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The Editor is always glad to receive for examination illustrated articles on subjects of timely interest. If the photographs are *sharp*, the articles *short*, and the facts *authentic*, the contributions will receive special attention. Accepted articles will be paid for at regular space rates.

THE LATEST STEAM TURBINE PLANT.

After a careful investigation in Europe and America of the performance of the steam turbine, the consulting engineer of the Cleveland, Elyria and Western Railway, Cleveland, has given orders for the installing of steam turbines for driving the generators in the new addition to the power plant of that company. Orders have been given for two 1,500-horse power Parsons turbines, which are to be direct-connected to two 1,000-kilowatt, two-pole, 400-volt, 25-cycle Westinghouse generators. These turbines will embody the fruits of the experience that has already been gained with the turbine both here and abroad. It is significant that the Westinghouse Machine Company, which is building the turbines, guarantees that with 150 pounds steam pressure and 100 degs. F. of superheat at the throttle, and 28 inches of vacuum at the exhaust, the steam consumption shall not exceed 10.08 pounds per indicated horse power, while at half load they guarantee that the steam consumption shall not be more than 15 per cent greater than the consumption at full load. The most interesting novelty of these machines is that they will consist of two separate sets of cylinders, high and low pressure, these being, of course, on the same shaft as the generator. The superheated steam is first led to the high-pressure cylinder, and then passes through a reheater which is hung in a pit below and parallel to the axis of the turbo-generator. This reheater is 3 feet 4 inches in diameter and 23 feet 6 inches in length. As illustrating the great economy of space and foundation work, due to the substitution of the turbine for the ordinary reciprocating engine, it may be mentioned that the present station would have been crowded, had the addition consisted of only two 500-kilowatt alternating current units with an ordinary reciprocating engine drive; whereas by the use of the turbine sets, not only can two units of 1,000 kilowatts capacity be installed, but there will still be sufficient space remaining for an additional 2,000-kilowatt unit. There is also great economy in the construction of foundations, etc., since the perfect balance of the turbine in running obviates the necessity for heavy masonry and holding-down bolts.

THE LARGEST LOCOMOTIVE ENGINE IN GREAT BRITAIN.

There has recently been constructed at the Great Western Railway Works, Swindon, a passenger locomotive which has reached the limit in height and width available on English railways, where the loading gage places rather severe restrictions upon locomotive dimensions. The height from the rail level to the top of the smokestack is 13 feet 2 inches, the width over cylinders 8 feet 11 inches, and the height of the center of boiler above the rail is 8 feet 6 inches. As we have frequently pointed out, the locomotive builders of this country have had a great advantage over those of Europe in the fact that they have realized at the start that the point at which to commence in increasing the power of the locomotive is the boiler. It is only during the last few years that English builders appear to have realized this fact. There are thousands of express engines running in England to-day which have not over 1,200 square feet of heating surface. A few years ago some engines were placed on the Caledonian Railway having 1,500 square feet of heating surface, and later the Lancashire and Yorkshire Road brought out some four-coupled expresses with 2,050 square feet of heating surface. The present engine, which was designed by Major W. Dean, Locomotive Superintendent of the railway, has 2,400 square feet of heating surface, which is something certainly very remarkable in English practice. The barrel of the boiler is 14 feet 8 inches in length by 60 inches in diameter, and the Belpaire firebox is 9 feet in length. The grate area is 27¾ square feet, and the working pressure 200 pounds to the square inch. The six-coupled driving wheels are 6 feet 8½ inches in diameter, and the outside cylinders will be 18 inches in diameter by 30 inches stroke. The engine weighs 72 tons, and the engine and tender together 118 tons. The tender carries 5 tons of coal and 4,000 gallons of water. The tractive force of the new engines amounts to 121.5 pounds for every effective pound of steam pressure. The most curious feature of this engine is the extraordinary ratio of stroke to cylinder diameter; for at a time when 3 to 4, or say 18 inches diameter to 24 inches stroke, is standard practice Mr. Dean has raised his stroke until the ratio is 3 to 5. We presume, however, this is due to the restricted width of the clearing gage, which prohibits the use of outside cylinders more than 18 inches in diameter.

