

different parts of the country. Prof. Stone also edits the *Annals of Mathematics*, one of the few mathematical journals published in this country.

THE ENGINES OF THE STEAMER CONNECTICUT.

(Continued from first page.)

in the single cylinder construction. The wheels are of the feathering type.

The engine is carried by two parallel keelsons made of steel. These in their turn rest on yellow pine keelsons which rest upon the cross timber and are bolted to the hull timber. The surface condenser is carried on the after end of these steel keelsons. It contains 3,916

some of the city papers. This ratio of power to tonnage far exceeds the power of any vessel of over 200 tons that has yet been built for war purposes.

The run was made, commencing at 9 A. M. January 11, each way over a course of 2,543 knots, laid off outside the Delaware Breakwater, marked by two buoys placed by government officials, and the trial was made under inspection by U. S. naval officers.

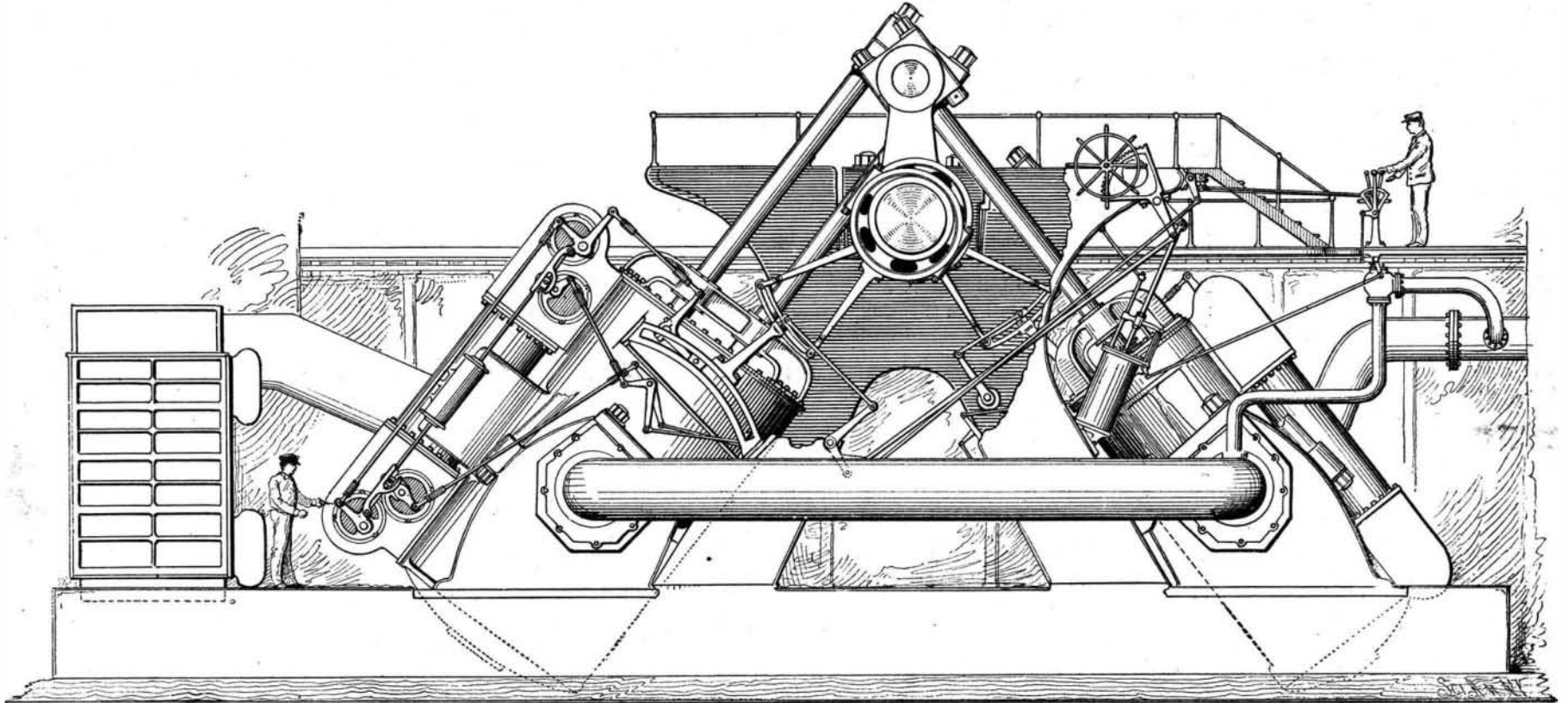
The speed of 22.947 knots with wind and tide, and of 20.346 knots against wind and tide, was easily accomplished; the mean of the two runs being 21.646 knots per hour, or an excess of 1.646 knots over the government stipulation, which makes the *Vesuvius* acceptable

and 6,160 I. H. P., or 1.71 H. P. to a ton. Speed on trial, 18.18 knots per hour.

A twin-screw naval steamer (English); length, 315 ft.; beam, 61 ft.; draught, 25½ ft.; 7,645 tons, with 10,180 I. H. P., or 1.33 H. P. to a ton. Speed, 17.21 knots per hour.

A twin-screw naval steamer (English); length, 325 ft.; beam, 68 ft.; draught, 27½ ft.; 9,690 tons, with 11,610 I. H. P., or 1.2 H. P. to a ton. Speed, 16.52 knots per hour.

