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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.

A 75,000 HORSE POWER TURBINE PLANT.

The great power station which is being erected at Chelsea, London, for the operation of the District Railway system, possesses special interest because of the fact that it will be the first large electrical power station to be operated entirely by steam turbines. The plant will consist of ten turbines, each of 7,500 horse power, with an overload capacity of 50 per cent above the normal rating. The turbines, which are being supplied by the British Westinghouse Company, will be of the Parsons type with Westinghouse modifications. Each turbine will be direct-connected to a three-phase generator of 5,500 kilowatts running at a speed of 1,000 revolutions per minute. There will be only four field-magnet poles, and current will be produced at 11,000 volts potential. The dynamos and the turbines are being built, part of them at the works of the American Westinghouse Company at Pittsburg, and part at the new works of the British company at Manchester. As a result of the high speed of revolution, and the consequent small number of field magnet poles required, the dynamos will be only about 9 feet in diameter; whereas, if reciprocating engines, of the type used at the Metropolitan Elevated Company's power station in this city, were used, running at 75 revolutions per minute, the diameter of the generators would have to be not less than 32 feet.

PERMANENCE OF STEEL FRAMEWORK IN TALL BUILDINGS.

The construction of the Rapid Transit Subway has necessitated the pulling down of a twelve-story skeleton steel building at the corner of Broadway and Forty-second Street, which was erected early in 1899. Its removal has given an opportunity to determine how far the methods adopted for the prevention of rusting or oxidation of the steel of these buildings are successful. Of course, the period of time during which the steel has been incased, three years, is very limited; but it is sufficiently lengthy to afford at least some indications of what may take place during the lapse of centuries. At the time of erection the steel work was given two coats of paint composed of carbon and linseed oil. The columns and girders were incased either in rectangular shells of brick, or with red brick and terra cotta; if with the latter, the spaces between the inclosing material and the steel work were filled in with brick and cement mortar. After the recent removal of the brickwork and terra cotta, the steel was found to be in first-class condition and showed no signs of decay. In the few spots where there was a slight evidence of oxidation, the rust had been on the columns, apparently, at the time they were put up, or it was due to some abrasion of the protecting coat of paint. It is interesting to note that the outside columns supporting the outer walls of the building were found to be in just as good shape as those in the interior of the building. Although, as we have said, the period of test was a brief one, it is considered by architects to have been long enough to establish the thoroughly reliable nature of the standard methods of protection adopted in this form of building.

THE CHANGES IN THE CROTON DAM.

It was to be expected that when the present Chief Engineer of the Aqueduct Commission proposed to make a radical change in the plans of the partly completed Croton Dam, his action would provoke more or less criticism. The vast importance of this great work, the standing and acknowledged professional ability of the former engineer, Mr. Fteley, who is responsible for the original design of the dam, and the fact that the radical changes proposed would involve the tearing down of a considerable portion of the completed structure, combined to produce a feeling of astonishment that any such fundamental reconstruction should now be proposed. However, after giving careful consideration to the reasons assigned for the proposed changes, and making a personal investigation at the dam, the SCIENTIFIC AMERICAN came to the conclusion that so far from having needlessly delayed the completion of the Croton Dam, Mr. Hill, the chief engineer, has not only added greatly to the stability and appearance of the structure, but has prevented the incorporation of a feature in the design which, in all likelihood, would have brought about the ultimate collapse of the dam. To say the least, it was a delicate task to propose a change which would look like an indirect censure of the plans of a distinguished predecessor; and it was a daring task when such changes were certain to provoke a storm of angry opposition from the citizens, who had already grown weary of the prolonged delay in the completion of this much-needed work. While we question altogether the judgment, we can fully understand that it was the best of motives which prompted the Merchants' Association of New York to criticise both the present Chief Engineer of the Aqueduct Commissioners and the Commissioners themselves for the delay of the dam. At the same time it is distinctly fortunate that the present Mayor of New York was able to take a clear grasp of the situation, and so far from removing the Commissioners, as the Merchants' Association demanded, did not hesitate to indorse their work, especially as concerns the proposed changes.

Mr. Fteley, who designed the original structure, substituted an earth dam for a solid masonry dam on the southern end of the structure, for reasons of economy. That he himself was at one time sensible to the risks which led his successor to condemn the earth dam, is shown by the following extract from a report on the great Quaker Bridge Dam, for which the present dam was afterward substituted, made by him as Consulting Engineer to the Aqueduct Commissioners, as far back as July 25, 1887, in which he says:

"An earth dam, with a core of masonry, was also considered. In such structures, the thrusts exerted by the earth against the center wall, during construction and at the different stages of the water surface, when filling or emptying the adjacent basin, are unknown or, at the best, very uncertain; if the wall became fractured under their action, or allowed the water, in places, to pass through, the leaks, under such a considerable and unusual pressure, would endanger the stability of the earth embankment. Moreover, the authorities agree that this kind of structure is not safe to adopt beyond a certain limit of height; and it was thought unwise to attempt an experiment, which owing to the importance of the interests involved, was not justified by the saving in expense which might have been effected by its adoption.

"In this case, where the welfare of New York is concerned, and where the consequences of a possible disaster, with 30,000,000,000 gallons of water behind the dam, may well be imagined, we must deal with certainties: we have before us many successful instances of masonry dams, although of less magnitude, and the proposed structure can be so proportioned and constructed in masonry as to stand effectually the great pressure to which it is to be subjected."

