

A NEW HYDROPLANE BOAT.

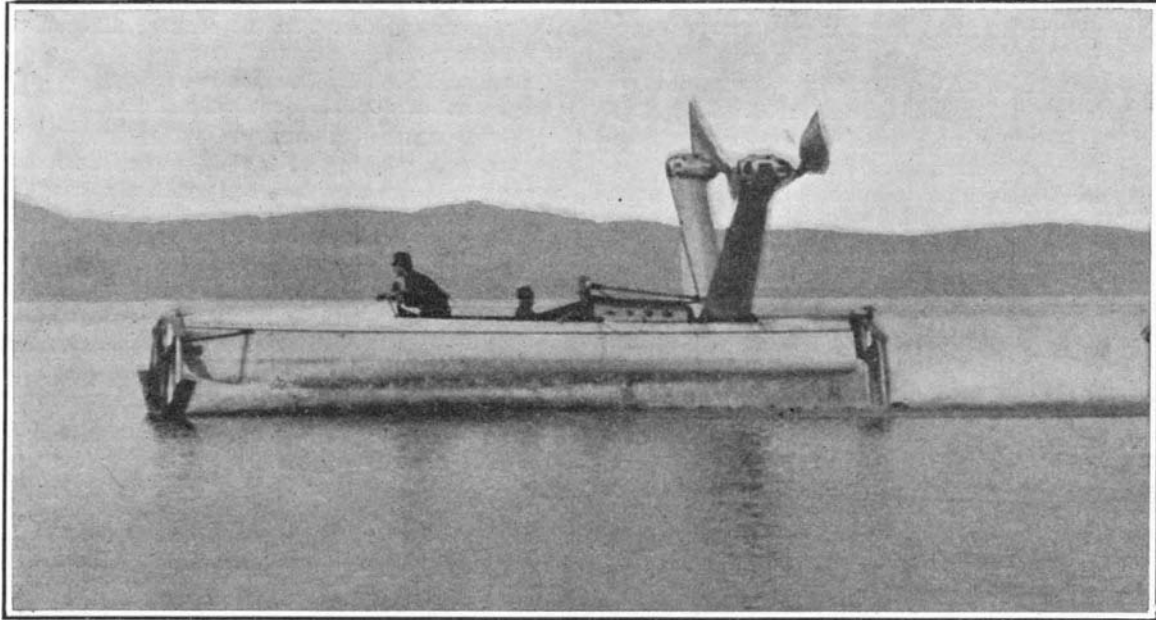
Our illustration shows a remarkable photograph of a new hydroplane boat, which was first experimented with successfully on Lake Bracciano, near Rome, Italy, on the 22d of last month. This boat was designed and built by Messrs. Crocco and Ricaldoni, of the Brigata

necessary to add another pair of drivers, and adopt what is known as the Pacific type of locomotive, in which the total necessary adhesive weight was realized without exceeding a load of 60,000 pounds on any one pair of drivers.

The dimensions of the new locomotive greatly exceed

COMPARISON OF THE FIRST AND LATEST LOCOMOTIVE OF THE PENNSYLVANIA RAILROAD.

	John Bull.	Pacific Type.
Date	1831.	1907.
Weight.....	10 tons.	134.6 tons.
Boiler diameter.....	3 ft. 6 ins.	6 ft. 7¾ ins.
Total heating surface.....	249 sq. ft.	4,322 sq. ft.
Diameter of cylinders.....	9 ins.	24 ins.
Stroke of cylinders	20 ins.	26 ins.
Volume of cylinders.....	1,273 cu. ins.	11,378 cu. ins.



An 80 H. P. Hydroplane Boat Driven by Air Propellers.

Specialisti, Rome. It is fitted with two V-shaped fins at the bow and stern, respectively, in accordance with a patent issued to an Englishman named Thompson, and modified somewhat by the present experimenters. The boat is fitted with an 80 to 100 horse-power gasoline motor, which drives two air propellers that propelled the boat first through and then above the surface of the water, as can be seen from the photograph. The weight of the boat complete with two men on board is 1,500 kilogrammes (3,300 pounds), and it is to attain a speed of about 40 miles an hour, although the inventors do not state the speed actually attained thus far.

anything hitherto built, or that would have been considered possible a few years ago. We all remember the great interest which engine No. 999, built especially for hauling the Empire State express of the New York Central Railroad, excited when she was

7 tons of water, weighs 70 tons, making a total for the engine and tender of 204.6 American tons, or 409,200 pounds.

