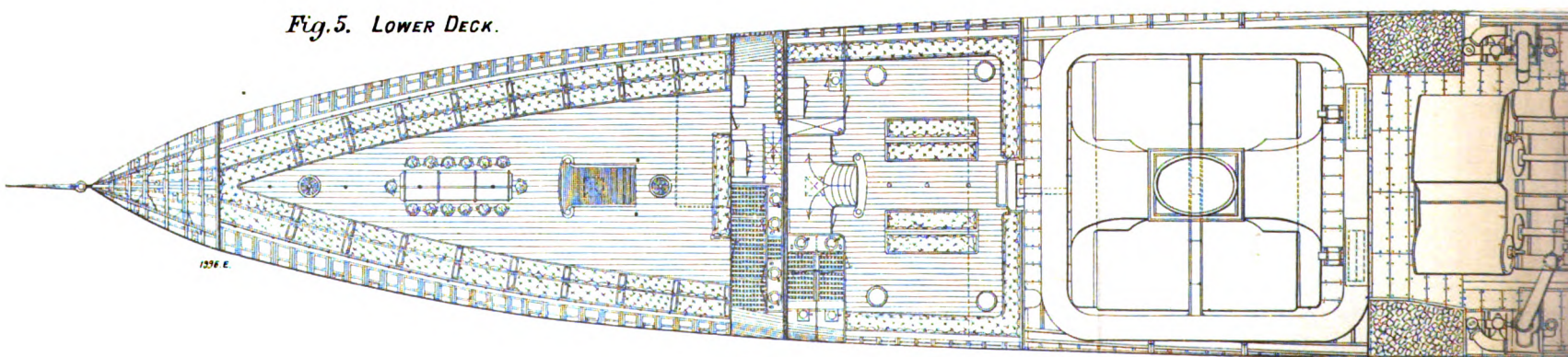
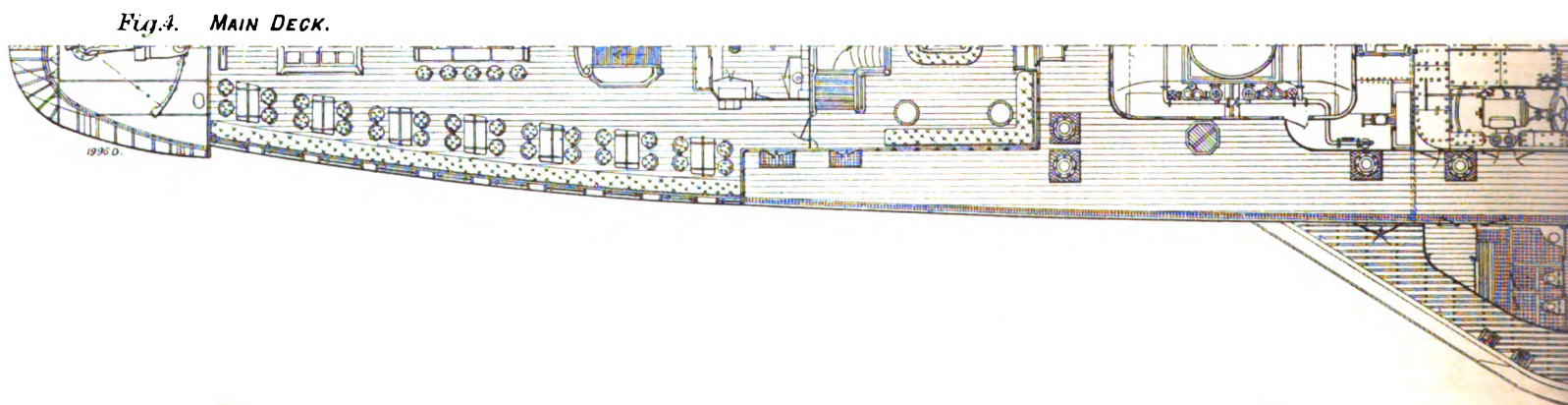
