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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.

FUTURE RECONSTRUCTION OF THE BROOKLYN BRIDGE.

In another column will be found an explanation of the causes which led to the recent partial failure of the Brooklyn Bridge. Our readers will probably agree with us that the collapse was due to indifferent construction, coupled with an inspection which, to say the least, was not any too thorough. The system of connecting the suspenders to the floor is poor and liable to introduce strains for which the parts were not proportioned. In the general reconstruction of the floor system of the bridge which undoubtedly will have to be undertaken at the earliest opportunity, the design of this detail of the bridge must be radically altered. It is manifestly difficult to hang a massive floor having a total horizontal movement of 14 inches to a cable which has practically no horizontal movement, by hinged connections which are only 20 to 24 inches in length. The best thing to do would be to make the trusses continuous across the center of the bridge and cut them either where the overhead diagonal stays commence, or else at the towers. The first would be a preferable position for the slip joints, for the reason that the fixed overhead stays form with the floor system a kind of cantilever construction, and the central portion of the span between them would thus act somewhat as the central supported span of a true cantilever bridge. There would be no difficulty in making connections between the suspenders and the floor system, at these points in the bridge, the great length and the flexibility of the former precluding any necessity for hinged connections.

The recent accident will serve the good purpose of forcibly directing attention to the fact that the bridge is carrying heavier loads than are desirable. This is the second occasion on which this condition of things has caused failure of the bridge. Two or three years ago it was manifested by the buckling of the stiffening trusses. Now it is the suspenders that are giving away. The first accident was not nearly so serious as the second; but they both show that there are weak places in the floor system which only require an extra bunching of the traffic, or the combination of excessive movement of the trusses with rather careless maintenance, to produce a breakdown. The main cables and the suspenders themselves when properly connected up and cared for are sufficient for the loads which the bridge is carrying, but the stiffening trusses are altogether too light to give the necessary rigidity to the structure. There is no question that the time has come for putting in more modern and stronger trusses, even if it should involve an increase in weight and the substitution of heavier suspenders for those which are now in place. We think it is quite within the resources of modern engineering to carry out this reconstruction, piecemeal, without interfering with the traffic. If this should be impossible, advantage will have to be taken of the completion of the new East River Bridge and of the ferries, to which traffic will have to be diverted while the change is being made.

The recent closing of the bridge and the enormous discomfort thereby occasioned are another reminder of the fact that the city authorities have ever been slow to realize the enormous and ever-accelerating rate at which the city of New York is growing, and its traffic requirements multiplying. We have seen this illustrated in the matter of the water supply, in the matter of the Rapid Transit tunnel, in the inadequate provision for public schools, and in other directions where the inconvenience, while not so widely felt, was, nevertheless, equally real. Those who are intrusted with the care of the city's interests, plan and build for an increase in the municipal demands of the city which, by the time the improvements are ready, is found to be immeasurably above the estimate. The Ramapo affair, bad as it was, has surely served the purpose—at least we hope it has—of teaching us that it is high time we made further and very much more extensive arrangements for securing an adequate water supply. The present overcrowded condition of the Brooklyn Bridge, and the fact that this splendid structure has been loaded up to, and almost beyond the safe limit imposed by good engineering, is another object lesson to the same effect. We sincerely hope that the new East River Bridge will be rushed to completion, and Suspension Bridge Number Three prosecuted with a speed that is commensurate with the urgent needs of traffic between Manhattan and Brooklyn. Bridge work is of necessity, because of its size and mass, slow in construction, and it is far better to be a little beforehand than very much behindhand in works of this kind.

RECENT DEVELOPMENTS IN THE BRITISH NAVY.

BY OUR ENGLISH CORRESPONDENT.

The energetic and progressive policy of the British Admiralty is being maintained in view of the keenness that is being exhibited by the various Continental powers in the struggle for the supremacy of the seas. The Naval Department has recently decided upon its new naval programme, and it is of a most extensive character. In the selection of this programme the experience and suggestions of naval officers and experts in the fleet were obtained, so that the Admiralty might gain a comprehensive insight into the defects of the existing vessels and consider suggested improvements. These suggestions have been adopted with liberality in the designing of the new vessels.

In connection with the first-class battleships a new type of this class of vessel is to be built, exceeding in armament any other vessel afloat or in course of construction for the English navy and equal in every respect to the vessels designed for any other of the powers. These new battleships, three of which are to be laid down immediately, are to be of 16,500 tons displacement. This exceeds the previous latest battleships by 1,500 tons. They will be 20 feet longer, being 420 feet over all, with a beam of 75 feet and a draught of 26¾ feet. Their engines will develop 18,000 I. H. P. and they will run on an eight hours continuous steam trial at not less than 18½ knots, an increase of ½ knot.

Their protection will be similar to that of the recent "London" class of battleships, with several developments, including an armored belt from the lower protected deck to a small height above the water line of 9-inch armor, and thence to the main deck of a thickness of 8 inches, and this will be continued over the whole length between the barbette and the heavy guns.

