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THE MAMMOTH POWER STATIONS OF NEW YORK CITY.

In an age when the excessive use of superlative and extravagant terms is one of the glaring faults of journalism, one hesitates before applying such words as "colossal," "mammoth" and their kind in the description of modern works. The rate of progression in the broad field of engineering is so rapid, however, the courage and daring of the engineer are so great, that the world is ever and anon confronted with works which call for superlative terms to give them adequate expression. Of such a kind are the great power houses which are either being planned or built for the three largest railway systems in New York city. When completed they will each exceed any other aggregation of motive power in the world so greatly as to be by comparison positively mammoth in their proportions. The first of these to be completed will be the central station of the Metropolitan Street Railway Company, with a total capacity of 70,000 horse power and following this will be an 80,000 horse power station for the electrical operation of the system of the Manhattan Elevated Railways, and an even larger station, with a reported maximum capacity of 100,000 horse power, for operating the electric roads of the Third Avenue Railway Company.

It is a curious fact that only a few years ago the largest aggregation of horse power was to be found in the engine rooms of the big Atlantic liners. The twin engines of the Cunard liner "Campania," for instance, indicated 33,000 horse power on her trial trip, each engine developing about 16,500 horse power. This has probably been surpassed by this time in the power house of the Niagara Falls Power Company, where the erection of the last of the ten 5,000 horse power turbines must be nearing completion. Apart from the hydraulic installations at Niagara and elsewhere, there is to-day no single power station in the world where the collective horse power of the steam engines equals or even approaches that to be found in the "Campania," "Lucania," "Kaiser Wilhelm," or "St. Paul."

The Metropolitan Street Railway Company's station, however, will exceed the maximum output of the "Lucania's" engine room by over 100 per cent. When completed, it will include eleven cross-compound engines of 6,600 maximum horse power, and the whole series could be completed and in operation early in the coming year should the demands of the system call for such an output by that time. The preliminary design for the power house of the Manhattan Elevated Railways provides for eight huge four-cylinder compound engines, each capable of developing 10,000 indicated horse power. Two of the cylinders will be carried vertically above the crankshaft on the usual A-frames, and the other two will be placed horizontally, all four cylinders working upon a common shaft. The huge size of these engines may be judged from the fact that each one will be capable of developing more power than the total output of any but a few of the largest steam-driven central stations in the country.

SOIL PARASITES.

Many of our farmers have observed in the past few years that crops which they formerly cultivated with success could no longer be grown. They tilled and fertilized their fields with their usual care, but the plants withered and died from no apparent cause. A careful investigation of the evil by the Department of Agriculture has shown that the soil in many regions of the United States, devoted to the cultivation of special crops, is infected with several most deadly varieties of parasitic fungi. The experiments and researches of the department have been exhaustively described by Dr. Erwin Smith in a paper which he read before the Botanical Section of the American Association for the Advancement of Science, and which we publish in full in the current issue of the SCIENTIFIC AMERICAN SUPPLEMENT.

Dr. Smith's investigations show that soil fungi have ravaged the fields of the watermelon region, the cotton section, the cabbage district of New York State, and

the tomato lands of Florida. To such an extent has the melon fungus infected the soil of our Southern States that watermelon growing has been sometimes rendered impossible, and in certain parts of South Carolina, Virginia, and Mississippi the industry has been almost given up. In one of the finest cotton-producing districts in the world (the "Sea Island" belt, extending from South Carolina to Georgia) many growers have been compelled to abandon their devastated fields. The cabbage growers of New York and the tomato farmers of Florida have suffered similarly.