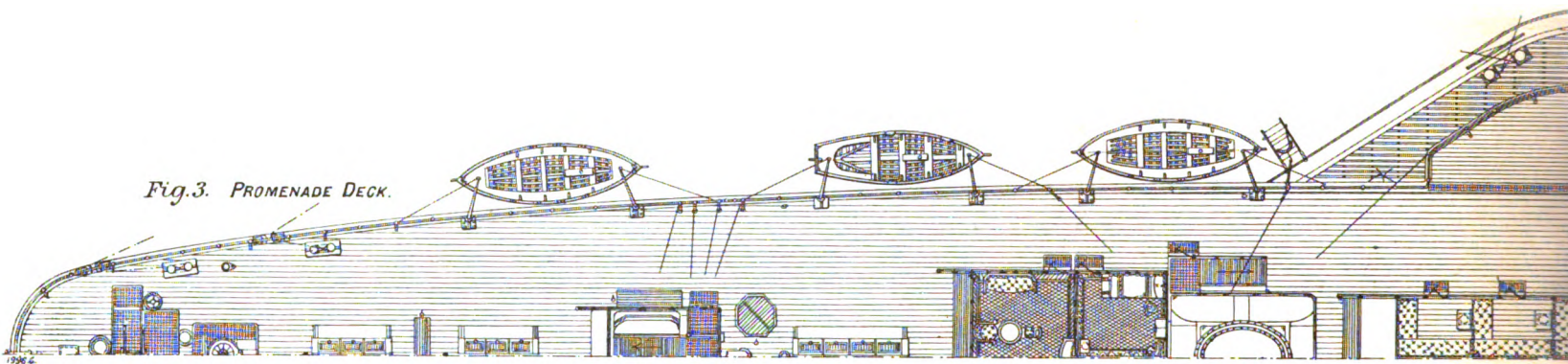
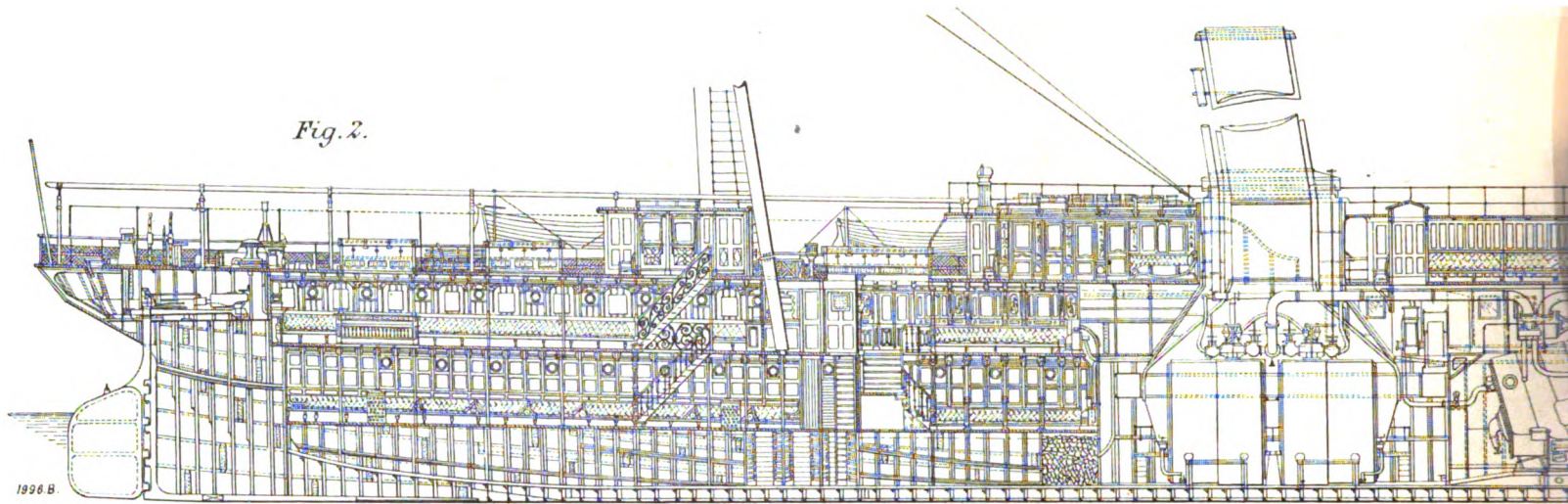


