

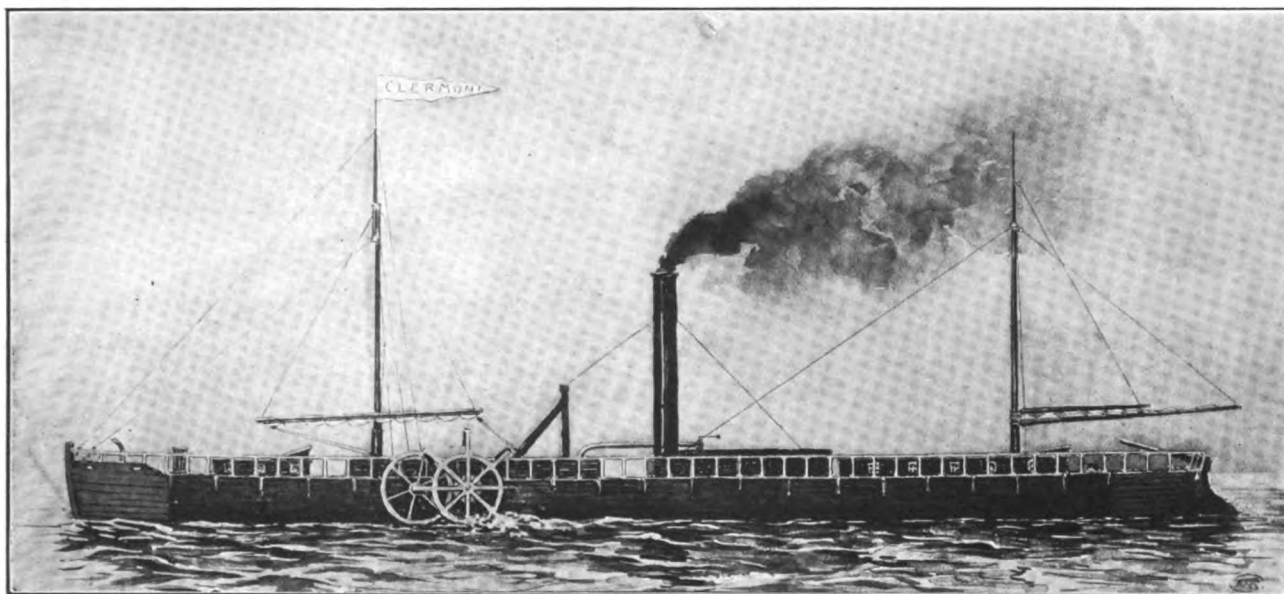
International Marine Engineering

SEPTEMBER, 1909.

THE CLERMONT.

The first practical steamboat to engage successfully in commercial navigation was the *Clermont*, built by Robert Fulton in 1807, at Charles Brown's shipyard, near Corlear's Hook, New York, and placed in service on the Hudson River between New York and Albany. She was 150 feet long, 13 feet wide with 7 feet depth of hold and a draft of 2 feet. The hull was flat-bottomed and wall-sided, slightly wider at the deck than on the bottom, with a wedge-shaped bow and stern cut to an angle of 60 degrees. The parallel middle body extended for almost the entire length of the boat. Two masts and two cabins were fitted, one forward and one aft. She was

The stem is both sided and molded 8 inches, the stern post is sided 8 inches and molded 12 inches, and the deadwood is sided 8 inches and molded to suit. The floors are sided 4 inches, molded 8 inches and are spaced 24 inches center to center. They are single throughout the boat, with the exception of the machinery space, where they are double. The frames are sided 4 inches and molded 7 inches at the floors and 4 inches at the deck, and are spaced the same as the floors. The center keelson is 10 inches by 10 inches, and the engine, boiler and bilge keelsons 8 by 10 inches. The deck beams are molded 8 inches at the center, 5 inches at the ends, sided 8



FULTON'S CLERMONT, THE FIRST PRACTICAL STEAMBOAT TO ENGAGE SUCCESSFULLY IN COMMERCIAL NAVIGATION.

steered by a tiller at the stern, and two lee-boards were fitted to prevent drifting sideways. Propulsion was by means of side paddle-wheels, placed well forward and driven by a single-cylinder, vertical, condensing, side lever type engine, supplied with steam at a pressure of 2 or 3 pounds per square inch by a copper boiler. The machinery was built in England, the engine by Boulton & Watt and the boiler by Cave & Son.

In connection with the Hudson-Fulton celebration to be held in New York this month a reproduction of this historic little vessel has been built as nearly like the original as would be allowed by the steamboat inspectors, and through the courtesy of the Hudson-Fulton Celebration Commission we are able to publish complete details of this replica. The principal dimensions of the boat, which differ from the original only in the matter of the beam, are as follows:

Length over all.....	150 feet.
Length at upper deck.....	149 feet.
Breadth at upper deck.....	17 feet 11 inches.
Breadth at bottom.....	16 feet.
Depth of hold.....	7 feet.

