in electrical work was a temporary "boom," and made no effort to meet it. Another explanation is that English consulting engineers have driven electrical work abroad by their practice of specifying that only those firms need tender who have already gained experience in building the particular class of machine required. This, it is urged, has limited the bidding to firms whose workshops were already crowded with work. We are told, furthermore, that the suggestion has been put forward that as there is uncertainty as to the value of what are claimed to be the fundamental patents for poly-phase systems, English manufacturers are doing well to avoid them. To this *The Electrician* very properly answers that such questions can be tested in the law courts, and that certainly they form no adequate reason for neglecting to take up a line of manufacture which in the nature of things must grow to vast proportions in the near future. Other causes that are named are the high rate of wages paid in Great Britain as compared with the Continent, though this, of course, cannot be applied to the United States, and the tyranny of the trade unions, whose constant and suicidal effort it is to limit the amount of work that is turned out by labor-saving machinery.

Now, while our contemporary allows that all of these excuses have more or less weight, it claims that they do not represent the true cause of the loss of Great Britain's manufacturing ascendancy. This is to be found in the indifference of the manufacturers, who are lulled into a state of contentment and fancied security by the fact that their books are full of orders and their shops crowded with work. "The foreign and colonial markets are left alone almost entirely, and so long as sufficiently high dividends are earned, British manufacturing firms are happy in their own shortsightedness and supine as to the industrial future of their country."

There is much truth as regards the electrical field in the position taken by *The Electrician*. It is our opinion,

furthermore, that the successful invasion of Great Britain by American manufacturers, not merely in electrical, but in steam engineering and the allied trades, is due to fundamental differences of character and methods. Where the British manufacturer is apt to be contented (as our contemporary explains) when his establishment is in the full swing of prosperity, his American brother is at all times keenly on the alert to seize every opportunity for enlarging the scale of his operations. In this restless energy, this conviction that no article is so good but it may be bettered, no operations so large but they may be extended, we find the promise of a future time when we shall dominate the industrial world as completely as Great Britain has done before us.

It is true we are an inventive people, and much of our success is due to this fact; though it is open to question whether we have not profited equally by our quickness to adopt the best inventions of others wherever they may originate, and carry them with a rush to their full development. The locomotive, the possibilities of the steam railroad, the bicycle, the Bessemer process and all the heavy trades that have sprung from it, received their full exploitation in this country. We rarely undertake the manufacture of an article without making it first cheaper and then better than our competitors; and unlike them we enlarge our facilities so as to keep well ahead of the demands of trade, being ready to sell from stock a locomotive or even a bridge, if the necessities of the case demand it.

BIDS FOR 16½-KNOT CRUISERS ACCEPTED.

The majority report of the Naval Board of Construction has rejected all the alternative plans presented by private firms for the new cruisers, and has awarded the six vessels to firms which bid upon the plans drawn up by the Construction Department. The rejected bids undertook to build, for practically the same price and in six months' less time, vessels of from 18 to 19 knots speed and 770 to 830 tons coal capacity, as against vessels of 16½ knots speed and 700 tons coal capacity.

In view of the fact that under the terms of the contract these six cruisers will be accepted at reduced price if they make as low a speed as 15½ knots, we think the country is warranted in demanding that the Naval Board shall explain why it has rejected bids for 18 to 19-knot vessels in favor of vessels which are distinctly inferior, in speed and coal capacity, and require six months more time to build.

We have read with great care everything of an official nature that has appeared in the way of an apology—it can be regarded as nothing less—for such an apparent retrogression in naval ideas as is involved in the construction of 15½ to 16½-knot cruisers in this age of high-speed vessels; but we are free to confess that no adequate reason has yet been offered for the extraordinarily low speed adopted for these vessels. If warship design is a compromise, we naturally look for some preponderance of battery, or coal endurance, or protection, to compensate for the deficiency in speed. But not only is there no preponderance in the features named, but in the matter of protection the ships are only less faulty than they are in speed.

THE METEOR DISPLAY.

The meteor display on November 14, 15, and 16 was disappointing. Unfavorable conditions hampered the astronomers at the Naval Observatory at Washington on the 14th; clouds prevented observations until 3 o'clock A. M., and it was only partially clear at any time. Paths of ten Leonid meteors were plotted on the star chart. One of these was as bright as a second magnitude star, but the others were fainter. The conditions at the Harvard Observatory were very unfavorable for observing the meteoric display. The efforts of the observers met with some success, however. On November 16 twenty meteors were seen about 5 o'clock A. M. at Chicago; the student watchers had an opportunity which was denied to the astronomers of the Yerkes Observatory. At the Flower Observatory of the University of Pennsylvania, Philadelphia, the watchers recorded 102 meteors, 69 of which were Leonids.