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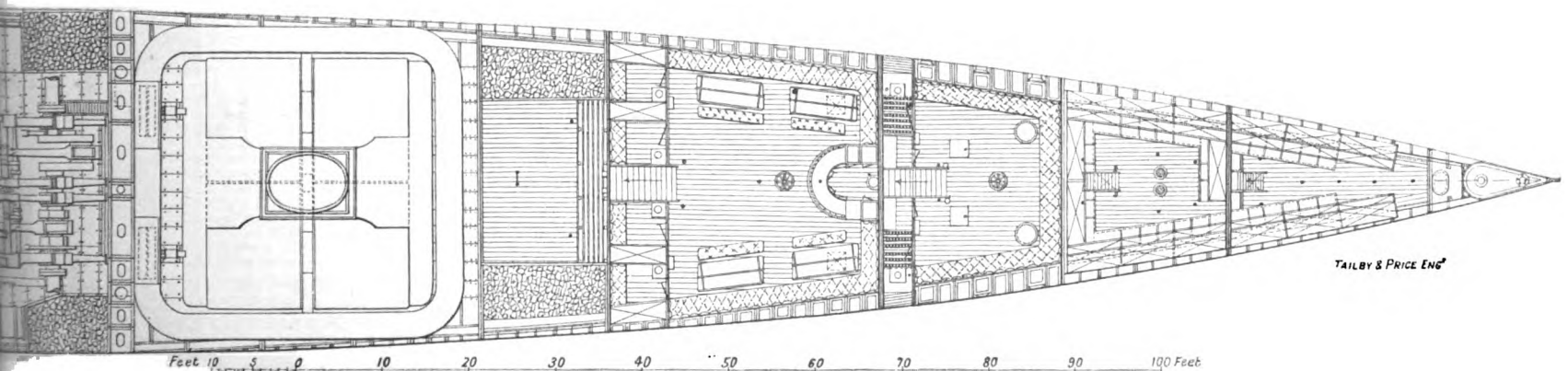
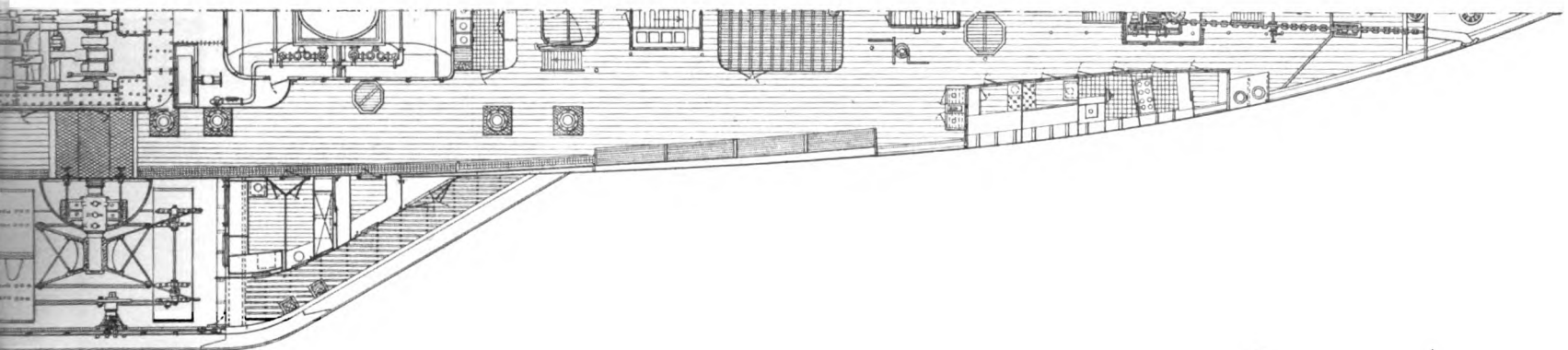
