

GASOLINE-PROPELLED GUNBOATS FOR RIVER SERVICE. BY THE ENGLISH CORRESPONDENT OF THE SCIENTIFIC AMERICAN.

The possibilities of applying the small explosion motor to certain light craft for naval duties, such as river patrol work, have been recently advanced by the construction of two gasoline-propelled shallow-draft gunboats for service on the river Danube. These craft were built by the British naval shipbuilding firm of Yarrow & Co. for the Austro-Hungarian government. Each vessel has a length of 60 feet with a beam of 9 feet and a draft of 32 inches. They are built on the Yarrow shallow-draft system, having three screws revolving in tunnels and fitted with twin rudders. The hulls are built of galvanized steel.

The propelling machinery aggregates 350 horse-power distributed in five sets. Each wing screw has two sets of four-cylinder vertical Yarrow-Napier motors having a bore of $6\frac{1}{2}$ inches by a 6-inch stroke, mounted in tandem and each developing 70-brake-horse-power. Thus each wing has eight cylinders representing 140 horse-power. The central screw has only one four-cylinder set and the reversing gear is coupled only to this middle set.

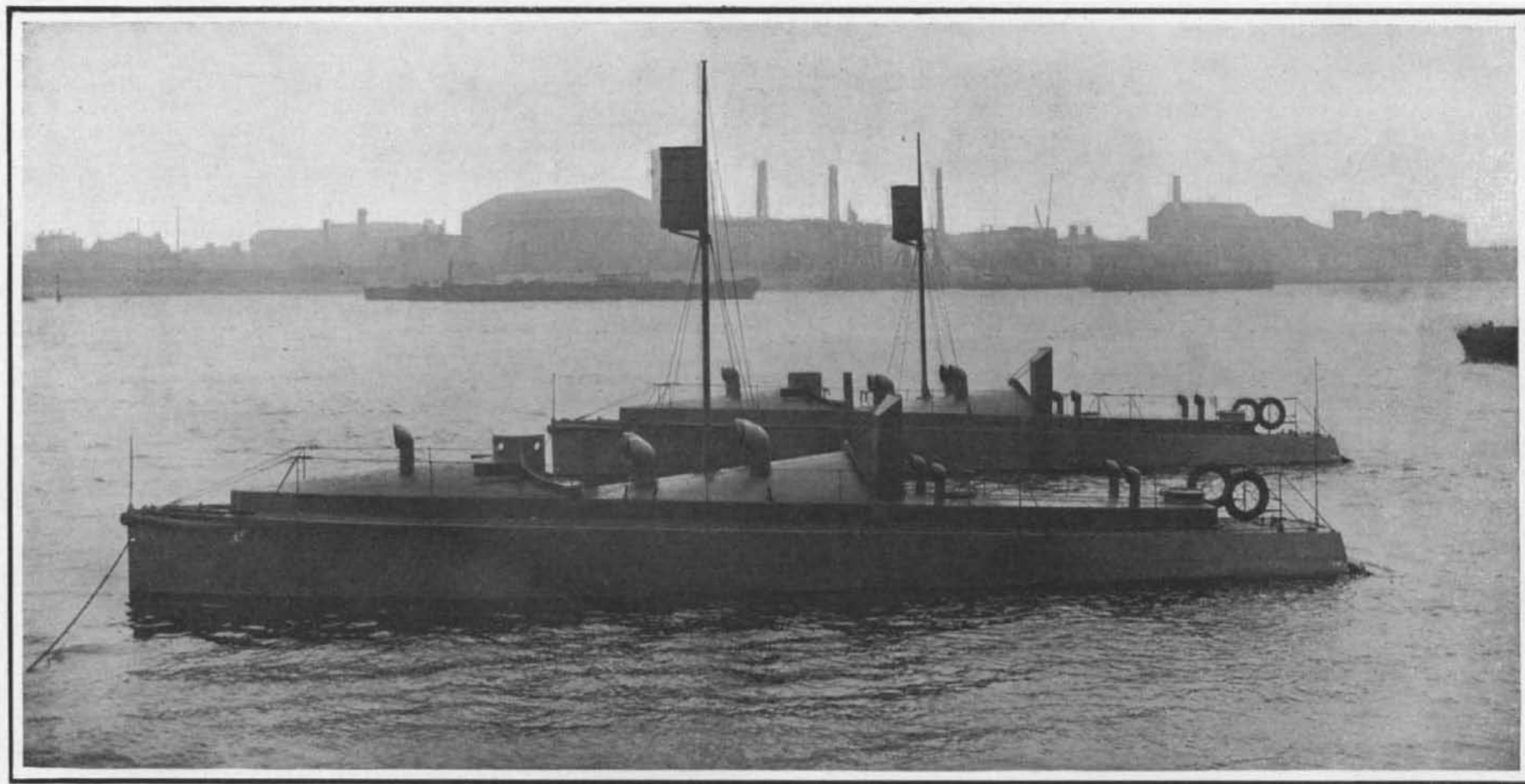
A small conning tower is fitted forward, while right aft is a revolving gun platform. A light gun will be mounted on the platform in Austria. The machinery space as well as fuel reservoirs, conning tower, and gun mounting are protected by $\frac{3}{16}$ -inch chrome steel armor plates affording complete protection to point-blank rifle fire at short range. Amidships is a short detachable mast fitted with a crow's nest for look-out