The *Italia*, an armored ship, built by the Italian government, probably the largest war ship afloat; length, 400 ft. 6 in.; beam, 73¼ ft.; draught, 30½ ft.;



VALVE MOTION AND GENERAL CONNECTIONS OF THE ENGINES OF THE CONNECTICUT.

brass tubes ¾ inch in outside diameter. The distance between the tube sheets is 16 feet, giving a condensing surface of 12,150 square feet. A second condenser of 750 square feet is provided for use if necessary. The crank pin, whose bearings are 18 inches in diameter and 49 inches long, is shrunk into place, as are also the crank arms. Each of the shafts thus constituted is 33 feet 6 inches long, and has 23 and 25 inch journals. The steam is generated in six boilers 12 feet 6 inches in diameter and 20 feet 1¾ inches long, carrying 120 lb. pressure. They are of steel, with drilled rivet holes, and machine-riveted throughout. The engine will develop about 4,500 horse power, and may be driven 1,000 horse power higher. The steamer is 358 feet 6 inches in length over all, and 87 feet in width over the guards. Its width of hull is 48 feet 2 inches, and its depth of hold 17 feet 3 inches.

The engines were designed by Mr. George B. Mallory, of New York, and were constructed by the William Cramp & Sons Co., of Philadelphia, Pa. The steamer is of wood, and was built by Robert Palmer & Co. at Noank, Conn.

TRIAL TRIP OF THE VESUVIUS.

The new dynamite gun cruiser *Vesuvius*, built by Wm. Cramp & Sons, Philadelphia, was put to a trial test on January 11, off the Delaware Breakwater,

to the government on her first trial test, something we think unheard of in American naval accomplishments.

The after run of 90 miles from the Breakwater to Philadelphia was easily made under low steam at a speed of 16 knots per hour, about all that could be attained in the shallow waters of the Delaware without causing a drag wave.

The speed attained by the *Vesuvius* has only been exceeded by the following small vessels: A twin-screw torpedo boat, built for the Italian government by Yarrow & Co., with a displacement of only 100 tons; length, 140 ft.; beam, 14 ft.; with which a trial speed of 25 knots was attained (the developed horse power not being given). The *Courier*, a French torpedo boat, built by Thornycroft, of about 150 tons displacement; length, 147½ ft.; beam, 14½ ft.; draught, 5 ft.; which in a trial trip developed 1,550 I. H. P., or 10 horse power to a ton of displacement; attained a speed of 26 knots per hour. And also a small torpedo boat for the Dutch government, for which a speed of 27 knots per hour is claimed.

The relative horse power per ton of displacement plays so important a part in the performance of all vessels propelled by steam that we give the proportions in a number of war vessels of exceptional speed, as far as known: The *Wattignies*, a French cruiser of 1,273 tons displacement, having engines of 4,000 I. H. P., or

having a displacement of 13,480 tons; has developed 18,000 horse power, with the extraordinary speed of 17.8 knots per hour. Considering that the ratio shows but 1.33 I. H. P. to a ton of displacement, this is an extraordinary speed for an armored cruiser.

Although none of the new unarmored cruisers has developed a speed equal to that of most of the vessels mentioned in the above list, it is expected that most of the cruisers, both armored and unarmored, that are as yet uncompleted will attain speeds that will compare favorably with the European standard. The *Vesuvius* has taken a long step forward, and marks a well defined line between the slow coaches of the old navy and the long hoped for high speed vessel of the new regime. That our American engineers are capable of rising to the emergency of the case has been pretty satisfactorily demonstrated; and that our marine architects have succeeded, with so little experiment and so few failures, in producing a vessel that can compare favorably with such veteran builders of high speed vessels and torpedo boats as the Yarrow and the Thornycrofts is a matter of congratulation.

In a paper lately read before the Academy of Sciences, Paris, on various methods of treating rabies, by M. Odo Bujwid, he said that, since his visit to M. Pasteur's establishment in 1886, he had been treating



THE DYNAMITE CRUISER VESUVIUS.

and she proved herself fully equal to the government requirement, developing a speed exceeding that of any war vessel of or above her size in the world.

The *Vesuvius* is 252 ft. long, 26½ ft. beam, 9 ft. draught, with displacement of 725 tons. She has a four-cylinder triple-expansion engine, and developed 4,295 I. H. P. on her trial trip, or nearly 6 horse power to a ton of displacement, and not 17 H. P. per ton, as stated by

3.2 H. P. per ton. Just finished. Speed not yet tested.

A twin-screw naval steamer (English); length, 220 ft.; beam, 34 ft.; draught, 15 ft.; 1,560 tons and 3,115 I. H. P., or 1.99 H. P. per ton displacement. Speed on trial, 16.91 knots per hour.

A twin-screw naval steamer (English); length, 300 ft.; beam, 46 ft.; draught, 19½ ft.; 3,584 tons displacement

persons bitten by dogs, either mad or suspected of being mad, in his laboratory at Warsaw. At first he followed the simple processes of inoculation of M. Pasteur, and of M. Frisch, of Vienna, with some failures in both cases. But during the last sixteen months he has adhered exclusively to the intensive or severe treatment, which has been applied to 370 patients without a single fatality.