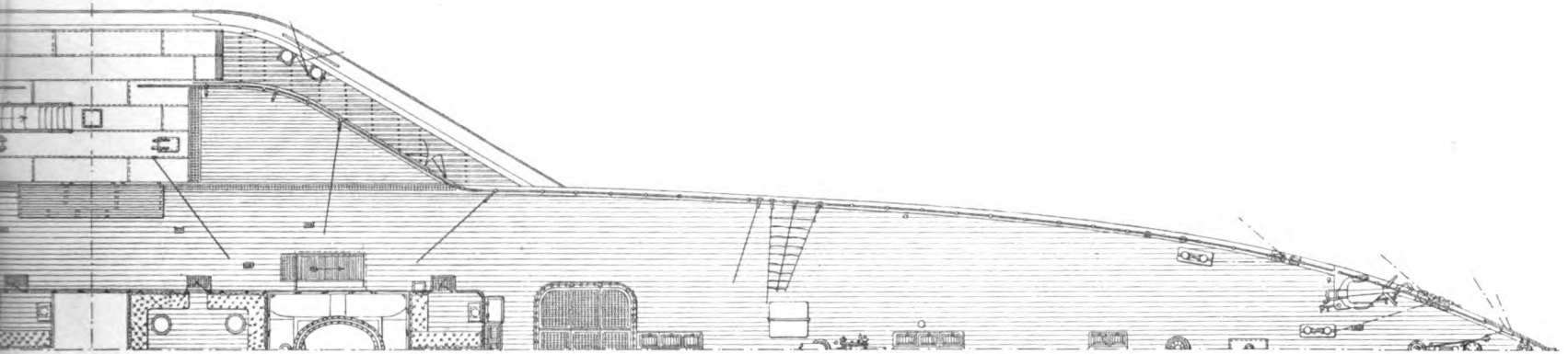
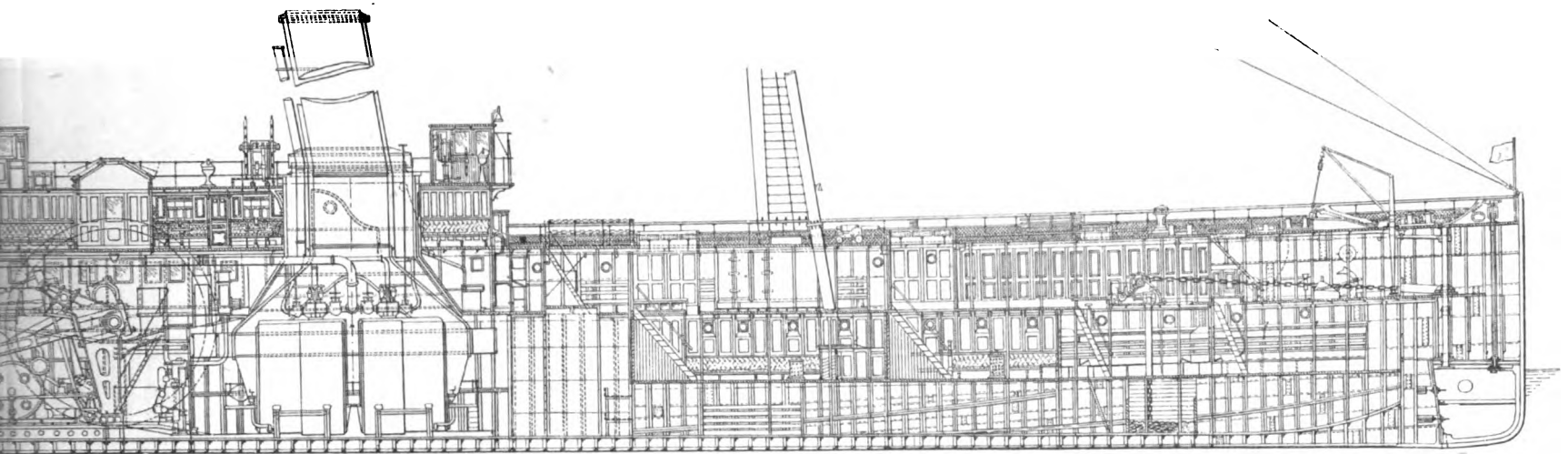
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OVER MAIL STEAMER "MARIE HENRIETTE."

