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(Illustrated articles are marked with an asterisk.)

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Scientific American Supplement

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For the Week Ending February 5, 1898.

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STRIKING SUCCESS OF THE TIN-PLATE INDUSTRY IN THE UNITED STATES.

There is, perhaps, no industry in the history of the United States which has enjoyed such a rapid and uninterrupted growth as the manufacture of tin-plate. Each year has shown an increase over its predecessor in the number of mills in operation and in the total output, and the most gratifying feature of all is that the price of the tin-plate to the retail dealer has steadily declined since the year when its manufacture in this country was first fairly started. The statistics furnished by Special Agent of the Treasury Ayer place the output of tin and terne plate at 446,982,063 pounds for the last fiscal year as against 307,226,621 pounds for the year preceding, an increase of over 45 per cent. It should be noted, too, that the report embraces the production of fifty firms, or three less than that for the fiscal year ended June 30, 1896.

Of these fifty firms, only one used foreign-made plates during a portion of one quarter, the amount being 57,208 pounds out of a total production by the firm for that quarter of 213,687 pounds. Compare this with the report of the previous year, when, of fifty-three firms reported as producing tin and terne plates, three used both American and foreign rolled sheets, with an aggregate output of 15,503,523 pounds, of which 4,226,523 pounds, or 27 per cent, was made from foreign rolled sheets. The total amount of tin and terne plate imported was 244,407,601 pounds. The quantity of plate imported and used in the manufacture of articles for export was 139,246,130 pounds. This leaves a net import of 105,161,471 pounds as against a total domestic production of 446,982,063 pounds. We thus arrive at a total approximate consumption in the United States of 552,143,534 pounds.

ELECTRICITY TO REPLACE STEAM ON THE LONDON UNDERGROUND RAILWAYS.

At last, after nearly half a century of discomfort due to steam and gases from the locomotives, the two famous underground railways of London, known familiarly as the "Metropolitan" and the "District," are about to banish the steam locomotive altogether. It has been decided to use electric traction; and it is likely that the third rail system will be employed. Only those who have had the misfortune to travel on these lines can appreciate what a relief the proposed change will afford to the general London public and to the City business man in particular. Apart from the vitiated atmosphere there was nothing to complain of in these railways. The service was prompt and frequent, and on account of the side doors, one at each pair of seats, discharging directly on to the platform, trains were emptied more rapidly and stops were briefer than on our own elevated lines, where the passengers have only two means of exit from the car. With the introduction of electricity, the air will be pure and the speed between stations will be greatly increased. These railways have to answer for much of the prejudices which exists against tunnel roads. They are a favorite theme with the opponents of the proposed New York tunnel. The forthcoming changes will change all this, and will sweep away all such objections at a stroke.

THE THIRD RAIL SYSTEM IN GERMANY.

Travelers by the Brooklyn Bridge cars will recognize familiar features in the description of a third rail electric system which is about to be installed in Germany. The line, which is about 7½ miles in length, runs between Berlin and Zechlendorf. The conductor will consist of a third rail carried at the side of the track on wooden saddles which will themselves be bolted to the ends of the ties. The present brake equipment will be utilized, and power will be supplied by compressors driven by electric motors carried on the cars. A similar brake equipment is at present in use on the Hartford-Berlin electric line of the New Haven Railroad in this country, illustrations of which will be found in our issue of June 12, 1897. The trial train will be unprecedentedly heavy for electric passenger traction, the loaded weight being 210 tons. The service will call for fifteen round trips per day.

SMOKE AND ITS PREVENTION.

Experiments recently carried out at Sibley College to determine the physical features of smoke show that dense smoke from a furnace produces on an average from 10 to 12 pounds of soot to the ton of fuel used. About one-half of the former was carbon, and the remainder was chiefly made up of unburnt hydrocarbons, from 10 to 15 per cent of ash and 2 per cent of moisture. The figures just stated were obtained with a restricted air supply. Low temperature combustion and a restricted supply of oxygen are the most fruitful causes of smoke production. In this connection we are reminded of a trip which we once took on the foot plate of an engine which was hauling the fast mail train that takes the American mail from Queenstown to Dublin. The furnace door was of the divided pattern, the two halves sliding apart sideways and being operated by a single lever. We noticed that when the fireman was shoveling coal into the furnace, the engineer by means of the lever opened the doors for each shovelful and instead of shutting them abruptly drew them slowly together. He explained that he was "burning the smoke," and illustrated the fact by shutting the door quickly after a shovelful was thrown in, when dense volumes of smoke appeared at the smoke stack. This was an extreme case; but it serves to indicate the careful firing to which, no doubt, is due in large measure the economy of the British express locomotives, which burn only from 22 to 35 pounds of coal per mile according to the load hauled.

