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SCIENTIFIC AMERICAN SUPPLEMENT

No. 711.

For the Week Ending August 17, 1889.

Price 10 cents. For sale by all newsdealers.

A RECENT SEARCH LIGHT EXPERIMENT.

The recent experiments with electrical search lights on the Spit, near Hurst Castle, opposite the Needles passage, in the Solent, England, were, so far as can be learned, not in anywise novel, nor is it easy to see how, as is claimed in some quarters, these lights can balk torpedo boat attack. The design was to protect the roadstead, and it is claimed that this was accomplished. It is true that the torpedo boats were discovered in the blackness and held in broad view for the fire of the shore batteries. Perhaps these batteries could have destroyed them before they reached the shipping, perhaps not. Even if so, it does not prove very much.

An account says that a great volume of smoke made by the war ships accompanying the little craft, purposely to mask their design, blew out to sea, the wind being outward, thus enabling the search lights to bring the enemy out clear. But the wind does not always blow in that direction, and hence the test would have been more satisfactory had the wind favored the attack.

Again, the best promise of the torpedo boat is thought to be in the protection of, rather than in the attack upon, harbors. Electrical search lights might or they might not advantage ships coming in from the sea. Supposing they did locate the attacking torpedo boats as they came up; unless there was the power to beat them off, of what value would the knowledge be? If the heavy quick-firing guns now being set up atop the conning towers of the new torpedo boats realize the promises made for them, the torpedo boat will have a palpable advantage, because able to throw upon a ship as heavy shot as can be thrown back, before it an immense target and a steady one, though itself affording only a small and running mark for the ship's gunners stationed aloft and alow.

THE INADEQUATE SUPPLY OF WATER FOR NEW YORK.

For complete physical independence there are few undertakings that will compare favorably with the new Croton scheme. Tested by any one of several elementary methods, it departs so widely from the requirements that the results only corroborate the hypothesis that the scheme claims absolute freedom from all obligations of physical science.

Take, for instance, the relation that should exist between the capacity of the aqueducts and the available supply. So far as any advantages of storage are concerned, the surveys explain that, owing to the topography of the 361 square miles constituting the basin, there is an area of 115 square miles in the lower part of the valley that cannot be made to contribute to reservoirs except a terminal one be provided, and therefore this portion may be deducted from the whole, leaving the available area for storage 246 square miles.

Speaking generally, one square mile of watershed will supply from 13,000 to 15,000 persons, provided the allotment is only fifty gallons. Now, since New York needs one hundred gallons per capita, it is plain that one square mile of the Croton basin will only supply half this number, or from 6,500 to 7,500 persons. Estimating the population at present to be 1,700,000, the number of persons depending on each square mile of watershed (omitting the inhabitants thereof) is about 7,000. But to furnish this population with water during the present summer, it is computed that 23 thousand million gallons of storage would be necessary; and inasmuch as the storage provided amounts scarcely to 9 thousand million gallons, there is a deficiency of 14 thousand million gallons.

This volume of storage (nine thousand million gallons) is what is necessary to furnish 100 million gallons per day—the capacity of the old aqueduct.

Can it be that the completed aqueduct is not "turned on" because it would now bring no greater volume of water to the city than the old one?

When the Sodom dam is completed, say in 1893, the storage will be increased, but the city also will have increased to such an extent that the deficiency of storage will then be 16 thousand million gallons. In case the new aqueduct is courageously put into use by the summer of 1893, the total aqueduct capacity will then be 350 million gallons per day, while the volume furnished by the reservoirs will be 135 million gallons.

Will the deficiency be made up in 1897? By this time the demand of the city will have reached 250 million gallons per day, and the storage computed to be necessary is 43 thousand million gallons. Now, the maximum storage capacity of the Croton basin, without the Quaker Bridge dam, is 20 thousand million gallons; and since it is practically out of the question to finish this latter structure before the year cited, there will then be a deficiency of 23 thousand million gallons, and more, too, unless all the smaller reservoirs are completed in the interval, which is so improbable that it is safe to assert that the two aqueducts together will not convey in the dry season of 1897 more than 140 million gallons per day.