JOHN COCKERILL, SERAING, BELGIUM.

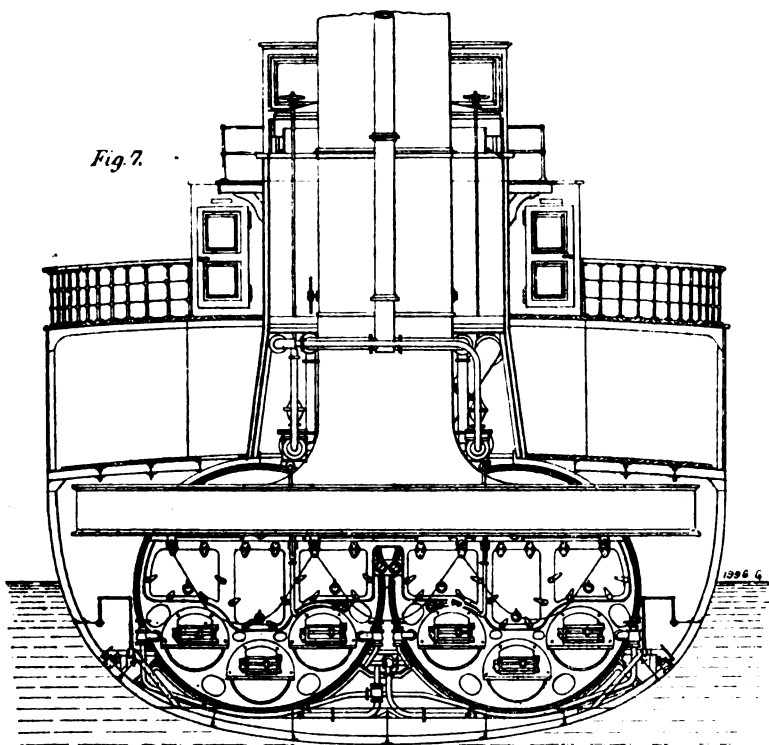
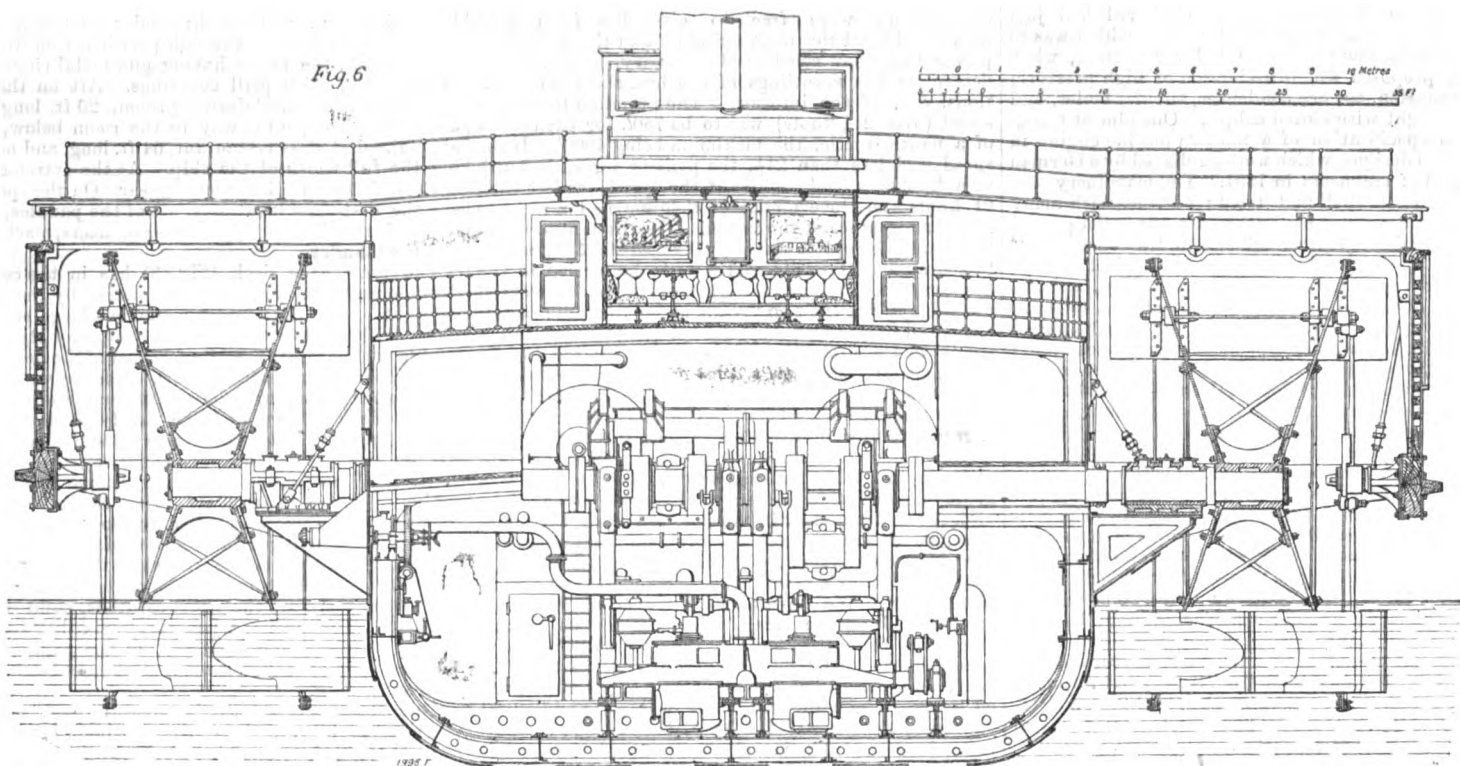
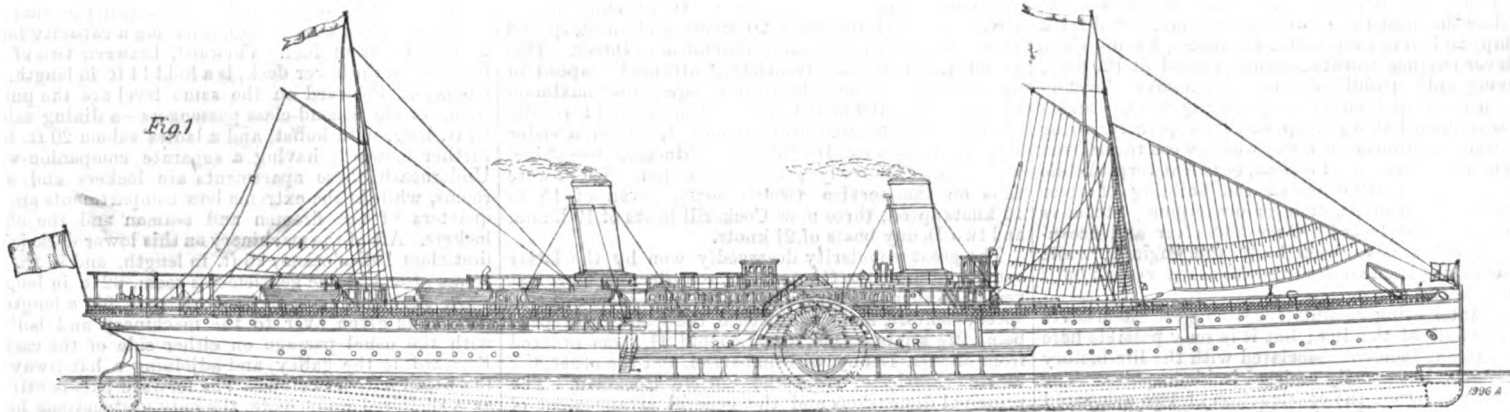
(See Page 255.)