It was in practically the same terms that the present Chief Engineer of the Commission recommended that a revision of the Croton Dam plans be made, to the extent of substituting masonry for earth, and we think that the above quotation from a report of the original designer of the dam itself should silence forever all criticisms that might suggest that the change in the plans was made from any other motive than that of securing the most durable and perfect structure possible.

WARSHIP CONSTRUCTION IN PRIVATE AND GOVERNMENT SHIPYARDS.

BY OUR LONDON CORRESPONDENT.

In view of the experiments of the British Admiralty department, now in progress, to ascertain whether a private shipyard can build warships with greater speed than the government shipbuilding yards, the results in this direction in other countries afford interesting comparisons. In Germany and France battleship construction in both the private and state yards is very and unnecessarily protracted. And this delay constitutes a grave national danger which, it would seem, the respective governments do not adequately appreciate. In England, where, on the other hand, such work is carried out with all possible expedition, it has now become an axiom that "Great Britain can afford to wait until the Admiralty know the designs and efficiency of the projected vessels of other (European) nations before she commences to build a new vessel to excel them." In the case of the German battleship "Kaiser Karl der Grosse," a vessel 377 feet 4 inches in length and of 11,500 tons displacement, with four 9.4-inch guns and eighteen 5.9-inch guns, and with engines of 13,000 i. h. p., capable of developing a speed of 18 knots, she was erected in the private shipyard of Messrs. Blohm & Voss at Hamburg, and no less than 40 months and 5 days elapsed from the laying of the keel until delivered to the government. Even the Krupp firm, notwithstanding its modern and extensive equipment, are not much faster, since they occupied 35 months in building the "Zaehringen." With respect to the Imperial dockyards, they are quite as slow, since it was nearly four years before the "Wittelsbach," a similar vessel to the "Kaiser Karl der Grosse," was ready for sea. In France a similar state of affairs exists, but in this case the delay is more attributable to the uncertainty and hesitancy of the Naval Department, since the French government have a peculiar way of suddenly stopping work upon the construction of one vessel and directing operations upon another ship. But in the case of the three new battleships "Democratie," "Justice," and "Verité," which are each to be of 18,000 horse power, it is calculated that they will occupy four years in building. What is the result of this protracted construction? These three French battleships are of tremendous power, but progress in naval affairs and armaments is so rapid that by the time they are in commission they will be somewhat out of date.

In considering the practice in England, we find that although the government is comparaively slow in construction, everything is being done by the Admiralty to decrease the time occupied in building. The private shipyards, when they have a vessel in hand, crowd the workmen upon it, and get it off the ways as quickly as possible. The recent cases of the Chilean battleships "Libertad" and "Constitucion," and the new type of torpedo destroyer "Erne," offer striking examples of the speed with which battleship construction is carried out. The two first named, notwithstanding their large dimensions and displacement, were launched 10 months after the signing of the contracts, while the builders actually undertook to have the vessels complete and ready for use within 18 months; and if the speed of building with which they were commenced had been maintained, the contract time would have been shortened by one month. To build and equip a first-class modern battleship such as these Chilean war vessels, ready for action, within 17 months is a commendable achievement. In the instance of the torpedo boat destroyer "Erne," a record in quick construction was accomplished. This vessel was launched 7 months after the signing of the contract, and will be handed over to the English Admiralty 6 months below the contract time. Even in the government dockyards quick construction is the chief desideratum, though in this case the speed is not so great as in the private shipyards. But the English Admiralty are determined to cut down the time for building to the minimum, and they have now inaugurated a new system of decentralization, by which there is a superintendent for naval contracts. Speed in construction is the continual demand of the government, and it is furthermore a great national demand. For the battleship costing $5,000,000 upward, when launched, to be out of date, owing to the long time occupied in its construction, is a result which, in the interest of the citizens and the defenses of any country, should be remedied at all costs

"SHAMROCK III"

BY OUR GLASGOW CORRESPONDENT.

It seems to be inevitable that the building of yachts intended for "America" Cup racing should be attended, year by year, by the circulation of a crop of extraordinary stories regarding the appearance of the yachts, and the wonders which they may be expected to perform. The building of the boats now under construction has run to the usual accompaniment, and the British yacht has received, if anything, the larger share of the attention of the resourceful inventors of these rumors. Anyone who has been led by these stories to the expectation of some sensational development in the boat built at Dumbarton to carry Sir Thomas Lipton's third "America" Cup challenge, may be counted foredoomed to disappointment, for the yacht which has been evolved by Mr. William Fife, Jr., differs so little from recent challengers and defenders that it requires the trained eye of a practical yachtsman to identify the developments.

Such changes of type as have been made are, however, none the less important because they are unsensational. In the recent contests which have been sailed for this much-coveted trophy there has been a marked leveling of the abilities of the opposing yachts, and it has come to be recognized on both sides of the Atlantic that a runaway victory for either side is not among the things which can fairly be expected. The last contest, that sailed between Columbia and the Watson challenger, "Shamrock II.," was admitted on all hands to be the closest match ever made for Cup honors, and it would therefore have be[illegible] policy for Designer Fife, when called upon to [illegible] another Cup racer, to have ignored the devel[illegible] already made and to have struck out in the [illegible] of experiments of unknown value. This cons[illegible] should, of itself, have been sufficient to disco[illegible] of the rumors regarding the sensational deve[illegible] to be expected in the Scottish boat.

As a matter of fact the designer of "Sham[illegible]