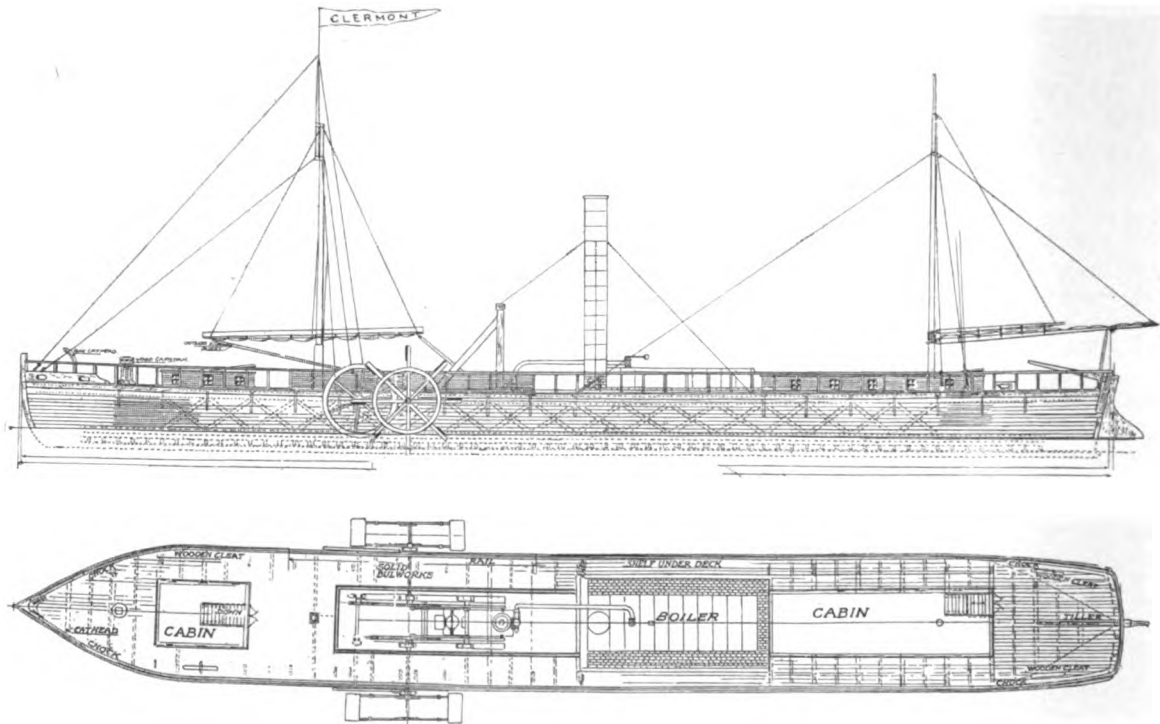
inches and spaced 3 feet center to center. The main beams are fastened with hackmatack knees. The bottom planking is 2 by 4 inches, the three bilge strakes 10 by 2 inches, the sheer strakes 10 by 3 inches, the sheer stringer is 12 by 2 inches, and the wearing piece 8 by 3 inches. The deck planking is 4 by 2 inches.

The machinery of the *Clermont* is located amidships, and is entirely uncovered. The paddle-wheels are placed well forward; aft of these is the engine and aft of this again the boiler. The paddle-wheels are 15 feet in diameter, each having eight paddles or buckets 4 feet long and 2 feet wide. Forward of the paddle shaft and connected to it through two to one gears is a jack-shaft, on which are mounted two large fly-wheels, arranged outside the hull. These fly-wheels have cast-iron rims, 4 inches by 4 inches, and are keyed to the shaft.

The engine is of the single-cylinder, condensing, side-lever type, designed for a working pressure of 20 pounds per square inch. The cylinder is mounted on a cylindrical condenser, which is connected to the air pump by a channel-way of cast iron, which forms the bedplate of the engine. One boiler-feed

pump is supplied, which has a capacity of 180 cubic inches, and is worked by the air pump cross-head. It has a brass plunger and valve. The bilge pump has a capacity of about 300 cubic inches. The side levers of the main engine are of cast iron

lowing extract from one of Fulton's letters is of interest: "My first steamboat on the Hudson's River was 150 ft. long, 13 ft. wide, drawing 2 ft. of water, bow and stern 60 degrees; she displaced 36.40 cubic ft. equal 100 tons of water;