TALBOT & PRICE ENG^s

Feet 10 5 0 10 20 30 40 50 60 70 80 90 100 Feet

THE BELGIAN GOVERNMENT MAIL STEAMER "MARIE HENRIETTE."
 CONSTRUCTED BY THE SOCIÉTÉ ANONYME JOHN COCKERILL, SERAING, BELGIUM.



all taken by one side, but by both equally. The advantages claimed are compactness, strength, lightness, and facility of repairs. These cars are constructed by the Canda Cattle Car Company, Chicago.

THE BELGIAN GOVERNMENT MAIL STEAMER "MARIE HENRIETTE."

THE encouraging prospects for the International Exhibition to be held this year at Antwerp, naturally create interest in Belgian manufactures, and in illustrating and describing the new Ostend and Dover steamer Marie Henriette, built by the Société Anonyme John Cockerill, some incidental reference may very properly be made to the extensive works at Seraing. They are well known as comprising collieries, blast furnaces, iron and steel works, and works for the construction of boilers, machinery, bridges, &c.; but less is known of the fact, or it is not duly appreciated, that the company are now competing successfully with British firms in the construction of fast steamers at their shipbuilding yard on the Scheldt, near Antwerp. The works at Seraing were founded in 1817 by Mr. John Cockerill, born in 1790 at Haslingden, in Lancashire. They consisted at first of a machine shop for constructing weaving and spinning machinery, and steam engines; but soon collieries, furnaces, and iron works were added, and led thus to the organisation of the great works now employing 10,000 men. Ten steamers are owned by the company for importing ore, and this fleet enables the firm to gain great experience in marine work, and to base designs on the experience acquired. Moreover, it provides an excellent school for training the members of a staff.

Appreciating the importance of the early efforts at

steam navigation, John Cockerill, in 1824, started marine engineering, and furnished machinery for river and tow boats, and later commenced to build the hulls at a shipbuilding yard on the Meuse. In 1825 he constructed for the Navy of the Netherlands (Belgium was then still connected to Holland) engines of 240 nominal horse-power for the corvette *Atlas*. These were at that time the most powerful engines constructed for a warship, and were remarkable in design, having three side-lever engines working cranks placed at 120 deg., revolving side paddle-wheels. Successive developments necessitated larger shipbuilding works, and a yard was opened at Antwerp, and subsequently, owing to military expropriations, the works were transferred to their present site at Hoboken, near Antwerp. While devoting special attention to the building of river steamers, the construction of ocean-going steamers has not been neglected. Over 330 river and ocean-going steamers have been built and engined, while machinery has been constructed for many vessels built in other works.

Many interesting reminiscences suggest themselves on a perusal of the list; but it is only possible here to refer to one incident associated with the life-history of Ericsson, but usually omitted in biographies. The company undertook the construction of two armoured monitors for the Russian Navy—*Kolidoune* and *Vestchoune*—from the designs of Ericsson. He went to Seraing in 1829, when twenty-six years of age, and remained there for some time. Cockerill had just built a passenger steamer—the *Ludwig*—which was to be fitted with low-pressure side-lever engines, when Ericsson proposed the introduction of high pressure, great expansion, surface condenser, tubular boiler, and forced draught with closed ashpit. One almost recognises the specification of a modern marine engine in the original designs, which were published by a German association of engineers in 1891. The machinery was actually constructed and tried; but, as with many subsequent attempts at improvement, the boiler proved the weak point. It was tubular in the sense that it contained a series of worms in cylindrical bodies. The firebox resembled a large bottle 6 ft. high, and was forged in one piece, and it is preserved as a splendid piece of work for the period. In spite of the forced draught, the boiler did not produce enough steam, and even then, sixty-five years ago, leaky tubes harassed the marine engineer. Cockerill spent 70,000 fr. on the experiment, and with patience and skill success might have attended the combined effort of Ericsson and Cockerill; but the owners pressed for delivery of their vessel, and the originally-designed low-pressure engines were fitted. Ericsson quitted Seraing for England, where his energies were directed to the construction of the locomotive which competed unsuccessfully against Stephenson's "Rocket" at Rainhill in 1829, and thereafter the United States offered a field of enterprise for Ericsson. Mention might also be made of some of the larger engines constructed, notably those for the Russian Navy, but space does not admit of it. Ruthven's jet propeller was tried a few years ago in a vessel built for service on the Meuse; but although it worked well, its efficiency was below that of a sister vessel fitted with ordinary paddle-wheels. The consumption of fuel was greater. Qualities, however, manifested themselves which justified the firm in fitting the jet propeller to a barge for river traffic in Asia Minor.