bodies of men and animals stricken with plague but the germs live and multiply within the bodies of the insects, retaining their full virulence for many days. The bedbugs do not appear to suffer any inconvenience, for they live and remain active for months after they have absorbed the germs. Hence a few bedbugs might easily infect a regiment with plague and it is to be feared that they possess equal power to spread other diseases.

THE WRIGHT BROTHERS' AEROPLANE IN FRANCE AND THE UNITED STATES.

In view of the fine performances of Wilbur Wright with his aeroplane in France, and also of the flights about to be made by Orville Wright near Washington, at Fort Meyer, we are glad to be able to present to our readers, in this issue, the first actual detail photographs of this world-renowned aeroplane which the Wright brothers have heretofore kept closely veiled from public view. These photographs show that, as had been supposed from the descriptions of eye witnesses and also from the minute photographs taken at long range of the machine in flight at Kitty Hawk, their motor-driven aeroplane is of the greatest simplicity and is, in fact, merely their gliding machine with a motor and propellers added. In the photographs which we reproduce the reader can see that the machine is fitted with a double-surface horizontal rudder mounted in front and having a small vertical rudder at its center point, while twin vertical rudders are used at the rear for side steering. The two propellers

an hour, although it is capable of traveling at the rate of 40. The machine in use in France has but two control levers, while the new one to be flown here has three. Two of these, which control the warping of the planes and the vertical rudders, can be worked in unison, while the third operates the horizontal rudder. The 4-cylinder, vertical, water-cooled gasoline motor (which is the Wright brothers' own design) is run at a constant speed of about 1,400 R. P. M. It drives the propellers in opposite directions at about 500 R. P. M. No carbureter is used, the gasoline being pumped into the cylinders above the inlet valves. According to Mr. Orville Wright, the speed of the aeroplane is varied by manipulating the surfaces and not by varying the speed of the motor. The method of operating the motor without a carbureter by feeding gasoline direct to the cylinders is that used by Farman with his 8-cylinder engine, and it is claimed that this method, although not economical of fuel, produces the best results when a motor is run at constant speed. The motor of the Wright aeroplane is placed in a fore-and-aft direction across the lower plane a short distance to one side of the center line, while the aviator and passenger sit beside the motor on the other side of this line and with their feet upon a cross brace below and in front of the plane. The frame and braces of the aeroplane are constructed of wood (spruce, ash, and pine), while unbleached muslin is used for the surfaces. No special pains have been taken to reduce the resistance of the various braces, with the exception of the uprights connecting the main planes, which are



TWO 350-HORSE-POWER GASOLINE-PROPELLED GUNBOATS FOR PATROL DUTY ON THE DANUBE.