That the evil is primarily due to soil parasites or fungi is fully proved by Dr. Smith's experiments. Merely by burying the fungus in the earth the characteristic signs of contamination are obtained in the plant. Microscopic examinations show that the parasite completely fills the water-ducts of the stem. The leaves wither; and, if the weather be dry, the plant never recovers. Even if the weather be moist, the plants soon droop under the heat of the sun. A plant may be contaminated at any stage of its development, from the seedling just shooting from the ground, with no leaves except cotyledons, to the full-grown vine with ripening fruit and dense foliage. From external indications alone the disease can not be diagnosed. Only by a microscopic examination of cross-sections of the plant stem is it possible to ascertain the true cause of the wilting of the foliage, for the white, cotton-like stuffing which fills the passages is an unmistakable sign of soil-fungus infection. As the plant dies the fungus comes to the surface, and in fruiting changes its form entirely. In his attempts to cross-inoculate the varieties of fungi Dr. Smith has been unsuccessful. Morphologically the parasites are apparently similar; physiologically they seem altogether different from one another.

The farmer naturally asks: What is the remedy for this soil-infection? Unfortunately no answer can be given. The malady is of such recent discovery, and so little is known of the fungi, that, for the time being, only precautionary measures can be recommended. The usual methods of curing vegetable diseases are utterly ineffective. A field once attacked by a particular parasite can henceforth produce no healthy plants subject to contamination by that parasite. Perhaps, as Dr. Smith suggests, the disease may be due to a disregard of one of Nature's first requirements—the rotation of crops. Year after year, the grower of especial crops will plant his ground with the same vegetables, until at last the soil, besides becoming "sick," accumulates a mass of decaying tissue which constitutes an excellent culture-bed for parasites. The moral is plain enough. The crops grown in soil still untainted should be carefully changed every two or three years. Contamination can be prevented only by burning diseased plants and by exercising the utmost care in separating the infected vines from the hay and other crops stored away during the winter; for so tenaciously do these fungi cling to life that, if not destroyed, they will attack the soil in the following spring with the same deadly effect as in the previous year.

BIDS FOR THE PROPOSED CRUISERS.

The SCIENTIFIC AMERICAN, as our readers are well aware, has taken a firm stand against the proposal to add a fleet of 15½ to 16½-knot half-protected cruisers to the United States navy. We have felt that the construction of these ships would be so prejudicial to the interests of the navy as to call for a most emphatic protest. It is not necessary to say that in criticising the department's plans and specifications we have been satisfied that they were drawn up with the best possible intentions, and that the objects aimed at in these vessels were considered by the department to more than outweigh their obvious deficiencies.

The position taken by the SCIENTIFIC AMERICAN is that, if the department was sacrificing speed and protection in favor of coal capacity and steaming radius, it has certainly failed to show adequate compensation in the latter particulars. We pointed out some weeks ago that a fine opportunity was presented to the private shipbuilding firms of the country to show what they could do in offering their own alternative designs, and we are glad to know that the bids which have recently been opened for the construction of these cruisers prove that the country possesses private shipbuilding yards which are prepared to build on their own plans and specifications cruisers which, although they are of the same displacement as contemplated in the department's design, will carry more coal and have from 1 to 2½ knots per hour greater speed. We have not been able to obtain the particulars as to the amount of protection contemplated, but we know that in every case the coal capacity has been increased, and we presume that the armored protection is not less than the 2 inches which is specified in the plans of the department. It is also gratifying to note that this increase of efficiency is obtained with practically no increase in cost, the amount of the bids being about the same for the improved designs as for those of the department.