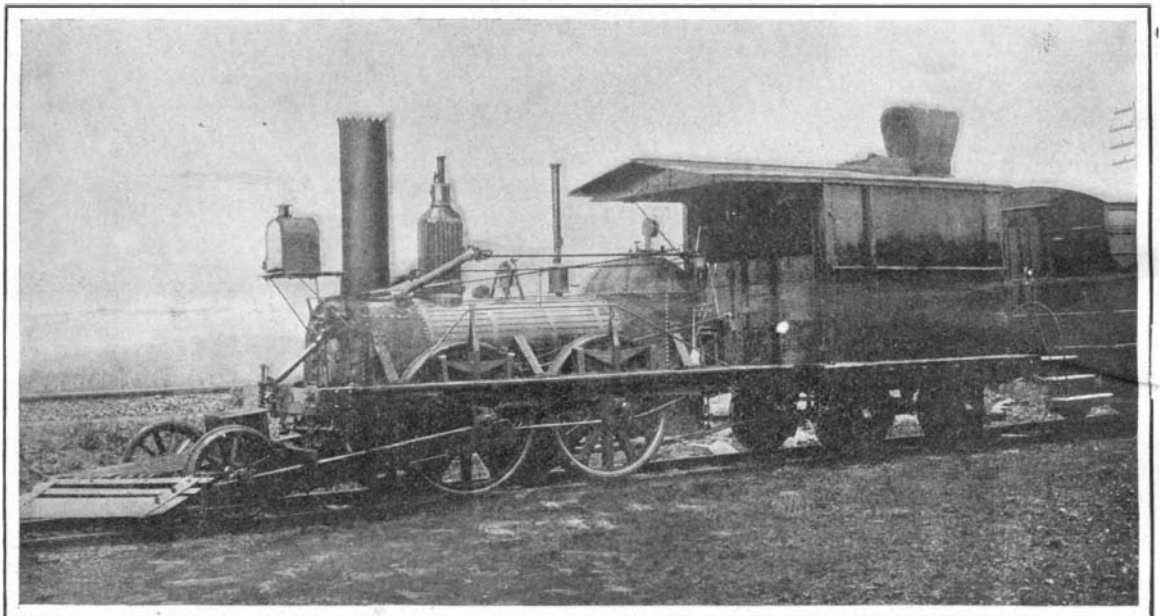
In order that the great power of the locomotive might be available at fairly high speeds, the drivers were made 30 inches in diameter, which is the same as that of the Atlantic type. The cylinders are 24 inches in diameter by 26 inches stroke, and the piston valves, which are operated by the Walschaert gear, are themselves 16 inches in diameter. The valve gear, which has been carefully designed with a view to bringing its working parts into one plane, is provided with a special supporting frame outside of the link. This frame will be observed in the accompanying view of the engine.

It will readily be understood that to supply sufficient steam for cylinders of this great capacity, an unusually large boiler was necessary. To begin with, the tubes, which are 2¼ inches in diameter, are 6 feet longer than those of the Atlantic type, or 21 feet over all; and of these there are 343 whose combined heating surface is 4,117 square feet. As there are 205 square feet in the firebox, the total heating surface reaches the enormous area of 4,322 square feet. The coal is burned on a grate whose area is 61.8

THE MOST POWERFUL EXPRESS LOCOMOTIVE EVER BUILT.

The truly enormous express locomotive shown in the accompanying illustration represents the latest effort of one of our leading railroads to keep pace with the ever-growing demands of its express passenger service. This company has just received the new locomotive from the shops, and placed it in trial service, in the hope that it will prove equal to the task of handling in one train passenger trains which otherwise must be run in two sections several minutes apart, or else handled by "double-heading," that is, coupling up two locomotives at the head of a train.

