SCIENTIFIC AMERICAN

ESTABLISHED 1845

MUNN & CO., - - Editors and Proprietors

Published Weekly at

No. 361 Broadway, New York

TERMS TO SUBSCRIBERS

One copy, one year for the United States, Canada, or Mexico $3.00
One copy, one year, to any foreign country, postage prepaid. £0 16s. 5d. 4.00

THE SCIENTIFIC AMERICAN PUBLICATIONS.

Scientific American (Established 1845) ..... $3.00 a year
Scientific American Supplement (Established 1876) ..... 5.00 "
American Homes and Gardens ..... 3.00 "
Scientific American Export Edition (Established 1878) ..... 3.00 "

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MUNN & CO., 361 Broadway, New York.

NEW YORK, SATURDAY, DECEMBER 2, 1905.

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.

"FESTINA LENTE."

If we were a people much given to the use of heraldic forms and phrases, the SCIENTIFIC AMERICAN would suggest that the classic saying of Augustus Cæsar, "Festina lente" (Make haste slowly) should be adopted as the motto for the Panama Canal. Never, surely, did the early history of a great undertaking illustrate, in the sequence of its events, the necessity for the exercise of patient investigation and the avoidance of precipitate haste, so clearly as have the past few months of the history of the Panama Canal.

Particularly is this true of the present premature discussion of the forthcoming report of the Board of Consulting Engineers, appointed by the President to determine what is the best type of canal to construct at the Isthmus. This Board is composed of the world's most eminent authorities in the particular class of engineering problems that will be involved in the construction of the canal, and they represent the full knowledge and ripe wisdom of America and Europe in work of this character. The professional reputation of these gentlemen is such as to make it certain that their opinion, as thus rendered, will be given absolutely without personal prejudice, and entirely upon the facts. We take it, therefore, that whatever the Board of Consulting Engineers may recommend as the best type of canal to be built, judged from the standpoint of the engineer, must be accepted by Congress as the best—unless, indeed, the nation is to stultify itself in the eyes of the engineering world. The report has not yet been made public, and cannot be for some time to come, at least in its entirety; and at the present writing nothing is certainly known beyond the bare fact that the decision, by a majority of eight to five, will be given in favor of a sea-level canal.

In view of these facts, we think that it is extremely unfortunate that the press of the country should have been fairly inundated with dispatches from Washington, which not only claim to represent the attitude of individual members of the Board of Consulting Engineers, but also have gone so far as to state that the President himself views the results that have been reached, or are likely to be reached, by the Board, with "great disappointment."

The SCIENTIFIC AMERICAN has the very best authority for stating that, outside of the simple fact that the Board voted eight to five in favor of a sea-level canal, the whole of these dispatches, with their professed statements of facts and opinions, and representations of the attitude of government officials, from the President down, are absolutely and of necessity without a basis of fact. Surely the least that the press and the public can do at the present juncture is to await with some measure of dignified restraint the announcement by the President himself of the findings of his Board. When these are given out, and not until then, will it be possible intelligently to criticise the arguments that are set forth in favor of a sea-level canal.

Speaking broadly, however, and without any reference to the pending report, we would suggest that in all the long discussion which will follow its publication, whether in Congress, by the daily press, by the technical journals, or even upon the lecture platform, it would be well to bear in mind the motto that is written at the head of this article. Let the nation remember that, although the extra one hundred millions of dollars and the few extra years of time that a sea-level canal may cost, may seem large in our day and generation—ten, fifty, one hundred years hence, this little question of time and cost will be forgotten by a posterity that is reaping the inestimable benefits of an unhindered waterway from ocean to ocean.

We are committed to a task, so stupendous both in itself and in its future commercial and political significance, that if we are to judge it rightly, we need to readjust our sense of proportion. To obtain a true point of view, we must take our stand among the future "forty centuries" that will "look down upon" our completed work. We must build for all time.

To a nation that can scatter an annual largess of one hundred and forty million dollars in pensions for a war fought out nearly half a century ago, the question of time and cost in the construction of an Isthmian canal should seem—so we get the best—to be the last consideration.

ADMIRAL PRINCE LOUIS OF BATTENBERG ON SPEED IN WARSHIPS.

In the course of an interview of the Naval Editor of this journal with Prince Louis of Battenberg, Admiral in command of the visiting British squadron, the conversation turned naturally to the subject of speed in warships—for the distinguishing characteristic of this squadron is the unprecedentedly high average speed of over 24 knots an hour, with which every one of the six ships is ready to respond, should the Admiral call for it. Twenty-four knots an hour is a speed which hitherto has been attained only by cruisers of the protected or unprotected type, and the number of these could be counted on the fingers of one hand. That these cruisers of the armored type should be capable of responding to a call for 24 knots is due to the fact that every effort is made to maintain the motive power in such a high state of efficiency, as to enable the ships, when the forced draft is turned on, to develop the same horse-power and show the same speed as were secured on the contract trial. In accordance with a regulation of the British navy, the ships in commission are required, once every quarter, to undergo a 24-hour speed trial, the first eight hours of which is done with the full power, and the remaining sixteen hours at three-fifths power.

Such a regulation naturally begets a desire on the part of the engine room and boiler room staff to equal, and, if possible, surpass the original contract performance; and that this can be done has been proved in the case of this armored squadron, and particularly of the Admiral's flagship, the "Drake."

Prince Louis informs us that the last 24-hour trial was carried out on the recent run of his squadron from Halifax to Annapolis. On the trial with full power, the "Drake" maintained for the first eight hours an average speed of 24.25 knots an hour, with an average indicated horse-power of 31,061, and a consumption of coal (of indifferent quality) of 2.2 pounds per horse-power per hour. The forced draft was then shut off, and for the following sixteen hours the "Drake" maintained an average speed at three-fifths power of slightly over 21 knots an hour. The full significance of this performance will be appreciated by naval men, when it is borne in mind that the "Drake," with full coal bunkers, was drawing 27½ feet, or 1½ feet more than her normal draft of 26 feet, on which her original contract trial took place. Moreover, it is six months since she was last in drydock for cleaning.

