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CONGRESS AND THE NICARAGUA CANAL.

One of the greatest problems which will confront the next Congress is the Nicaragua Canal. This, if we may believe a recent dispatch from Washington, is to be pushed to the front on the opening day of the session. Representative W. P. Hepburn, who was chairman in the last House of the committee in charge of Nicaragua Canal legislation, is quoted as saying: "I shall introduce a Nicaragua Canal bill on the first day of the session;" and he evidently intends to do this in spite of the fact that the Commission appointed by the President to examine all routes across the Isthmus and decide which is the best will not have had time to present its report.

We doubt if any question of similar magnitude has come before Congress upon which so much general misapprehension exists, both in the country at large and in Congress itself; and the gentlemen who will be called upon to vote upon the subject prematurely (if Mr. Hepburn has been correctly reported) cannot do better, in the intervening time before Congress meets, than acquaint themselves with the true merits of the question. The sources of information are many and voluminous, and are to be found in the reports, official and private, that have been published. We ourselves, during the last session of Congress, published two illustrated articles (SCIENTIFIC AMERICAN, February 4 and 18, 1899) which were written with the object of placing before the public, in concise form, the respective advantages of the Nicaragua and Panama routes, which are the only two that are likely to be seriously considered by Congress.

It will be remembered that the last Congress, after considerable discussion of both routes, decided that it required fuller information, and authorized the President to appoint a committee for the purpose of investigating every possible route and deciding which it was most desirable to build. That committee is still at work and we can readily believe that a year may prove to be all too short a time in which to complete its investigation. If the report is not ready, the obvious thing to do is to wait until it is ready. To vote one million dollars for a committee to investigate and throw light upon the subject and then to ignore the committee by putting the matter to the vote before that committee has reported, is unworthy of the dignity of Congress, and is certainly not the course that will promote the interests of the country.

Before Congress votes away some $150,000,000 of the nation's money, let it at least know if it is to be wisely spent.

"A GROSS ERROR."

At the recent meeting of the Society of Naval Architects and Marine Engineers, Rear-Admiral Hichborn read a paper on the designs for the "Denver" class of cruisers, in which he referred to the criticisms to which these vessels have been subjected as follows: "One of these publications, for instance, in a prominent scientific paper, contained cuts of the vessels with certain particulars headed respectively: 'The 3,500-ton protected cruiser "New Orleans,"' and 'The proposed 3,500-ton semi-protected cruiser "Denver" and class.' It takes but a glance to discover the first gross error in this comparison, for those familiar with the facts—the 'New Orleans' having left the New York yard a short time ago, in ordinary full load condition, displacing over 4,000 tons."

The "prominent scientific paper" referred to will be recognized by our readers as the SCIENTIFIC AMERICAN; but the "gross error" of putting the displacement of the "New Orleans" at 3,500 tons is not chargeable to us, but to the annual report for 1898 of the bureau over which Admiral Hichborn presides, from which our figures were taken. In this report the displacement of the ship, "fully equipped, ready for sea, all stores on board," and with 700 tons of coal in the bunkers, is given as 3,437 tons. To allow for extra coal, due to close stowage, we raised this figure to 3,500 tons, and made our comparison accordingly, having no reason to suppose that in the official statement of the displacement of a vessel of 3,500 tons there could be a shortage of 500 tons.

We note that in the annual report for 1899, just out, the displacement of the "New Orleans" under similar conditions is set down as 3,769 tons; and now, following closely upon the issue of the report, we have the statement of the chief of the bureau that the displacement is over 4,000 tons!

Surely we may be pardoned if, in taking our figures from such an elastic source, we have fallen unwittingly into "gross error."

THE EXPLOSIVE FEATURES OF ACETYLENE.

The rapidly extending use of acetylene and the fact that its widening range of application is putting it increasingly into unskilled hands, render the question of its explosive properties a vital one to the community at large. In the earlier stages of its manufacture and use the new illuminant suffered somewhat in reputation from the recurrence of explosions more or less destructive and fatal, and there was for awhile a danger of its field of usefulness being narrowed by a popular fear as to its safety, out of proportion to the facts. Thanks, however, to exhaustive experimental work in the laboratory, the explosive possibilities of acetylene have been determined with accuracy, and it is now possible to manufacture, transport and use the new illuminant with something of the same immunity from accident that characterizes the familiar coal gas.

Pure acetylene gas, when under atmospheric pressure, is not explosive. This was proved by Berthelot and Vieille before acetylene was looked upon as having commercial value, and as soon as its production on a commercial scale became certain, they took up the question again and confirmed their earlier experiments with the following statement: "Under atmospheric pressure and at a constant pressure, acetylene does not propagate to an appreciable distance decomposition provoked at any point. Neither the electric spark nor the presence of an incandescent wire, not even the detonation of a fulminate primer, exercises any action beyond the vicinity of the region subjected directly to the heating or shock."

As the pressure of the gas rises above that of the atmosphere, it becomes liable to explode, but it is not possible to state the exact critical pressure above which a definite exciting cause will, and below which it will not, render acetylene explosive. Berthelot and Vieille state that when the exciting cause is an incandescent wire in the gas, the maximum allowable pressure is 10·5 pounds gage, and when the cause is the detonation of a fulminate cap, 3·5 pounds is the limit. These two causes of explosion were taken as representing the extreme conditions that could obtain in faulty manufacture and manipulation of the gas, the first representing intense local heating in calcium carbide attacked by a small amount of water, or caused by intense friction due to the rush of gas through a valve. The second case, which would be represented in the formation and detonation of acetylides, is not liable to occur in the commercial production of acetylene, but could only happen under special laboratory conditions.