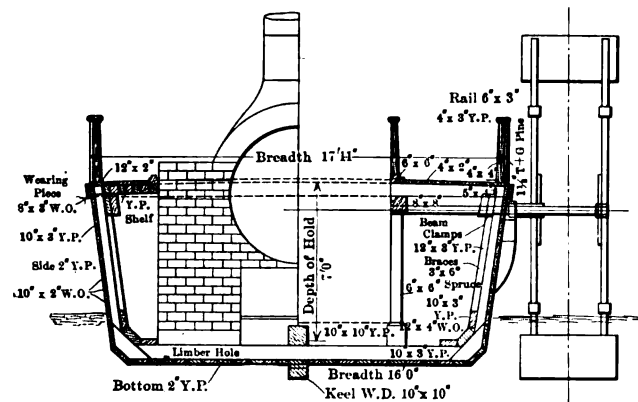


GENERAL ARRANGEMENT OF THE CLERMONT.

on a wrought iron center shaft. Each connecting rod is forked and fitted with wrought pins. Counter weights are provided to balance the weight of the piston, piston rod, crank, side links, air pump gear, etc.

No attempt was made to reproduce the original boiler of the *Clermont* exactly, because such a boiler would not be allowed in operation to-day by the steamboat inspection ser-

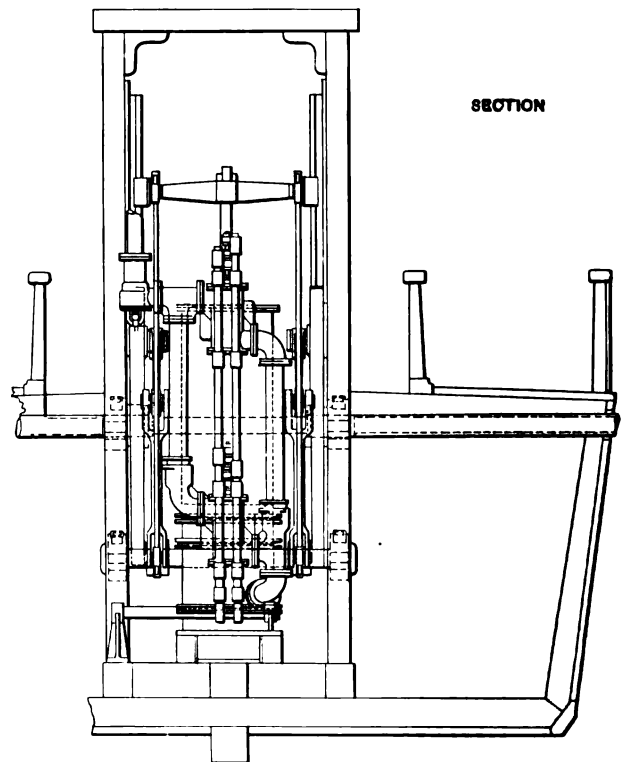
her bow presented 26 ft. to the water, plus and minus the resistance of 1 ft.; running 4 miles an hour.



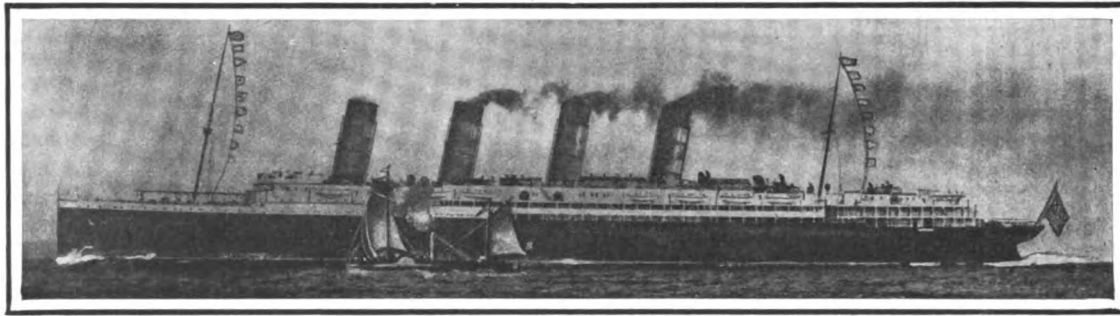
MIDSHIP SECTION OF THE CLERMONT.

vice. The boiler used on the replica is an ordinary externally-fired horizontal tubular boiler, 5 feet 6 inches diameter, 16 feet long, with 3/4-inch shell, 5/16-inch heads and forty-six 4-inch tubes, designed for a working pressure of 25 pounds per square inch.

