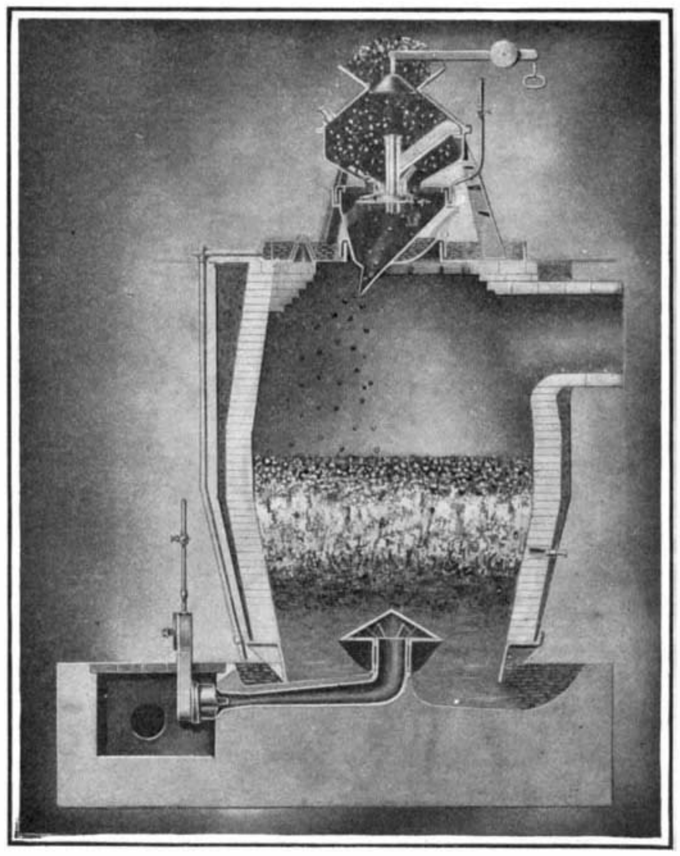
OFFICIAL TRIALS OF THE BATTLESHIP "RHODE ISLAND."

The unusual rapidity with which the "Louisiana" and "Connecticut" have been built, and the delay due to delayed armor plate and other causes in completing the ships of the "Georgia" class, have conspired to render the present fiscal year a most remarkable one in respect of the number of first-class battleships that will be completed within the twelve months. By June 30, 1906, the five battleships of the "Georgia" class, authorized in 1899 and 1900, and the battleships "Connecticut" and "Louisiana," authorized in 1902, will have been completed, and it is possible that the whole seven will have gone into commission within the brief period of six months. In the "Georgia" class are the "Georgia," "Nebraska," "New Jersey," "Rhode Island," and the "Virginia." The "Georgia" is building at the Bath Iron Works, the "Nebraska" at Moran Brothers, Seattle, the "New Jersey" and "Rhode Island" at the Fore River Works, Quincy, Mass., and the "Virginia" at Newport News. These five ships have as their distinguishing characteristic a pair of double-deck or superimposed turrets, one forward and one aft, with a pair of 12-inch guns on the lower deck and a pair of 8-inch guns on the upper deck of each turret. A little forward of amidships on each beam is an 8-inch turret, carrying a pair of 8-inch guns. In addition there is a battery of 6-inch guns carried in broadside on the gun deck, and a battery of twelve 3-inch, twelve 3-pounders, and eighteen smaller guns, placed in various points of vantage throughout the ship.

The superimposed turret is the only feature about these fine battleships that is open to criticism, and it formed the subject of a lengthy controversy in the Naval Board on Construction, at the time these designs were adopted. The principal objection against this method of mounting was that it crowded too many guns into a single emplacement, and rendered four guns of the main battery liable to be put out of action by one successful shot. It is probable that the events of the Russo-Japanese war have tended rather to weaken the force of this argument; for the heavily armored turrets, and, indeed, the turrets of even the secondary batteries, appear to have come through the ordeal most successfully, not a single case, we believe, having been recorded of absolute penetration or permanent disablement of a turret. There is more force, probably, in the objection urged against the double turret, on the ground that, when more than one gun is mounted in a single turret, the guns have to wait upon each other in their order of firing. Of course, in a four-gun turret, this incidental delay would be greater than in one carrying two guns or one gun. The advantages of the double turret are that it admits of a great concentration of fire, and that there is a considerable saving in weights. Thus, as compared with the later ships of the "Connecticut" class, the "Georgia" class can concentrate two 12's and six 8's ahead or astern, and four 12's and six 8's on the broadside, whereas the larger "Connecticut" can concentrate two 12's and four 8's ahead and astern, and four 12's and four 8's on the broadside—a clear gain for the superimposed turret of a pair of 8's on every point of fire.