SPRAGUE MOTOR PATENT DECISION.

An important decision affecting the Sprague patent for a suspended railway motor has been given by Judge Wheeler, in the United States Circuit Court. It is well known that in the earlier attempts at electric traction the motors were either carried upon the car platforms or rigidly attached to the wheel trucks, connection with the driving axle being made by chain and sprocket or by friction wheels. The effect of this construction, both upon the motors and the track, was very destructive.

Frank J. Sprague patented a method of suspending the motors so that both they and the track would be relieved from shock and yet the motor would be always maintained in its proper relation to the axle. This was done by suspending one end of the field magnet of the motor on the axle and supporting the other end on springs, thereby causing the latter to move with a radial play around the driving wheel axle and permitting the use of gear wheels. The device marked the opening of a new era in railway motors, and opened the way for the successful application of electric traction.

The Sprague Company was absorbed by the Edison Electric Company, and the latter was eventually absorbed by the General Electric Company. The present suit was brought by the General Electric against the Union Railway Company and the Walker Company, of Cleveland, on the ground that the latter were infringing upon the Sprague patent, and the present decision of Judge Wheeler sustains the plaintiff.

Commenting upon the decision, the Walker Company, who intend to carry the case to the Circuit Court of Appeals, state that they expect the patent to be overthrown, and believe that the use of the invention will be thrown open to the world.

The decision states that "the defendants' structures differed in some respect from those of the patent, but have all these parts" specified in the decision "working together in the same relation to each other for the same purpose and producing the same result."

COST OF STEAM IN 1870 AND 1897.

One of the best papers recently read before the American Society of Mechanical Engineers was presented by Mr. F. W. Dean, on the decrease in the cost of steam power between the years 1870 and 1897. This was shown to amount to nearly 40 per cent. Seventeen per cent of this is attributed to the use of multiple cylinder engines, steam jacketing, higher steam pressure and superheating the steam. Five per cent is due to the use of vertical engines, 7 per cent to improved boilers, 7 per cent to economy realized in heating the feed water, and 2 per cent is put down to the credit of improved construction of grates. Taking the best performances of the two periods named, the least consumption of steam per horse power per hour in 1870 was 20 pounds, whereas the best for 1897 was 12½ pounds.

EXCELLENT CONDITION OF THE IRON AND STEEL EXPORT TRADE.

The present condition of the iron and steel export trade is very satisfying and full of promise. If the figures for the first ten months of the year are a criterion, the total exports for the year 1897 will amount to some 600,000 tons, valued at about $13,000,000. The largest item was pig iron, of which we shipped in the first ten months 194,734 tons; the next was steel rails, 108,816 tons. The other most important exports in their order were steel ingots, billets, bars, etc., 59,633 tons; wire, 44,016 tons; scrap and old iron for remanufacture, 34,929 tons; and cut nails and spikes, 13,165 tons. Our steel rails and locomotives are being sold in Europe in successful competition with the local manufacturers, and in view of this fact it is needless to add that we are gathering in an increasing share of the foreign trade of the world, which was formerly exclusively controlled by Europe.

THE TURBINE FOR UNITED STATES TORPEDO BOATS.

We are pleased to note that the United States is not to be behindhand in the development of the steam turbine for naval purposes. The truly astonishing results obtained with the Turbinia have a significance which cannot be gainsaid. We do not predict that the turbine will revolutionize marine propulsion in general, but we are satisfied that for vessels up to a size yet to be determined, it is the coming motor. Commodore Melville, Engineer-in-Chief of the Navy, is about to make tests of an American design of turbine in the