Liquid acetylene, therefore, on account of its condensed state, is naturally susceptible to explosion, detonation being caused by high temperatures, sparks, or heavy shocks to the liquid itself. Berthelot detonated a steel bomb filled with liquefied acetylene by means of an incandescent wire, the crusher gage showing a pressure of 5,383 atmospheres; but liquefied acetylene contained in cylinders was shown by the same experimentalist to be proof against detonation by shock, a cylinder charged with 300 grammes of the liquid falling repeatedly upon a steel block from a height of 19·5 feet without explosion. A direct blow upon the liquid itself may heat a small portion to a dangerous temperature, whereas the same blow to the cylinder would be only partially transmitted, and what portion did reach the liquid would be absorbed by the whole liquid mass. A real peril exists at the cylinder and reducing valves, due to the sudden arrest of the column of gas at the reducing valve raising its temperature adiabatically to the explosion point.

Acetylene is more dangerous than illuminating gas in forming explosive mixtures with air, for not only is the ignition temperature lower, but the explosive energy is greater, and the range of the explosive proportions of the gas and air is wider. Thus a mixture of one volume of illuminating gas with one or with two volumes of air will not burn; whereas a mixture of similar proportions of acetylene gas and air burns with a sooty flame. In the case of each gas a mixture of one volume of the gas to three of the air is explosive. The strongest explosive in the case of acetylene is one to nine, and in the case of illuminating gas one to six. But whereas the latter ceases to explode at one to twelve, acetylene mixtures do not become non-explosive until the proportion is one to twenty. The temperature of ignition varies but little with the proportions of the mixture, and is placed at 900° F. for acetylene as against 1,100° F. for most combustible gases.

For a more complete discussion of the explosive possibilities of acetylene our readers are referred to an article by Frederick H. McGahie in the current number of the SUPPLEMENT.

THE YACHT "COLUMBIA" IN EUROPEAN WATERS.

After defeating decisively the fastest yacht that England could build this year, "Columbia" is to be sent across the water to try her paces in the Mediterranean, and later, during the summer months, over the various English courses. The champion of this year showed such a marked superiority over the "Shamrock" that we think the owners of "Columbia" are fully justified in making this venture. The most formidable yachts that she will have to meet on the other side are the "Shamrock," the German Emperor's "Meteor" (formerly a 90-foot cutter, now rigged as a yawl), the "Valkyrie III.," and a new 90-foot cutter which is being built from plans by Watson, the designer of the "Britannia," "Meteor" and the "Valkyries." The most formidable of these boats will be the "Shamrock" and the new Watson boat. It is possible that alterations will be made in "Shamrock," with a view to improving her qualities on a wind, though we very much doubt if she can be bettered sufficiently to overcome the present 6 to 10 minutes difference in a 15-mile beat to windward between herself and "Columbia." Probably the new Watson boat will be a more formidable competitor, and this for several reasons. In the first place, the later Watson boats have been excellent in windward work. Then again the new boat is an improved "Meteor," and "Meteor," after "Shamrock" had sailed for this side of the water, on several occasions beat "Britannia" by nearly three times as much as "Shamrock" had done, being as much as from 20 to 35 minutes better on a 40 to 50-mile course. Another circumstance which would be in favor of the new Watson boat is the fact that she is being built to race under the new English girth rule, which puts a penalty upon beam and draft, and she should gain thereby some advantage over "Columbia," which was built under a rule that puts no penalty on beam or draft. On the other hand, the Watson boat is sheathed with wood and will be handicapped by some 7 or 8 tons of dead weight. Although the new cutter may prove a troublesome competitor, we do not doubt that "Columbia" will accomplish that wholesale "capture" of English cups which was vainly attempted by "Navahoe" and "Vigilant."

CABLES OF THE NEW EAST RIVER BRIDGE.

The plans and specifications for the cables of the new East River bridge which have just been given out serve incidentally to show what a great stride has been made in the past half century in improving the quality of the materials that enter into a bridge of the suspension type. The great possibilities in the way of length of span and capacity now open to the builders of this type are chiefly due to the use of wire in place of chain cables, and to the extraordinary strength that is possessed by modern cable wire. The iron bars that made up the old chain cables possessed, probably, a tensile strength not exceeding 25 tons to the square inch, and they were open to the suspicion that attached in early days to welded members. The steel wire cables of the East River bridge will have a tensile strength of 100 tons to the square inch, or just four times as much as the old iron chains.

THE NEW NAVAL PROGRAMME.

Secretary Long and the Board of Naval Construction are to be congratulated on the new programme of naval construction, which calls for the construction of eighteen vessels with an aggregate displacement of 75,300 tons, to cost exclusive of armor about $26,000,000. The most important ships will be three great armored cruisers of 13,500 tons trial displacement, with high speed, unusually large coal supply, and powerful armament. They will differ but little from the armored cruisers "California," "Nebraska," and "West Virginia," vessels of 15,500 tons displacement, authorized by the last Congress. These vessels will combine the offensive and defensive qualities of the battleship with the speed and radius of action of the cruiser. If, as is suggested, they are to carry the 10-inch gun in their main battery, they will mount a more powerful weapon than the latest German battleships, whose largest gun is of 9·45 inches caliber. The programme also provides for three 8,000 ton protected cruisers, which are to be improved "Olympias," the increased displacement being devoted to larger supplies of coal, ammunition, and stores, and a larger crew, all of these additions being necessary to meet the long-distance cruises required by the extension of our foreign possessions. The third class of ships will consist of twelve sea-going, light-draught gunboats of 900 tons, to have the highest speed compatible with good cruising qualities and great radius of action. The presence of these vessels on the programme is due to the recommendation of Admiral Dewey, who considers them necessary for the proper patrol of the Philippines. They are to be patterned broadly after the "Wheeling," but will be of several feet less draft.

The programme is admirably adapted to meet the