Coming now to the Dover and Ostend steamers, the latest of which we illustrate, it may be mentioned that the first vessels constructed for the service by the Cockerill Company were the *Rubis* and the *Topaze*, of 144 ft. length, 21 ft. breadth, and having low-pressure trunk engines of the Maudslay type, of 120 nominal horse-power. To these were added in 1862 *La Belgique*, of 170 ft. length and 21 ft. beam, with oscillating engines of 160 horse-power nominal, and this vessel is still employed in hydrographic service on the coast of Flanders. About the same time Messrs. Ravenhill, London, supplied *L'Emeraude*, and the *John Penn* was acquired and renamed *La Perle*. Towards 1866 the Government decided to renew their fleet with larger and faster vessels, and had built the *Louise Marie*, by the Cockerill Company. This vessel was 200 ft. long, 24 ft. broad, and 7 ft. draught of water, and with oscillating engines working with 30 lb. pressure of steam, developed 1550 indicated horse-power. The excellent seagoing qualities of the vessel resulted in six sister vessels being ordered in succession in the next six years—one per annum. These vessels conducted the service until 1885, but progress had been made in the interval, and again the Belgian Government decided to take action to maintain the popularity of the service. They ordered from Messrs. Cockerill in 1886 the *Prince Albert*, but on trial the guaranteed speed of 17½ knots was not attained. They lengthened the vessel 15 ft., and fitted more powerful engines and boilers. Two similar vessels were constructed on the improved conditions, and the trial speeds of the vessels were as follows: *Prince Albert*, 19.005 knots; *La Flandre*, 18.978 knots; and *Ville de Douvres*, 18.85 knots; in each case about 1½ nautical miles per hour more than the

guarantee. For each tenth in excess a premium of 10,000 fr. was to be paid, with a maximum of 100,000 francs, and in each case the maximum was awarded. About the same time the Government purchased the British steamer *Manx Queen* and the German steamer *La Treya*, and accepted the offer of Messrs. William Denny and Brothers, of Dumbarton, to construct a vessel to steam 20 knots and meet special requirements of the ports of Ostend and Dover. This vessel, the *Princesse Henriette*,* attained a speed of over 21 knots, and the firm secured the maximum premium of 100,000 francs. The splendid results induced the Belgian Government to order a sister ship from Messrs. Denny, the *Princesse Josephine*, which gave similarly great satisfaction. There were thus on the service twelve boats, seven of 15 to 16 knots speed, three new Cockerill boats of 19 knots, and two Denny boats of 21 knots.

The great popularity deservedly won by the latter vessels induced the Government to order two more fast vessels to surpass everything afloat in respect alike of speed, comfort, and magnificence, the guaranteed speed being 21½ knots. One, the *Leopold II.*, was ordered from Messrs. Denny, of Dumbarton, and the other, the *Marie Henriette*, from the *Société Cockerill*. The principal dimensions and the general arrangement of the interior were arrived at by common agreement between the Belgian Administration and the two firms. But while the general features were the same, the constructors were free to give the form that they considered the most suitable, and the propelling power that they considered necessary, as well as to determine the scantlings of the hull and the decorations, &c., of the interior. The premium for excess speed (over 21½ knots) was to be 750l. for each tenth of a nautical mile, the maximum being 4000l. If the speed was less than 21½, the penalty for each tenth of a knot was 500l., while if the speed was less than 21 knots the Government of Belgium had a right to refuse acceptance of the vessel. The draught of water for the ship complete was not to exceed 9 ft. 3 in., and at this draught 70 tons of coal were to be carried in the bunkers, and 20 tons of baggage. It was considered desirable to try the two vessels under the same conditions, and the Flemish coast was not considered suitable, owing to the draught of water being limited, while the natural currents made numerous sandbanks. Both vessels were therefore tried in the Firth of Clyde. Four runs were made between the *Cloch* and *Cumbræ Lights*, two in each direction. The distance each way is 13.666 nautical miles, so that the trial was over a distance of 54.664 nautical miles, and the run was made when the tide influenced the result least. The high speed demanded, in conjunction with the small draught of water, made the problem an interesting one, in view particularly of the stringent conditions.

Messrs. Denny's vessel, the *Leopold II.*, was completed first. We have already described it.† The mean speed on the official trial was 21.995 knots.‡ The *Marie Henriette*, built by the Cockerill Company, proceeded to the Clyde to undergo trials in May last year, and completed her voyage from Antwerp in 56 hours. Unfortunately there was an accident at the commencement of the trial, the starboard wheel being broken.§ The vessel returned to the company's works, and with only one wheel working took about 68 hours, barely 12 hours more than when steaming with the two wheels. A new paddle-wheel was fitted, and the vessel proceeded again to Greenock in August, and concluded her official trials. The runs between the lights were as follow, the mean results being also given. The mean draught with the prescribed load was 8 ft. 11½ in.

	Speed.
First run	22.724 knots.
Second run	21.568 "
Third run	22.872 "
Fourth run	21.638 "
Mean	22.2 "

Revolutions, 52.89; indicated horse-power, 8134; weather, fine; sea, slightly rough; wind, strong breeze from N.N.W. The engines worked perfectly, and the steam pressure was maintained with an average air pressure of 34½ millimetres (about 1½ in.). These results commend themselves. The vessel returned to Antwerp, and although she experienced bad weather, behaved well.

The *Marie Henriette* is of the following dimensions: Length between perpendiculars, 340 ft. = 103.629 metres; breadth, 38 ft. = 11.582 metres; breadth over paddle-boxes, 76 ft. 7 in. = 22.341 metres; depth of hold from main deck, 15 ft. = 4.572 metres. The hull of the vessel is constructed of steel. The decks and the carpentry work generally are of yellow pine; the sponsons, the longitudinal stringers aft, and the vertical members of the paddle wings are of Belgian oak. Very little teak has been employed in the con-

* See ENGINEERING, vol. li., page 39.