Now the question arises, Will the aqueducts even in mid-summer convey a volume approximating to their capacity? According to the meteorological record of the Croton Aqueduct Department, the maximum volume of water obtainable is 270 million gallons per day (80 million gallons less than the aqueducts can deliver); and since the city will need this volume during or before the year 1899, it is certain that even if the projected dams are then in service, the deficiency of storage would only be made up for a brief season.

To state the whole matter in a different way, we might say that during the next ten summers sixty per cent of the joint capacity of the aqueducts cannot be utilized. What can be the gain in adding to the expenditure in this drainage area, when the greatest possible effort can only remedy the present deficiency ten years in the future, and then only for a short period?

The conclusion is unavoidable that the Croton basin was too limited to warrant the construction of the second aqueduct, and does not warrant the construction of more dams now—hence the scheme's independence of surveys and records of rainfall.

If all future expenditure be devoted to bringing water from an elevated watershed that will afford 500 million gallons daily, the deficiency existing to-day can be made good in five years, the pressure can be restored, and the quality of the supply improved.

SPEED TRIALS OF A BRITISH SQUADRON.

The British Mediterranean squadron recently had a four hours' trial of speed between Cagliari and Port Mahon, the result showing that, in a seaway only fairly heavy, an enemy's mercantile traffickers, if ordinarily fast steamers or even sailers—for a quick-heeled sailing craft with a gale behind her is good for 15 knots—have little to fear from any ship now in the Mediterranean squadron, and any craft purporting to be a warsman not fast enough to distance it nor armored to stand and fight would scarce deserve a better fate than to fall a prey.

The trial was under the British Admiralty orders that squadrons must try the speed of their ships quarterly, the day being set long in advance, so that nothing better than ordinary condition of wind and sea may be expected. The wind was a head one, what there was of it, a "moderate" swell running. Here is the tally of the four hours' run, the measure being in knots: Benbow, 61·5; Scout, 58; Phaeton, 57; Colossus, 56·5; Edinburgh, 51; Temeraire, 50·5; Dreadnaught, 48. From this it will be seen that the best time made was the Benbow's, averaging scarcely 15·4 knots an hour, the others in their order averaging 14·5, 14·2, 14·1, 12·7, 12·6, 12·0.

When the speed of these several ships is compared with what they are credited with upon the measured mile, the disparity is wide—further evidence, surely, that practical tests, under ordinary conditions, are the only ones worth the care and expense of making. If the sea were always smooth, save at odd and widely separated intervals, a run along the measured mile or along the channel of a sheltered river would be a fair test. But the contrary is the case. It's nearly always rough, sometimes heavy seas running with the wind, sometimes running against or athwart it, with a nasty swash resulting, and again swelling as with subterranean convulsion. Hence the measure of a ship's efficiency should be on the broad seas in ordinary weather.

A curious and interesting feature of the recent test was the behavior of the Temeraire, which, notwithstanding her aged boilers and lofty spars, she being ship-rigged, ate into the head wind, fairly up with most of the more modern craft, though they were without tophamper, indeed, beating one of their number, the Dreadnaught, for which so much had been promised.

It is only a natural inquiry how such ships as those composing this squadron could destroy an enemy's commerce that should be carried in steamers like the City of Paris, the new Hamburg-American steamer Columbia, the City of New York, Augusta Victoria, Etruria, Umbria, and many more that could be mentioned? How could they prevent the commerce of their own country from being destroyed by these swift craft, a few light guns being mounted on their main decks?

A New Joint-Making Material.

A permanent and durable joint can, it is said, be made between rough cast iron surfaces by the use of mineral asbestos mixed with sufficient white lead to make a very stiff putty. This will resist any amount of heat, and is unaffected by steam or water. It has been employed for mending or closing cracks in cast iron retorts used in the distillation of oil and gas from cannel coal. The heat being applied to the bottom of retorts, and the temperature of the iron maintained at a bright red heat, after a time the bottom of the retort would give way, the larger portion of the crack being downward toward the fire. The method employed was to prepare the mixture, and place it on the top of a brick, then put the brick on a bar of iron or shovel, and press the cement upward to fill the crack in the iron, holding it for some time until it had penetrated the cavity and somewhat set. Of course, during this operation, the lid was removed from the retort, so that no pressure of gas or oil forced the cement outward until set.