The "Rhode Island" and her sisters are well protected, Krupp armor being employed throughout. The belt has a maximum thickness of 11 inches; the 12-inch turrets have a maximum protection of 12 inches, and the 8-inch turrets of 8 inches of armor. The armored deck varies in thickness from 1½ to 3 inches. The vessels are 435 feet long by 76 feet 2½ inches in beam, and on a mean draft of 23 feet 9 inches they displace just under 15,000 tons. The coal supply of 1,705 tons is considerably less than that of the "Connecticut," and the steaming radius at 10 knots is 3,825 knots, which compares rather unfavorably with the 5,000 knots of the "Maine" and the "Connecticut."

However, it is impossible, upon a given displacement, to bring every element of power and efficiency up to the highest standard; what the "Rhode Island" and her sisters lack in coal capacity and radius of action, they gain in their great battery power, their excellent armor protection, and their high speed of 19 knots an hour, which, if we may take the "Rhode Island" as a criterion, is likely to be exceeded in all the vessels of this class. The "Rhode Island" was taken out on the government course on November 11 to undergo a four-hour standardization trial, during which it was found that with an average number of revolutions of 125.86 per minute she averaged, for the four hours, a speed of 19.01 knots per hour. In the turning trials it was found that it took 10 1-5 seconds to put the helm hard a-starboard, and the vessel occupied 3 minutes and 30 seconds in steaming through a complete circle; that it took 19 3-5 seconds to put the helm from hard a-starboard to hard a-port, and that the time to complete the circle was 4 minutes and 25 seconds. By the courtesy of the builders of the vessel, we are enabled to present the accompanying view showing the "Rhode Island" when she was steaming at her full speed of over 19 knots an hour during the standardization trials.



THE GAS PRODUCER FOR HEATING PROCESSES.

THE GAS PRODUCER FOR HEATING PROCESSES.

BY WILLIAM B. CHAPMAN.

The early discussions, in England and Europe, of producer gas or "poor" gas, as it was called, awakened but little interest in this country. Our coal supply was generous, and the price of fuel comparatively low; moreover, just at that time the great possibilities of natural gas were discovered, and aroused so much enthusiastic interest, that little thought was given to any other form of fuel. Gas producers were looked upon by American manufacturers as unnecessary and of questionable economy. More than that, the producers themselves were designed in such small sizes that the American, using only large units in his processes, failed to recognize the possibilities of the new gas.

Nature was so prodigal of her gifts in this country, that men saw at first no need of economy in their use. In time, however, it became apparent that the supply of natural gas was not unlimited, but that, at the rate it was being used, the end would eventually be reached.

The advantages of a gas fuel had by this time been learned: its cleanliness, its controllability, its power, and its economy. Manufacturers not in the natural gas region had begun to ask if any form of gaseous fuel could be found, which would enable them to meet the competition of cheap natural gas; and when it was seen that the failing natural gas supply might compel a return to coal and wood as the only means of producing heat, the attitude of America toward the gas producer was entirely changed.