Of the bids which have recently been opened, the

one which commends itself most on the score of speed and coal capacity combined is put in by the William R. Trigg Company, of Richmond, Va., on their own plans and specifications. They offer to build one cruiser of 3,283 tons trial displacement, 19 knots speed, and 770 tons bunker capacity, for \$1,079,000, the vessel to be completed in twenty-four months: or they will build two vessels of the same type, in the same time, for \$1,039,000 each. Compared with the department's design, this vessel, on 83 tons more trial displacement, will have 2½ knots increase of speed, and an increase of 70 tons in the total bunker capacity. The same firm puts in a design for a vessel of the same displacement and of 18 knots speed and 830 tons bunker capacity, of which they will build one for \$1,041,000; and two for \$993,700 each. They will build a vessel of 18 knots and 785 tons bunker capacity for \$1,073,000; or two of the same type for \$1,024,700 each. The Fore River Engine Company, of Baintree, Mass., will build a 3,200 ton vessel, with a speed of 18 knots, and a total bunker capacity of 866 tons, for \$1,065,000; or they will build two of the same type for \$1,020,000 each. They will also build a vessel of the same coal capacity and displacement, but of 18½ knots speed, for \$1,100,000; or they will build two for \$1,066,800. Townsend & Downey, of New York, offer to build a 3,250 ton vessel of 17½ knots speed, total bunker capacity not stated, for \$1,059,500.

Ten firms have put in bids on the department's plans for a 3,200 ton 16½-knot cruiser of 700 tons bunker capacity, the lowest bid being that of Townsend & Downey, New York, who offered to build one boat for \$954,500 in twenty-one months, or two boats for \$950,000 each in twenty-seven months. The highest bid is that of Moran Bros. Co., Seattle, Wash., who offered to build one boat in thirty months for \$1,122,000.

It is evident that unless there are defects in the alternative plans and specifications offered by the builders or the Department has doubts of the ability of the firms that make these bids to carry out the contract, the United States navy is in a fair way to secure vessels which are fairly well up to modern requirements. The William R. Trigg Company, which offers the highest speed, also puts in the lowest bid but one, the lowest being that of Townsend & Downey, of New York, to build two of the 16½-knot cruisers of 700 tons coal capacity for \$950,000 each. This bid, however, in respect of value for price, is far inferior to that of the Trigg Company, who offer to build two 18-knot vessels with 830 tons coal capacity for \$993,700 each. The Trigg Company, which has lately launched the "Shubrick," has other ships upon the stocks for the United States navy, and is unquestionably well able to live up to the full terms of its proposal.

In any case we trust the Department will give the preference to such proposals as guarantee high speed and superior coal capacity. No mere saving of a few thousand dollars can warrant the acceptance of inferior designs. The whole country is fully alive to the merits of the question, and will watch the making of the awards with close and intelligent attention.

NAVAL TESTS OF MARCONI TELEGRAPHY.

In the current issue of the SUPPLEMENT will be found illustrations of the tests of the Marconi system of telegraphy recently carried out on the warships "New York" and "Massachusetts." The illustrations are reproduced from photographs taken during the course of the trials. Messages were sent and received between the two ships up to a distance of forty-five miles, beyond which the apparatus proved to be unable to record the messages with distinctness. The great difference between these results and the eighty-mile transmission accomplished in the British naval maneuvers is explained by Marconi on the ground that he only brought to this country apparatus designed for the limited distances necessary in reporting the yacht races to a ship stationed at the Sandy Hook lightship. The sending and receiving instruments installed on the "New York" and "Massachusetts" were the same as those used on "La Grande Duchesse" and the "Mackay-Bennett" cable ship, and their operation is stated to have been thoroughly successful up to the limit named. Mr. Marconi informs us that it was only two or three years ago that Mr. Preece, who was so active in introducing the system in England, named ten miles as the probable limit for wireless transmission, and the fact that in so short a time messages have been sent over eighty miles of sea and one hundred and ten miles of land and water, augurs well for the future development of the system.

OPENING OF THE NEW YORK ZOOLOGICAL PARK.

With fitting ceremonies the new Zoological Park in Bronx Park was formally opened to the public on Nov. 8. Special trains took the guests to the Fordham Station, where conveyances were waiting to take them to the main entrance, where Director W. T. Hornady received the Hon. Levi P. Morton, President of the Society, the Controller, Mr. Coler, and Park Commissioner Moebus. After brief exercises the guests were allowed to wander at will through the beautiful grounds.