The most powerful Pennsylvania standard express engines at present in service are themselves heavy and powerful machines, with cylinders 22 inches diameter by 26 inches stroke, which, on divisions having heavy grades, are capable of successfully handling trains made up of eight Pullman cars. But the passenger traffic has increased so rapidly that ten or twelve car trains are not unusual. The capacity of the Atlantic type, with four-coupled drivers, could not be increased sufficiently to meet the demands without adding considerably to the weight on the drivers. To gain the required capacity, therefore, it was found



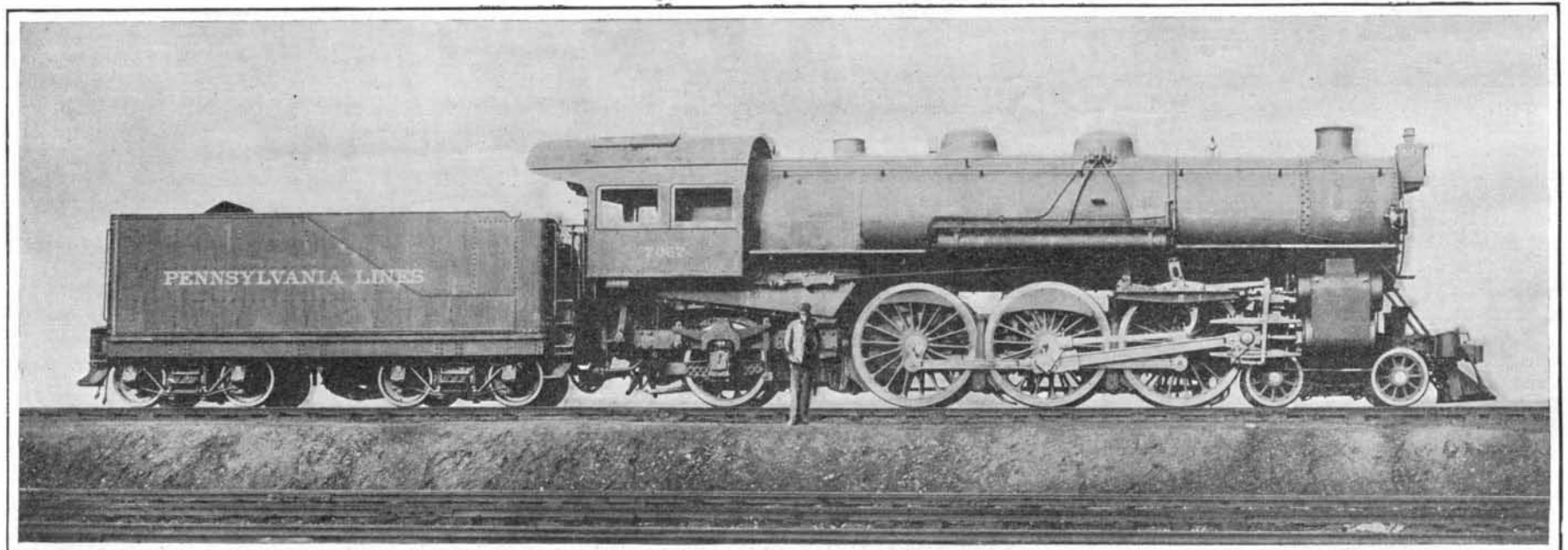
Cylinders, 9 inches diameter by 20 inches stroke. Total heating surface, 249 square feet. Weight, 10 tons.

The "John Bull"; Built in 1831.

exhibited at the Chicago World's Fair. Yet, to-day it would take two of such engines coupled together to do the work that can be performed by the new Pennsylvania engine; for the latter locomotive, with water in its boiler and in running condition, weighs 134.6 tons; its tender when loaded with 11 tons of coal and

square feet. The maximum diameter of the barrel of the boiler is 79¾ inches, so that a man six feet tall could walk through the boiler shell, and yet clear the top of it by over half a foot. The maximum tractive power is 31,000 pounds or 15½ tons.

(Continued on page 530.)



Cylinders, 24 inches diameter by 26 inches stroke. Total heating surface, 4,322 square feet. Weight, engine alone, 134.6 tons.

New Locomotive for Heavy Express Service.

THE FIRST AND LATEST LOCOMOTIVES OF THE PENNSYLVANIA RAILROAD.