THE ENGINES OF THE VESUVIUS AND YORKTOWN.

The launch of the two new cruisers was illustrated in our last issue. The vessels, as far as regards their hulls, presented many features of interest. The ships, after the launch, were taken to the docks, and are now awaiting the reception of their boilers, machinery, and general equipment. In the present issue we give a view of one of the engines, as nearly completed, of each cruiser.

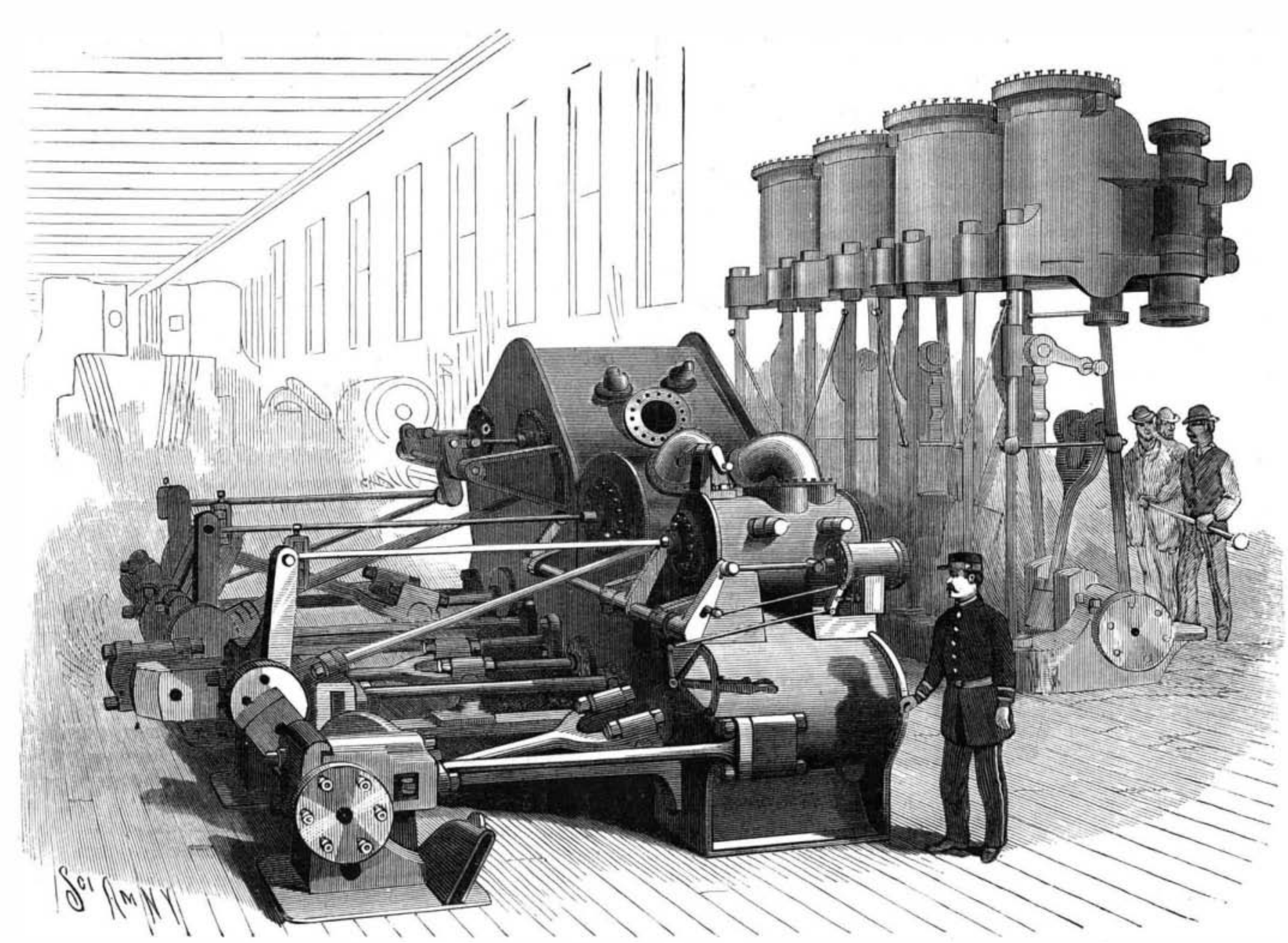
The Vesuvius, the pneumatic dynamite gunboat, is to have two compound engines, driving twin screws, each carried by an 8 inch shaft. The engines are of the vertical type, with a framework of round bars, rendered familiar by its extensive adoption on the Thorneycroft torpedo boats. It is peculiar in the system of its compounding, possessing four cylinders, arranged for triple expansion. The diameters of the cylinders, beginning with the high pressure one, are 21½ in., 31 in., 34 in., 34 in., giving as relative piston areas 462$\frac{25}{100}$ high pressure, 961 intermediate pressure, and 2,312 low pressure. The piston stroke is 20 inches for each cylinder. This type of engine occupies very little space laterally, which in so narrow a vessel as the Vesuvius is of paramount importance. The cranks are equally distributed, making angles of 90° with each other. The shafts are hollow and made of Whitworth fluid-compressed steel. They were imported from England.