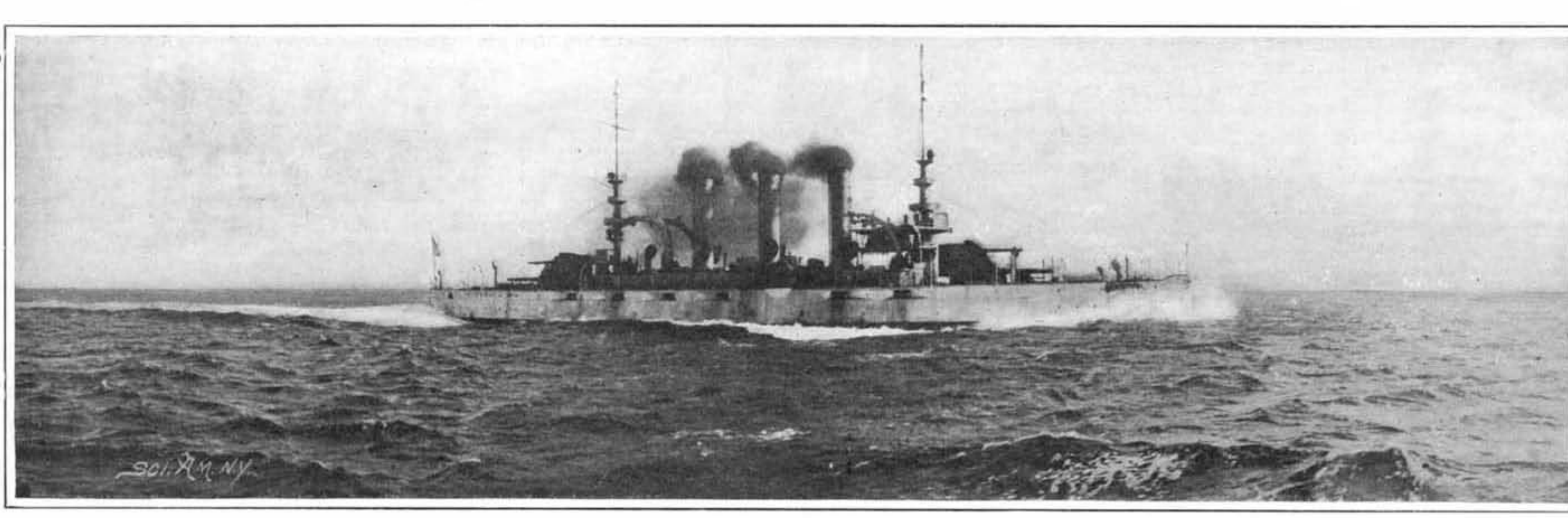
Finding here a subject worthy of their attention, American engineers thoroughly investigated English and European methods, and then began experimenting, to see if they could devise a producer that would meet the needs of the American manufacturer. Instead of devoting their energies to improving the details of small producers, as was being done on the Continent, they turned their attention to devising producers of increased capacity, and with an automatic feed device which would allow the producer to be run both continuously and uniformly. These efforts resulted in the development of producers of larger capacities than had been thought possible. Other improvements have been added, until at least one American gas producer has reached such a high state of efficiency that not only are American manufacturers becoming aroused to its merits, but numerous European firms are ordering it in preference to the cheaper producers made at home.

In many localities a prejudice exists against the gas producer, due to the failure of some particular make, designed and put upon the market by a boiler maker or machinist lacking the necessary engineering knowledge and experience. It is a mistake, however, to refuse to investigate this subject because of the blunders of some. The designing of a gas producer, and the adaptation of producer gas to various heating operations, are problems which so far have only been successfully accomplished by engineering companies having wide experience in many forms of heating operations. The manufacture and installation of gas producers is a business which, like the steam turbine or other great innovation, requires much special knowledge, and during its infancy must necessarily be limited to those having special facilities for obtaining the necessary experience.

The best type of American gas producer may be briefly described as follows:

An upright cylindrical steel shell, 10 to 14 feet in diameter, and of about the same height, slightly tapering at the base, lined with firebrick. In this is kept a bed of ashes at the bottom, two or three feet deep, and above a layer of partially-burned coal of about the same depth. A forced draft of air and steam of the proper proportion is admitted into the bottom of the producer through a large spreader or hood and passes up through the ashes and incandescent coal or carbon, with which it unites to form producer gas, which is led out through a large firebrick-lined nozzle near the top of the producer to the flue leading to the furnace, where the gas is to be burned. There is no grate to

(Continued on page 507.)



Displacement, 14,948 tons. **Speed,** 19.01 knots. **Maximum Coal Supply,** 1705 tons **Armor:** Belt, 11 inches; deck, 1¼ to 3 inches; turrets, 12 to 6 inches. **Armament:** Four 12-inch, eight 8-inch, twelve 3-inch, twelve 3-pounders, eighteen small guns. **Torpedo Tubes,** four submerged.

BATTLESHIP "RHODE ISLAND" AT 19 KNOTS SPEED ON HER TRIAL TRIP.