

THE CUNARD COMPANY'S NEW TWIN SCREW STEAMSHIP CAMPANIA.

We may correctly speak of the present as the twin screw era in the history of Atlantic navigation. It was inaugurated in 1888-89, when the four notable steamships, City of New York, City of Paris, Majestic, and Teutonic, were brought into the field, and it was soon further signalized by the introduction into the same service of the fine twin screw vessels built and owned by German and French firms—*e. g.*, the Augusta Victoria and Furst Bismarck, of the Hamburg-American line, and La Touraine, of the Compagnie Transatlantique. At the present time there are built, and building, as many as thirty-five twin screw steamships of over 5,000 tons, the Campania making the fifteenth vessel to be produced of over 6,000 tons.

The Campania is for the present the longest and most capacious steamship afloat, her 600 feet length between perpendiculars being only 80 feet short of that of the late Great Eastern, and her beam of 65.7 feet being 17 feet less than that of the defunct leviathan. The vessel in actual service most nearly approaching her in length is the White Star Teutonic, which is 566 feet between perpendiculars, or 34 feet less, the beam being 8 feet narrower. The Campania is 73 feet longer, but only 1 foot 9 inches broader than the Inman Com-

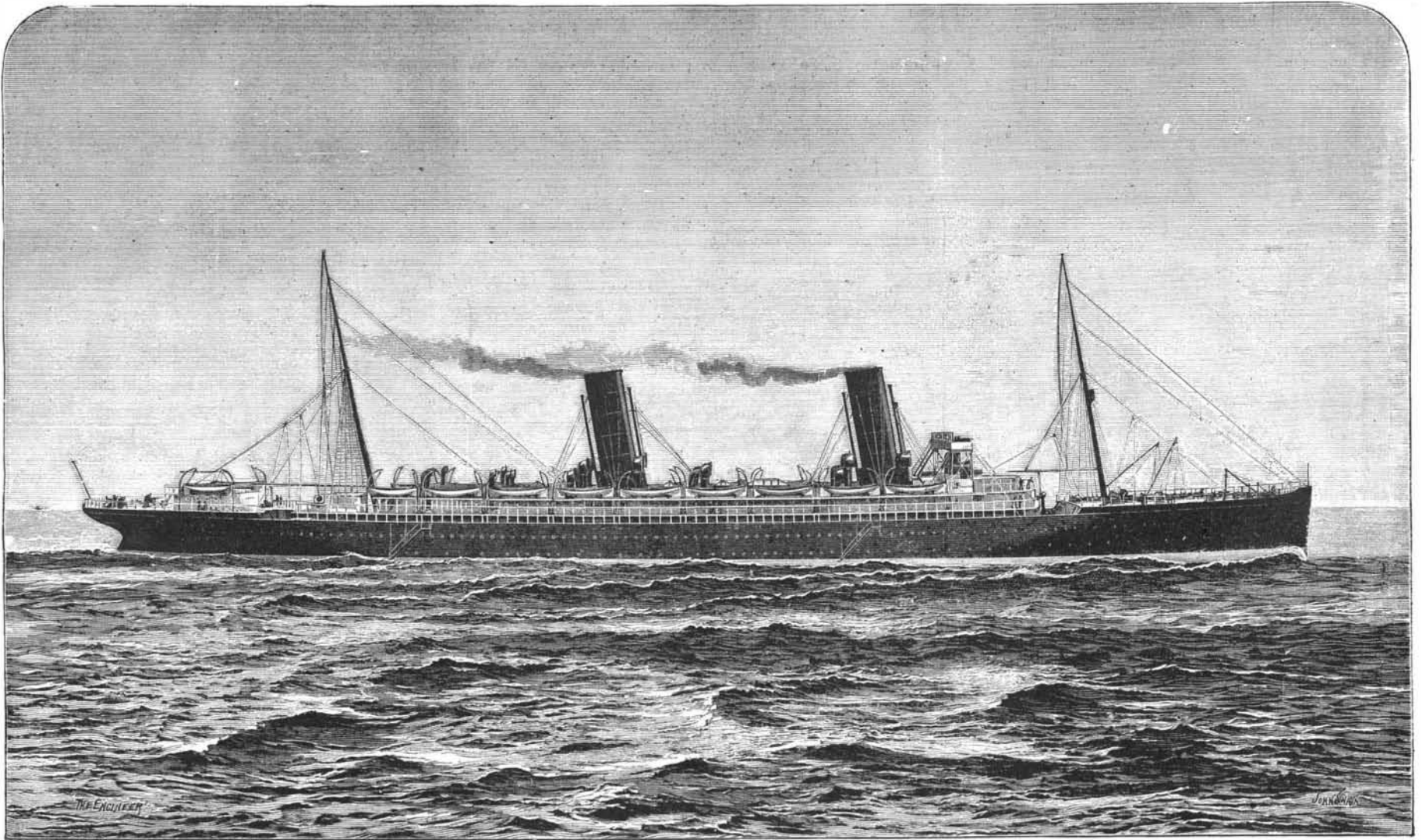
type made by Messrs. Brown, Brothers & Co., Edinburgh, and fitted with their patent automatic emergency gear. The condensing water is circulated through the condensers by four large centrifugal pumps, each driven by independent compound engines. These pumps may also, if required, pump water from the ship in case of damage to the hull. In the engine room are also fitted four evaporators of Messrs. G. & J. Weir's patent manufacture, to produce the necessary fresh water from sea water, and thereby make up the loss incurred through working and avoid the use of salt water in the boilers.