The engines, by contract, are to indicate 3,500 horse power. Should this amount be exceeded on trial, the builders are to receive a premium for each horse power above it. It is believed that 4,000 horse power will be attained.

The engines of the Yorktown are also triple expansion, but have the regular three cylinders. They are to drive twin screws. Their diameters are 22 in., 31 in., 50 in., giving relative piston areas of 484 high pressure, 961 intermediate pressure, and 2,500 low pressure. The piston stroke is 30 in. for each, and the three cranks are equally distributed as regards their angular position. In placing these engines in the hull, one is to be forward of the other, to save filling up the hold. The indicated horse power, according to the contract, is to be 3,000, a premium being offered for an excess, as in the case of the Vesuvius. The shafts are of the same style and material as those of the Vesuvius, but are only eight inches in diameter.

The engines of both vessels are fitted with Marshall valve gear. With a single hand an engine can be reversed, stopped, or started. The boilers are of steel, of the cylindrical locomotive type. The furnaces are cylindrical and corrugated. The pressure carried is to be 160 lb., and four boilers are provided for each ship.

The performances under trial of these engines will be watched for with much interest, as there is every reason to believe that they will maintain the high reputation of their builders, Wm. Cramp & Sons.



THE ENGINES OF THE VESUVIUS AND YORKTOWN.

Compressed Oil Gas.

At a recent meeting of the Institution of Civil Engineers a paper was read on "Compressed Oil Gas and its Applications," by Mr. Arthur Ayres, M. Inst. C. E.

In considering this system of illumination, its applicability to buoys, isolated beacons, lighthouses, and railway carriages, etc., the author treated it under the primary heads of mode of manufacture, illuminating properties, cost, storage, and transit, and in doing so he referred to the early history of oil gas, and the patents taken out from time to time in connection with the system. It was stated that in 1825 Faraday contributed a paper to the Royal Society "On New Compounds of Carbon and Hydrogen, and on Certain Other Products obtained during the Decomposition of Oil by Heat." That communication, however, dealt with the chemistry of oil gas. It was mentioned in that paper that 1,000 cubic feet of good gas yielded nearly one gallon of hydrocarbon.

The gas from which the hydrocarbon was obtained was manufactured by the Portable Gas Company, and was compressed to 30 atmospheres. It was drawn from a gas holder, and passed over water into a large and strong receiver, and from it into portable vessels, the principal condensation taking place in the receiver. The oil gas manufactured by the Portable Gas Company was not distilled from shale oil or petroleum, but from other oils and fatty substances, mineral or vegetable. Between the years 1792 and 1883, numerous ingenious patents were taken out for manufacturing and compressing oil gas for lighting and heating purposes. Oil or hydrocarbon gas was the product of heavy petroleum or shale oil once distilled. It had a specific gravity of about 0·840, and flashed at about 220° Fah. In detailing the process of the manufacture of oil gas, the author described the works erected at the South Foreland by Pintsch's Patent Lighting Company (Limited).

The illuminating intensity of oil gas might be taken at from 40 to 50 candles when burned in a London standard Argand burner, with a consumption of 5 cubic feet per hour, under a pressure of 0·5 in. of water. The price varied from about 5s. 6d. to 16s. per 1,000 cubic feet, being directly influenced by the quantity of gas produced, the management of the retorts, and the price of oil, fuel, and wages. Until the adoption of oil gas for their illumination, buoys and isolated beacons were only useful for the purposes of navigation by day, but they were now equally so by night (in clear weather), enabling vessels to navigate with safety intricate channels, which hitherto could not have been attempted except at considerable risk.