A NOVEL METHOD OF BRIDGE ERECTION.

The natural tendency of the American engineer to seek the most direct way to the accomplishment of his work has been strikingly illustrated in the development of American bridge-building, where, indeed, it has led to the origination of a distinct type of bridge known as the pin-connected, in which the intersecting members at the joints are assembled on a common central pin, thereby greatly facilitating the cheapness and rapidity of erection. Concurrently with the development of this type, there was produced the "traveler," an ingenious portable derrick, or system of derricks, by which the bridge members are picked up and swung into place by the bridge gang. In the construction of cantilever bridges, and sometimes of long bridges made up of successive disconnected trusses, we have carried the method of construction by overhang to a great degree of perfection. Recently in the erection of the Highland Park highway bridge, at Pittsburg, a decided innovation was made, when it came to the erection of the central span of the main cantilever. Ordinarily the central span of a cantilever is erected by overhang until the two halves meet. In this case, however, the central span, 150 feet in length, was erected upon a large scow, towed to position below the overhanging arms of the cantilever, and then drawn up from the scow through a distance of 80 feet by means of tackles attached to the top chords of the truss. One set of tackles was suspended from the traveler booms, and the other from a pair of derricks set up at the ends of the opposite cantilever arm. The economy of this method in time and material is evident when we remember that, had the span been erected by overhang, its members would have had to be reinforced to take the erection strains, and special adjustments would have been necessary at the expansion joints.

AMERICAN METHODS FOR ENGLISH WORKMEN.

There was recently published in the London Times a letter from the building manager of the Westinghouse Manufacturing Company, dealing with the subject of the amount of work that can be got out of British workmen, which has attracted a great deal of attention in England, and has stirred up a controversy that has found its way to this side of the water. It seems that in the construction of the works of the Westinghouse Company at Manchester, England, British bricklayers were employed for laying the several millions of bricks required in the construction of the various shops. The contract was carried out under an American manager, who used the same methods that he employed in the erection of the Westinghouse factories at Pittsburg; and, according to the writer of the letter, the result has proved that it is possible to get as rapid work out of the English workmen as out of the American. Certain Proceedings of the Works Committee of the London County Council, recently published, have shown that the average London bricklayer considers that if he lays 400 to 500 bricks he has done a fair day's work. The average number laid per day in Manchester is not very much higher; but under the system employed by Mr. Stewart it seems that the British workmen laid bricks at the rate of 1,800 a day, and that on the commoner class of work, for which less care was required, they reached as high a figure as 2,250 bricks a day. This is taken to prove that the British workman can do as well as the American, whose average is about 2,000 bricks on good work. It is claimed that the result is the more striking because the question of the union does not appear to have entered into the problem at all, for Mr. Stewart employs unionists and is on very good terms with the union. It is claimed that the difference in the amount of work done is due to the American system of management, in which the employer and not the man is master and insists that every possible labor-saving system and device shall be used.

On the other hand, a reply has been sent to the Times from an English bricklayer, with extensive experience both in England and America, who says that the comparison is misleading, for the reason that the American bricks are smaller and lighter than the British bricks. The brick used in this country is 8 inches long by 4 inches deep and 2¼ inches in thickness, and it takes, according to the writer, 1,170 to equal in measurement 880 English bricks; furthermore, he states that, working in America, bricklayers who have been paid a dollar a day more than the union rate have given satisfaction when they set from 500 to 700 bricks a day, according to the quality of the work. This, on the other hand, is explained by a correspondent on this side of the water, who states that the lower rate quoted refers to the men who lay the fine facing pressed brick, which requires special skill and care. An English contemporary, commenting on the controversy, explains the discrepancy by saying that for the rougher class of work, of the kind for which the Westinghouse manager claims such a high record a day, it is customary in this country to use a much wetter mortar than is used in Great Britain, and this enables the bricklayer not only to spread his mortar more rapidly, but to set the bricks with a single tap of the trowel instead of having to hammer them down into place, as is necessary with the stiffer mortar used by the British workman. It is probable that the truth of the matter lies, as usual, somewhere between the two extremes.