† *Ibid.*, vol. lv., page 444.

‡ *Ibid.*, vol. lvi., page 273.

§ *Ibid.*, vol. lv., page 737.

struction, except for the companion-ways, rails, and similar work. The vessel, as will be seen from Fig. 2, on our two-page plate, has two decks besides the promenade, which runs right fore and aft.

Taking first the lower deck, as shown in Fig. 5, it may be stated that the machine and boiler department occupies 120 ft. of the length, and within the compartment are seven coal bunkers, having a capacity for at least 100 tons of fuel. Forward, between two of the bunkers on the lower deck, is a hold 14 ft. in length, for baggage. Forward on the same level are the public rooms of the second-class passengers—a dining saloon 30 ft. long, with buffet, and a ladies' saloon 20 ft. long further forward, having a separate companion-way. Underneath these apartments are lockers and sail-rooms, while in the extreme bow compartments are the quarters of the firemen and seamen and the chain lockers. Aft of the machinery on this lower deck is the first-class ladies' room, 26 ft. in length, and in the extreme after end the gentlemen's room, 62 ft. in length.

On the main deck the central part, for a length of 116 ft., is given over to the machinery and boilers, with the usual passage on either side of the casing. Forward is the galley, and adjoining a hatchway for the baggage-room below. The forward part is utilised as a sheltered promenade, the only obstructions being the companion-ways to the second-class rooms below, while in the extreme bow are quarters for the lower officers. On either side of the deck are arranged lavatories, &c., while light and ventilation to the apartments below are through port-holes on the side and on deck, the latter having gun-metal rings 14 in. in diameter, with grill coverings. Aft on the main deck there is a ladies' drawing-room, 20 ft. long, with a beautiful companion-way to the room below, while aft is the first-class restaurant, 64 ft. long, and occupying the full width of the ship. At the extreme stern is Brown's steam tiller steering gear. On the sponsons are the first-class lavatories, aft of the paddles, while forward are cabins for apprentice engineers, machinists, and the laundry.

The promenade deck (Fig. 3) has in the centre a deck-house 64 ft. long, which is pierced by the engine skylight. This deck-house contains a large smoking-room, with eight cabins fitted in a superior style, each having two bedsteads, while forward of the fore funnel are two additional state-rooms. The only other obstructions forward are the companions and skylights for the deck below, with the usual cranes, capstans, &c., at the bow. The winch is on the main deck below. Aft on this promenade deck is the royal deck-house, 25 ft. long, containing a drawing-room and two large cabins. These apartments, with the other public rooms in the ship, we shall describe later, when we shall give engravings showing the chief saloons in the ship. At the after end of the ship there are cupolas ventilating and lighting the saloons on the main deck, and at the stern are the usual capstans, hand-steering wheels, and Brown's telemotor. Six lifeboats are carried on forged iron davits aft of the paddle-boxes. The after end of the promenade deck may be sheltered with an awning.

This deck-house on the promenade deck forms a large bridge deck, in the centre of which, between the funnels, is the captain's cabin, while forward of the fore funnel is the wheel-house. Amidships, too, there is a gangway athwart the ship. On the bridge are Brown's telemotor, and the usual telegraphs and compasses. The ship, as will be seen from Figs. 1 and 2, has a rudder within the stem as well as aft, the former being worked by hand gear from the bridge. The ship, as shown on Fig. 1, has two funnels, and two masts with light sails, and presents a smart trim in the water. She is lighted by electricity, with oil-lighting arrangements for use in case of emergency.

(To be continued.)

GERMAN COAL IN ITALY.—The deliveries of German coal to Italy *via* the St. Gothard in December last year amounted to 3150 tons. In this total Westphalian coal figured for 2370 tons and Sarrebruck coal for 780 tons.

ROYAL AGRICULTURAL SOCIETY OF ENGLAND.—We are requested to remind intending exhibitors at the "Royal" Show, to be held at Cambridge from June 23 to 29 next, that applications for space in the implement department at that meeting must be made by Saturday, March 31, 1894. The entries in the various departments of live stock, poultry, produce, &c., must be made by Tuesday, May 1, 1894.

PROJECTED ELECTRIC RAILWAY IN DENMARK.—An application has been made to the Danish Government for a concession for an electric railway from Klampenborg to Humlebök, both on the Sound, a distance of some 16 miles. The plan does not include any contribution from the State, nor from the districts through which it will have to pass. It is principally intended for passenger traffic, only secondarily for goods. The Danish Government has proposed a railway from Klampenborg to Elsinore, which would entail an expenditure of some 350,000l., whilst the proposed electric railway will not cost the State anything, in addition to which the Parliament does not seem disposed to pass the Government's Bill.