Steam for the main engines is generated in twelve large double-ended boilers, each having eight corrugated furnaces. The boilers are arranged in two groups of six, each group self-contained in water-tight compartments, and having a common funnel of the unprecedented diameter of 21 feet. The two funnels, it may be added, are from their lowest section 120 feet high, or about the height of the Eddystone Lighthouse. There is also a large single-ended boiler for supplying steam for the electric light, refrigerating, and other auxiliary machinery. In addition a small single-ended boiler is fitted on the lower deck for supplying steam to the distilling condensers, heating pipes, etc. An elaborate system of piping is fitted through-

sel. There are four sets of generating plant on board, each set consisting of a Siemens dynamo, coupled direct to a Belliss engine, which runs at the rate of 280 revolutions a minute, and gives an output of 42,000 watts. This is capable of supplying 1,350 16-candle power incandescent lights, including eight large reflectors of eight lights each, for working cargo, throughout the ship, and, in addition, a powerful searchlight for facilitating the navigation of the ship into port, the picking up of moorings and scouting in time of war. The large switchboard for controlling the lights consists of thirteen sections, so arranged that each may be connected with any of the four dynamos. From these dynamos and this large switchboard there runs throughout the ship an enormous amount of wiring, reaching, in point of fact, to upward of forty miles in length.

The Campania is expected to be completed in time for the rush across the Atlantic at the opening of the Chicago World's Fair.

We give an illustration of the ship as she will appear at sea, taken from a photograph courteously placed at our disposal by the Cunard Company. A fair idea of her size may perhaps be gathered from the statement that her funnels are each 21 feet in diameter, and the monkey bridge is 60 feet above the level of the



THE NEW CUNARD LINE STEAMER CAMPANIA—18,000 TONS, 30,000 H. P.

pany's City of Paris and City of New York. Her length over all is 620 feet; breadth extreme, 65 feet 3 inches; depth to upper deck 43 feet, and gross tonnage about 12,500 tons. Her displacement will probably be 18,000 tons. The vessel has a straight stem and elliptic stern, topgallant forecabin and poop, with close bulwarks, all fore and aft, and erections above the upper deck consisting of two tiers of deck houses, surmounted respectively by the promenade and shade decks.

The Campania is fitted with two sets of the most powerful triple expansion engines that have yet been constructed, each set capable, it is believed, of indicating from 14,000 to 15,000 horse power. These engines are fitted in two separate engine rooms, there being a dividing center line bulkhead between them, fitted with watertight doors for the necessary purposes of communication. Each set of engines has five inverted cylinders, *viz.*, two high pressure, one intermediate pressure, and two low pressure cylinders, the two high pressure being placed tandemwise above the low pressure ones. These are arranged to work on three cranks set at an angle of 120 degrees with each other. The high pressure cylinders are each fitted with piston valve, the intermediate and low pressure with double piston valves, all of which are worked by the usual double eccentrics and link motion valve gear. Steam from the two high pressure cylinders exhausts into the intermediate one, which in turn exhausts into the two low pressure cylinders, which have relieved slide valves, expansion taking place in three stages. The reversing engines are of the steam and hydraulic direct-acting

out the ship, and connected to the various auxiliary pumps for filling and emptying the ballast tanks, pumping out bilges, pumping water on deck in case of fire, and other purposes.

Her gigantic proportions considered, it will be readily understood that the greatest care and forethought have been expended on the structural arrangements and details throughout the huge vessel. Not only has the requisite continuity of strength been maintained throughout the entire length, in ways which experience has firmly established, but structural features have been introduced which may be said to be uncommon, if not entirely new, in shipbuilding practice, suggested, if not necessitated, by the conditions as to size and proportions.

The bottom of the vessel is constructed on the cellular principle for water ballast, minute water-tight subdivision being a feature in the arrangement. There are four complete tiers of beams, all of which are plated over with steel, and sheathed with wood planks, forming the upper, main, lower, and orlop decks. The last is used for cargo and refrigerating chambers, store rooms, etc. The other decks are entirely devoted to the accommodation of passengers, with dining and social saloons, state rooms, bath rooms, lavatories, etc., all on a scale of magnificence unequalled, no expense being spared on anything calculated to render traveling at sea more comfortable and enjoyable.

The electric installation on board—which is being carried out by Messrs. Siemens Brothers—is in keeping with the other marvelous details of the huge ves-

sel. We are indebted to the *Engineer*, London, for the foregoing particulars and for our engraving.

Massachusetts Institute of Technology.

The course in civil engineering was rearranged some six years ago in order to admit of certain training being given to the students, with special reference to their future work. To meet this requirement three options are offered to students during the fourth year: First, one in hydraulic and sanitary engineering; second, one in which particular attention is given to railroad engineering and management; and third, a special course in geodesy. These subjects are all, more or less, treated in the regular course, but particular attention is given to them in the different courses which permit the student to start upon his chosen branch of the profession with a fund of special information which could only be obtained elsewhere with great sacrifice of time and effort. The staff and equipment of the institute are excellent, and all who are interested in engineering should send for the pamphlet of the department of engineering.

The *Canadian Architect* sensibly suggests that in building brick houses in positions where they are not protected by surrounding property, not to forget that hollow walls will add greatly to the convenience of the occupiers. They will render the house cooler in summer and warmer in the winter, and will assist in materially keeping the house dry. The cost of hollow walls is only very little higher than that of walls built solid.