As showing the extent of the theoretical knowledge of naval architecture and marine engineering in Fulton's time the fol-



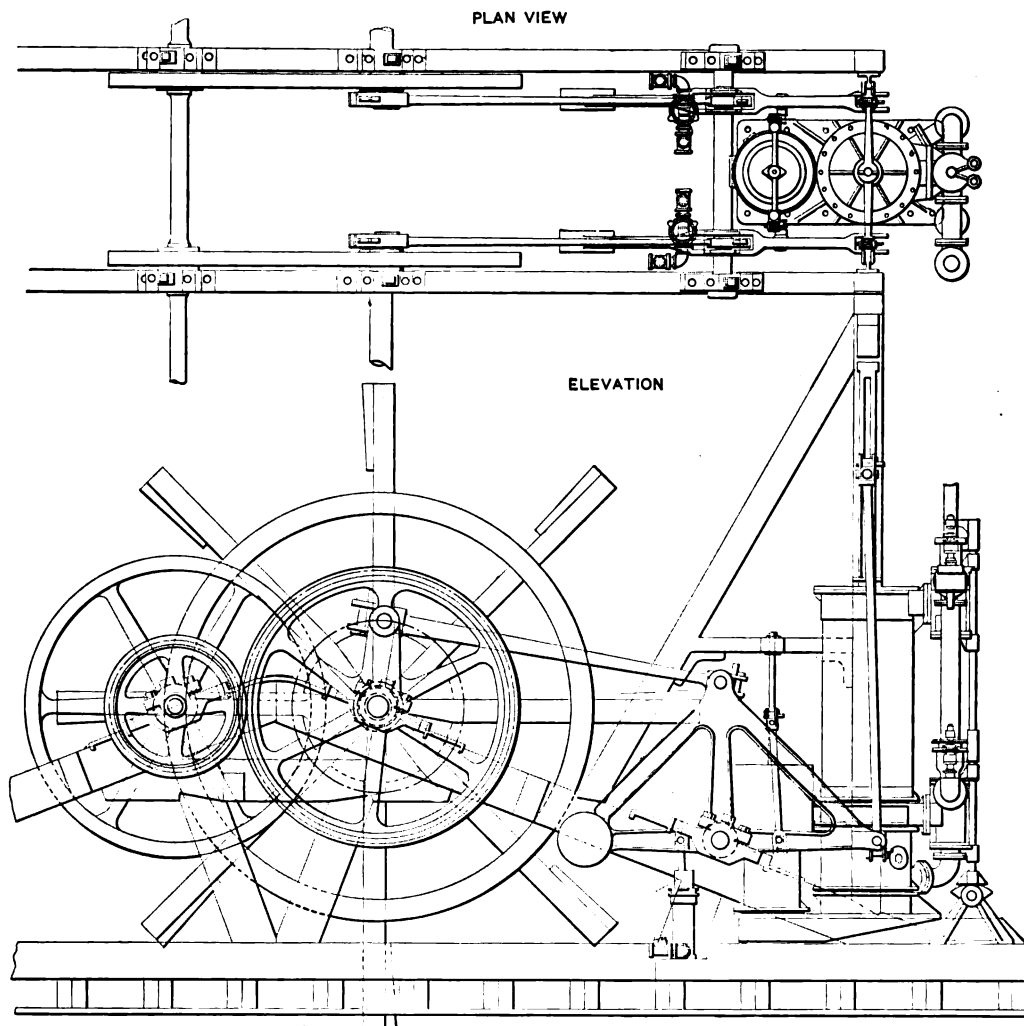
END VIEW OF THE MAIN ENGINE.



THE MAURETANIA AND THE CLERMONT, SHOWING A CENTURY'S PROGRESS IN STEAM NAVIGATION.

12.37 lbs. multiplied by 26, the bow of the boat.....	321 lbs.
Friction on 2,380 superficial ft. of bottom and sides, 7.50 lbs. or 50 superficial ft.....	352
Total resistance of the boat, running 4 miles an hour	673
A like power for the propellers.....	673
Total power felt at the propellers.....	1346
The boat running 4 miles an hour is 6 ft. a second; this is three times faster than the piston; hence multiplied by.....	3
Necessary power of the engine, the piston running 2 ft. a second.....	4038 lbs."

The first voyage of the *Clermont* was begun on Aug. 17, 1807, the boat proceeding from New York up the Hudson River for 110 miles during the first twenty-four hours. The average speed thus far had been about 4.6 miles per hour. Continuing the journey on the following day the *Clermont* proceeded to Albany, a distance of 40 miles, in eight hours. The running time for the entire trip of 150 miles from New York to Albany had been thirty-two hours, or at the rate of nearly 5 miles an hour. The return trip was made in thirty hours' running time, or an average of just 5 miles an hour. This same trip is made to-day in the regular running time of nine and one-half hours by boats capable of an average speed of 20 miles an hour.



MAIN ENGINE OF THE CLERMONT.