A peculiar feature will be introduced which has not hitherto been attempted in any English vessels. The plan of placing the 6-inch guns in casemates is to be abandoned. The ten guns of this caliber will be inclosed in a battery with 7-inch armor, and the battery will be divided by traverses to diminish the effect of any shell that may happen to penetrate the armor. In addition to the four 12-inch guns which form the normal armament of this type of battleship throughout the world, four 9.2-inch guns are to be introduced. These guns are of tremendous power and will considerably strengthen the armament of the vessel. They will be placed on mountings similar to those which have been recently placed on the "Cressy" and which have proved so conspicuously successful. They will be protected by 6-inch or 7-inch armor, and will have a direct forward and aft fire. By this means the ship will get a forward fire of two 12-inch, two 9.2-inch and two 6-inch guns, and an aft fire of the same formidable character. This means that presuming all the guns to be fired simultaneously an aggregate weight of 2,660 pounds of metal—nearly 1¼ tons—will be fired from the six guns fore and aft respectively.

A new type of cruiser has been designed. This new vessel, of which six are to be laid down, will be of 9,800 tons, 22,000 I. H. P., developing a speed of 23 knots. Instead of carrying two 6-inch guns, both fore and aft, which comprises the armament for these vessels already on service, one 7.5-inch gun will be placed fore and aft. There is a great material increase in the power of this larger caliber gun which will render the armament of a very superior character.

With regard to the destroyers, ten are to be built which at full draught will have a speed of 30 knots. One important improvement in this type of vessel will be the increase in the coal-carrying capacity.

Several vessels have been struck off the effective list and will be used simply as depots. Eight vessels which the Admiralty decided to refit have been abandoned in lieu of new ships. The present programme for building comprises 18 first-class battleships, 25 armored cruisers, 25 torpedo boats, making in all, with several other vessels for different purposes, a total of 84 new ships.

Building in the various shipyards, both governmental and private, is in full swing, and rapid headway is being made to make up for the delay in building in past years. Many of the larger private yards have carried out extensive improvements and alterations and have installed new plants in order that they may cope with the work.

The fittings of the new vessels are to be of a most up-to date and modern description. They will be provided with the most approved ammunition, the guns will have cordite charges and telescopic sights, electric hoists, and the latest types of torpedoes.

Owing to the importance of specially equipped coaling vessels the Admiralty proposes devoting $400,000 for this type of ship, and at present there are seven fast steamers plying at home and abroad for supplying the vessels of the fleet with coal. Coal barges to be used as temporary transmitters are to be fitted in order to be available for getting coal on board ships not lying at the wharves. A new distilling ship has been provided, and large distilling apparatus is being installed at all the stations, so that an abundant supply of fresh water is always available. The construction of an ammunition ship is also under consideration, but, owing to the difference of opinion among experts concerning the advisability of such a vessel, it has not been definitely settled.

The trials respecting the boilers are also being pushed forward. Experiments are being made in all directions to ascertain which type of boiler is the best suited for naval requirements. The installation of the Belleville boiler has been stopped, pending the decision of the investigating committee, and orders have been placed for one or two of the Babcock & Wilcox water-tube boilers. The German naval authorities are also conducting similar boiler tests, and they are also experimenting with a combined installation of water-tube and cylindrical boilers upon some of the battleships. If this scheme is feasible and proves successful, it will probably be adopted in the English battleships.

It has also been decided to decrease the height of the masts of the new battleships. Owing to the fact that signaling has been revolutionized by Marconi's wireless telegraphy, it is considered unnecessary to have lengthy masts, as nearly all the vessels in the English navy are being provided with Marconi's apparatus. Probably as much as €0 feet will be cut off from the masts. Hardly any wood is to be employed in construction, and that utilized in the shape of furniture and fittings will be arranged so that it can be thrown overboard within a few minutes, owing to the great danger of ignition that arises from its presence.

The system of building fore-and-aft bridges at present in vogue will be discontinued. Small unobtrusive structures will be provided in their stead, and although made of steel they will be rendered easily removable so that they can also be quickly thrown overboard. These improvements will somewhat detract from the beauty and symmetry which has hitherto characterized the British ships; but a great deal of conspicuous superstructure will be removed, so that when cleared for action the vessel will not offer so conspicuous a target.

ELECTRICAL METHOD FOR DETERMINING THE VARIATIONS OF MINERAL WATERS.

A simple and rapid method of finding out the variations in composition of mineral waters has been brought out by M. P. Muller, who uses the variations in electric conductivity for the purpose. To make a complete study of a given mineral water and establish its qualitative and quantitative composition, chemical analysis is indispensable, and of course cannot be replaced; but the composition of a water is not necessarily invariable, and one cannot be sure whether a certain spring of mineral or ordinary drinking water, when analyzed in the month of January, will have the same composition in the month of June, or in the following year. The chemical analyses would be long and costly, nevertheless it would be interesting to be able to follow the variations of a spring from the time when an analysis had been made, and to know the influence of the seasons or of a change of flow due to rains or dry weather; also the modifications due to an infiltration which may be unknown. A method of indicating such variations should be simple, rapid and easy to carry out, and besides, the property which it is proposed to measure should depend as much as possible upon the dissolved matter and not upon the water itself. The method of electric conductibility fulfills these conditions very well. The experiment is made promptly by the method of alternating currents and telephone (a greater or less sound indicating greater or less conductivity), but care should be taken to operate always at the same temperature, say, 25 deg. C. The conductivity of a water defines this liquid in the same way as a fusing point defines a chemical substance; it depends upon the nature and quantity of the substances dissolved, which in a potable water are almost exclusively composed of electrolytes. It is natural that two different waters which have the same conductibility may not have the same composition, any more than two bodies with an identical fusing point would be alike, but to follow the variations of a determined source the value method cannot be questioned.