Note the conning tower, the crow's nest, and the revolving gun platform aft.

purposes and to provide an elevated rifle firing position. Special attention has been devoted to the ventilation of the machinery space so as to avoid the accumulation of any noxious gases.

In the official speed trials carried out on the Thames measured mile by the Hungarian naval officers the vessels attained a mean speed of 22.25 knots with a load of three tons during a run of one hour's duration. A consumption trial was then carried out to ascertain the radius of action at an average speed of about 11 knots per hour and it was found that the vessels carried sufficient fuel for a continuous run of some 500 nautical miles. This represented a radius of action three times in excess of what would be possible with craft of the same size propelled by steam. A distinguishing feature during the high-speed trials was the absence of any vibration. Accommodation is provided for a crew of six men, the sleeping appointments for which are placed fore and aft respectively.

The evil repute of the bedbug has acquired fresh justification. It is well known that most contagious diseases are disseminated by blood-sucking insects—malaria and yellow fever by mosquitoes, plague by fleas, the African sleeping sickness by *Glossina palpalis* (a near relative of the tsetse fly), anthrax, tuberculosis, smallpox, scarlet fever, typhoid fever, etc., by the common house fly. Now Jordansky and Klodentzký have proved by very delicate experiments, that bedbugs are the worst of all, at least in the dissemination of plague. Not only do they draw contagion from the

are located at the rear of the main planes, and are driven in opposite directions by chains from the motor located on the lower plane a short distance to one side of the center line of the machine. A vertical surface seen at the front end of the motor is the radiator, which consists of a number of small tubes closely assembled. The machine is carried on wood skids placed a short distance below the lower plane and which project forward and upward to form a support for the front horizontal rudder. Suitable stays extend downward from the front edge of the upper plane to these skids and also upward from the front edge of the lower plane to their vertical uprights. Practically all of these features could be made out in the small photographs taken at Kitty Hawk and published and described by us several months ago.

The main planes are 40 feet long by $6\frac{1}{2}$ feet wide, and spaced 6 feet apart. Their supporting surface is 500 square feet. The horizontal rudder planes are 16 feet long by about $2\frac{1}{2}$ feet wide, their total surface being 75 square feet. The weight of the aeroplane without operator or supplies is about 800 pounds. With two men and a supply of fuel and water, it weighs about 1,150 pounds, which, if the area of the horizontal rudder is added to that of the main planes, gives a loading of the surfaces of but 2 pounds per square foot. As some of the recent French monoplanes carry from 3 to $3\frac{1}{2}$ pounds per square foot of supporting surface, it can be seen that the Wright machine is not heavily loaded, the consequence being that it can rise in the air and fly at a speed of 26 miles

oval. The planes are braced in all directions with piano wire. They are flexibly connected so that they can be warped slightly by cords passing through pulleys and connected to the levers.

The main points about the Wright machine are its simplicity and efficiency. The former is apparent by a glance at the photographs, which also show some reasons for the latter, such as the lack of a tail and the almost flat surfaces set at a very slight angle of incidence. While there are apparently a good many braces to make head resistance, nevertheless these are chiefly concentrated at one point in the center part of the machine where the resistance of the motor, radiator and men are met with anyway. Besides the ease with which the machine glides through the air for the reasons above mentioned, the Messrs. Wright claim that their screw propellers (which are of wood and about 6 feet in diameter), give very great efficiency. This is another of the chief reasons why they can propel their machine at such high speeds with so little horse-power. The chain drive from the motor to the propeller shaft is also a fairly efficient form of power transmission. As a result of these various causes, they have succeeded in attaining a speed of 44 miles an hour with about 25 horse-power, which shows that their machine is practically 100 per cent more efficient than the best of those made abroad. When the question of stability and safety is considered, however, this machine does not appear to so great an advantage. It is true that the transverse and longitudinal stability can be maintained with great ease by the