Gas buoys, as at present used by the Honorable Corporation of Trinity House, were constructed of best mild steel. They were spherical, 9 feet in diameter, and surmounted by a light wrought iron superstructure, carrying a lantern inclosing the illuminating apparatus. The total weight of one of these buoys complete was about 80 cwt., the weight of the buoy being 78¾ cwt., and that of the illuminating apparatus 1¼ cwt. The buoys were usually charged to a pressure of 5 or 6 atmospheres, or from 75 pounds to 90 pounds pressure per square inch. The gas was contained in the spherical portion of the buoy, the capacity of which was about 382 cubic feet, and was consumed at the rate of 0·75 cubic foot per hour, burning night and day continuously.

When fully charged to 5 atmospheres, and burning at the above rate of consumption, the light would be maintained for 106 nights and days. The intensity of the light was from 17 to 20 candles through the lens. The estimated cost of a first-class gas buoy, including the lantern and illuminating apparatus, also royalty, was about 420*l*. In a new form of gas buoy, constructed wholly of mild steel, it was intended to carry the gas in the lower portion of the buoy. The capacity for storage of gas would be 383 cubic feet, which, at a pressure of 5 atmospheres, would sustain the light (consuming 0·75 cubic foot per hour) for 106 nights and days. The advantages of this form of buoy were improved stability and its applicability to the recently adopted uniform system of buoyage. The estimated weight of this buoy was about 6 tons, without moorings.

In 1885 the Canadian government adopted a combination of the bell and gas buoy for service in the Gulf of St. Lawrence, the bell weighing 3 cwt., giving the usual warning by day and night, supplemented by the light. The gas was stored in a welded cylinder (independent of the buoy proper) having a capacity of 339 cubic feet. The cylinder, when charged to 6 atmospheres, was capable of maintaining the light for 113 nights and days. The weight of the buoy complete was 9½ tons. In 1881 a beacon lighted automatically by compressed oil gas on Pintsch's system was adopted by the Clyde Trust Commissioners, who had recently erected another on the Gantock Rock, off Dunoon, on the Argyleshire coast, and who were extending this system of illumination at Cardross and Dumbuck lighthouses, Donald's Quay, Rashilee, and Dalmuir light towers.

In December, 1885, two iron lighthouses, similar in construction, were erected by the Trinity House, one at Stoneness, opposite Greenhithe, and the other at Broadness, on the Thames Estuary. At Stoneness Lindberg's system had been adopted, the burner for producing the light being that of Lyth, of Stockholm. The light burned day and night at full power, showing a white light with short occultation at periods of about five seconds. A description of this system was given. The first cost of Stoneness Lighthouse had been 630*l*., and the cost of its annual maintenance was 88*l*. Broadness light was produced by the combustion of compressed oil gas. The intensity of the flashes at Stoneness was about 60 candles, and at Broadness about 500 candles.

The first cost of Broadness Lighthouse had been 1,026*l*., and the cost of its annual maintenance was 128*l*. Both Broadness and Stoneness lighthouses were under the charge of a boatman, who visited them at least twice a week, when he adjusted and cleaned the apparatus. These systems being comparatively new, no reliable comparison had yet been made as to their relative efficiency. An important installation of an oil gas apparatus for lighting and fog signaling had recently been made by the Commissioners of Northern Lighthouses at Ailsa Craig, on the Firth of Clyde (Min. Proc. Inst. C. E., vol. lxxxix., page 297), the first cost of which had been 24,000*l*., while the cost of its annual maintenance was 725*l*. There were now 214 buoys, lightships, beacons, and other lights in use in various countries on Pintsch's system.

The author next dealt with the application of compressed oil gas to lighting of railway carriages. It was probably first tried in the year 1871 with satisfactory results in Germany, on the Lower Silesian Railway, and in England, in 1878, on the St. John's Wood trains of the Metropolitan Railway, with equally satisfactory results. The Great Eastern Railway Company was the next to adopt it, the Metropolitan Railway Company definitely adopted it for the whole of its rolling stock a few weeks later, and other companies quickly followed suit. The systems chosen were those of Messrs. Pintsch and Messrs. Pope & Sons, which differed but little from each other. Some trials were also made of Messrs. Bower's system on the Great Northern Railway. The gas holder was attached either to the roofs or to the under-framing of the carriages, and was charged to a pressure of from 6 to 8 atmospheres. The gas was conveyed to the roof lamps by pipes from the gas holders, passing through a contrivance for regulating the pressure at the burners, one such regulator being attached to each carriage. There were now 23,499 carriages so illuminated on Pintsch's system, and 2,791 on Pope's system. Taking the double journey between Euston and Aberdeen, the cost of compressed oil gas was 0·0404d. per lamp per hour, and for the ordinary oil system 0·385d. per lamp per hour, showing a greater cost of the ordinary oil system of 0·3446d. per lamp per hour, or 8½ times more than oil gas.