The great speed of the "Drake" naturally led to the question being asked as to whether, in the supposititious and altogether unlikely event of hostilities, if the "Drake" were to sight one of the fastest merchant liners, such as the "Deutschland" or the "Kaiser Wilhelm II.," both of 23½ knots speed, she would be capable of overtaking and capturing her. Prince Louis considers that this would be largely a question of the relative ability of the boiler room force on the warship and the converted cruiser to endure for a lengthy period the intense strain incidental to driving the vessels at the highest possible speed. If she had a sufficiently long start, the merchant vessel, because of her large reserve of firemen, and her superior staying powers, might be able eventually to draw away. The result, however, would be determined somewhat by conditions of sea and weather, and on a clear day the "Drake," with her advantage of three-quarters of a knot of speed, should be able, in a calm to moderate sea, to draw up within range, and wing her quarry with her 9.2-inch forward rifle.

Although Prince Louis believes in the great advantage conferred on an armored cruiser squadron by the possession of superior speed, he is of the opinion that the speed given to a battleship should under no circumstances be raised above that critical point at which, on a given displacement, it would become necessary to sacrifice either the armament or the armor, in order to accommodate the great engine and boiler weights that would be necessary to secure that speed. The battleship, heavily gunned and heavily armored, is the central fact about which the other elements that go to make up a navy are grouped; and to which they are, after all, merely accessory and subordinate. The outer screen of scouts and the inner screen of armored cruisers may be considered as having fulfilled their primary function, if they succeed in locating each other's battleship squadrons and bringing them together to fight out the battle of big gun against heavy armor. When the battleships are once engaged, it will be found (always supposing, of course, that the personnel is of equal efficiency) that the ships which carry the most powerful guns and the heaviest armor will survive as victors. Prince Louis considers that in the present day, when the speed of battleships has risen to the high average of 18 knots, the possession of one or two knots higher speed by one of two contending fleets will not offer such a great tactical advantage as is commonly supposed. This is particularly true in these days of long-range fighting, when, as in the late war, engagements may open at a range of as great as seven miles, and be carried on for hours, at ranges of four and five miles. For at such distances it would take a considerable time for a difference of a knot in speed to have any material effect upon the tactical movements of the two fleets.

And after all is said and done, it must be admitted that recent events seem to show that the possession of the "speed gage" is determined, not so much in the designer's office, as it is by the efficiency of the personnel when the ship has been placed in commission. A highly-trained boiler and engine room force, controlled by a staff of ambitious and painstaking engineers, on the one hand, as contrasted with careless and indifferent methods on the other, may easily transpose the "paper" speeds of two contending warships. So that after Admiralty Boards and Boards on Construction have determined what speed a ship shall have credited to her, her actual speed on the high seas will depend upon the day-by-day efficiency of the engineer force.

ELECTRIC MINING IN CALIFORNIA.

Electricity for operating mining machinery has reached a high stage of development in Nevada County, and it is natural that it should typify the progress that California is making in harnessing its mountain streams and utilizing this power for industrial and commercial purposes. It is not that electricity is displacing hydraulic and steam power in the old mines so much as it is that it is opening up new mines that were considered inaccessible and reawakening abandoned mines that could not be operated profitably with steam power. The cost of getting coal up to the mines was in some cases so great that nothing but the richest returns in minerals could make any profits for the company. Before the advent of electricity in the California mining fields there had been developed ideal systems of water and pipe lines and in Nevada County many of these systems are in use to-day. In spite of this, electricity has achieved remarkable results.

The reasons are not far to seek. The mines located above what is called the water line could not be worked, nor could many abandoned mines, which were known to be moderately rich in ore, but that cost too much to work with steam generated from coal. The fuel had to be transported many miles over rough, mountainous country, and its cost at the mouth of the mines often averaged ten and more dollars per ton.

With her fine system of hydraulic generation of electricity in the Sierra Mountains, California leads all other States in the cheap distribution of electric power. Gold mines all along the route of her long-distance transmission lines have been converted into active scenes of mining. Lateral lines of transmission run in all directions, and some of these extend upward of twenty and thirty miles from the main route. So great has grown the demand for electricity for mining purposes that the supply of power for the Pacific coast end of the transmission lines is seriously menaced. The application for electricity for new mines increases with each month, and several new mines call for electricity every few weeks.

The water power of California is thus its most precious heritage. So important is this considered that its distribution has been developed into a system that makes both miners and farmers dependent upon it. The location of a mine or farm is therefore the important consideration in opening and working it. Water is sold and distributed at so much per miner's inch throughout the State. This appears on the surface a very equitable system, and it was, before hydraulic power was introduced for generating electricity. The sale of the miner's inch of water has no bearing whatever upon the head of the water. One farmer or miner pays the same for the water as another who is located 100 or more feet lower down in the valley. As each inch used had to be paid for, it was not considered necessary to take into consideration the pressure of the water.

This condition of affairs has created some peculiar results. The miner or farmer who uses the water in the higher altitudes loses a power which another some hundred feet below can convert into electric power for mine purposes. There are a number of instances where one mine develops something like 0.19 horse-power for each miner's inch of water, and another 500 feet lower down secures 1.19 horse-power at the same cost for the water. We find, therefore, that the generation of electricity on a large scale in the lower valleys is more economical than in small units near the camps higher up. Most of the power-house companies can transmit electric current to the higher camps at less cost than