A COMPARISON OF WATER-TUBE BOILERS.

A most interesting opportunity for comparison of the relative efficiency of various types of water-tube boilers will be afforded in connection with this year's shipbuilding programme of the British Admiralty, because of the determination of this body to install four different systems of water-tube boilers in the five new armored cruisers which are to be built. These vessels, four of which will be constructed in private yards, and the fifth by the government, are to be of something over 10,000 tons displacement, and are to be driven at a speed of 23 knots an hour by engines of 22,000 horse power. As a result of the investigations of the British Water-Tube Boiler Commission, and the elaborate tests carried out by them on the "Minerva" and "Hyacinth," full accounts of which have been given from time to time in the SCIENTIFIC AMERICAN, the government has decided to test the Belleville, the Yarrow, the Dürr, the Niclausse, and the Babcock & Wilcox boilers under exactly similar conditions by putting twenty-two Yarrow boilers in one ship, twenty-five of the Dürr in another, thirty-four of the Niclausse in a third ship, and in the fourth and fifth twenty-five Babcock & Wilcox boilers. As several of the "County" class cruisers now under construction, which are practically of the same type, are to have the Belleville boiler, an excellent opportunity is afforded for comparison. The steam pressure in the case of every ship will be the same, 250 pounds to the square inch at the throttle valve. The greatest heating surface per unit of power is shown by the Yarrow boilers, in which it amounts to 3 square feet per indicated horse power. The lowest ratio is found in the Belleville, where it is 2.29 square feet. On the basis of horse power per square foot of grate surface, the Niclausse shows 12.2 indicated horse power, while the Yarrow boiler shows 20 horse power. In a comparison of indicated horse power per ton of weight, the Belleville boiler stands first, with 12.57; then follows the Yarrow with 12 horse power, while there is not much difference between the other three. The total weight of the installation of 22,000 horse power is 1,750 tons for the Belleville, 1,832 tons for the Yarrow and 1,892 tons for the Niclausse, which is the heaviest of the five. In the case of the three new battleships of the "King Edward VII." class, which are to be 16,350 tons displacement and are to have a speed of 18½ knots with 18,000 horse power, Babcock & Wilcox boilers are to be adopted in two of the ships and a combination of three-fifths Babcock & Wilcox and two-fifths cylindrical boilers is to be installed on the third ship. In these vessels also it is possible to institute a comparison of the new water-tube types with the Belleville boilers, since the engines of the new ships will be very similar to those of the preceding battleship class of the "Duncan" type. The total weight of the Belleville boilers of the "Duncan" class is 1,580 tons; of the Babcock & Wilcox 1,735 tons, and of the combined types 1,885 tons; the indicated horse power per ton of machinery being 11.4 for the Belleville, 10.37 for the Babcock & Wilcox, and 9.54 for the combination.

FRENCH RAILWAY ENTERPRISE IN ABYSSINIA.

In the report on the Somali Coast Protectorate, the British Consul at Zaila describes at great length the possibilities of developing trade with Abyssinia by the construction of railroads, and particularly the French enterprise in this direction. Until recent years Zaila was the chief port for the import and export of goods to and from Harrar. Harrar is the gateway of Abyssinia, and the point from which that country communicates with the Somali coast. Notwithstanding the disadvantages of Baila as a port, and the want of water near the town, a thriving trade is done, all goods passing between Zaila and Harrar by caravan. Zaila is an old Egyptian town, and remains unaltered. With the exception of a few unpretentious government buildings, British ownership has made no outward change.