Nearly all the meteors observed were faint, only a few of them being of the second magnitude. Most of the non-Leonids were scarcely discernible. In no instance did a meteor leave a trail visible for more than a few seconds. The Harvard Observatory counted 64, but the display hardly came up to the expectations of the astronomers. Professor Howe, of the University of Denver, reported that he counted 18 Leonids besides a large number of meteors in other portions of the sky. On November 14 many students of Princeton stayed out long after midnight to observe them, and in order that all might have an opportunity of observing them, the bells in the town rang to wake up the students at one o'clock. No photographs were taken of the few stray meteors which were seen. At McGill University photographs of 156 meteors were obtained. At Lima, Peru, at half past 12 o'clock on November 15, there

was a strong earthquake shock, but no celestial phenomena were observed. By the falling of an aerolite seven miles south of Crescent City, Ill., a residence was partly wrecked, tearing away a portion of the upper story. The aerolite buried itself in the ground about three feet from the foundation of the house.

In England a balloon made an ascension for the purpose of observing the Leonid shower. The observers saw only five meteors, and they were obliged to make a sudden descent, as the balloon was drifting toward the sea. As a result two of the three occupants of the balloon were injured. Generally speaking, the European observations proved a failure, except in the Austrian Alps, where, on November 15, no less than 300 Leonids were seen and photographed. One hundred were seen at Paris, and a fair display at Brussels.

The most interesting report received from the observations in the United States on November 15 is a dispatch, unsubstantiated as yet by astronomical authorities, to the effect that a large meteorite fell in the woods just east of Webster City, Ia. The dispatch said that the falling body came down with a terrific roar and, all seething and smoking, plowed out a hole in the ground 50 feet square. If the report is verified, the find will be more than usually interesting, because, while meteorites at times fall to the earth, it is not known that any of the Leonids have hitherto penetrated through the earth's dense atmosphere without being entirely consumed.

RAILROADS IN ASIA.

The lines of railway now existing in Asia form a total length of about 30,000 miles, of which two-thirds belong to British India. The portions of the Transcaspian and Transsiberian railways already constructed represent a length of 3,200 miles. In China, a number of European syndicates have obtained concessions for 3,600 miles of railroad, which will traverse regions which are rich in mineral and vegetable products; these lines are for the most part in course of construction. The Chinese government has about 800 miles of railway, these lines being very productive, especially that from Peking to Tientsin. Japan is well provided with railway communication, having 3,200 miles. French Indo-China has at present but 120 miles, but French possessions in Cochin-China, Annam and Tonkin will shortly have 2,400 miles, which will develop the mineral and agricultural resources of these countries. The Dutch Indies are well provided, Java alone having 1,000 miles. In British India the greatest length is to be found; here there are 21,000 miles of railway. As to Persia, there are as yet no railroads of any consequence, but Turkey in Asia possesses 1,500 miles, and 600 miles are in construction or projected.

REPORT OF THE BUREAU OF ORDNANCE.

Admiral O'Neil's report on the Naval Bureau of Ordnance, a digest of which is published in the current issue of the SUPPLEMENT, gives some interesting details regarding the power and performance of the new types of long-caliber guns. Such of these weapons as have been completed and tried at the proving grounds have given most satisfactory results, and there is every reason to expect that the high velocities which have been obtained in the smaller calibers will be approached in the large armor-piercing guns. The 12 inch gun is to be 40 calibers long and fire an 850-pound shell with a muzzle velocity of 2,800 foot-seconds and muzzle energy of 46,186 foot-tons. Its penetration at 3,000 yards will be 17.92 inches of Harvey armor. The new 6-inch gun of 50 calibers, with 2,900 foot seconds velocity, will have a muzzle energy of 5,838 foot-tons and at 3,000 yards will penetrate 5.3 inches of Harvey armor. The new 5-inch gun of 50 calibers is to have 3,000 foot-seconds velocity. Altogether, the Bureau is to be congratulated on the excellent results which have already been achieved or are promised in the early future.

WIRELESS TELEGRAPHY BETWEEN BALLOONS.

Experiments are being made at Vienna on the possibility of communication between balloons by wireless telegraphy, and they have met with some success: A captive balloon takes the place of the tall mast as used in the Marconi system. A copper wire is stretched between it and the earth, where the transmitting apparatus is placed. The second balloon, which ascends freely, carries the receiving instrument and is furnished with a wire 60 feet long hanging downward from the basket. The balloons received and transmitted messages up to a distance of six miles and at an elevation of about a mile. Of course, the great difficulty will be to establish a transmitting station in a free balloon, both on account of the weight of the necessary apparatus and also because there is danger of discharges from the powerful condenser so near the inflammable gas of the balloon. Future experiments will be looked for with interest by all who are engaged in making a study of wireless telegraphy.