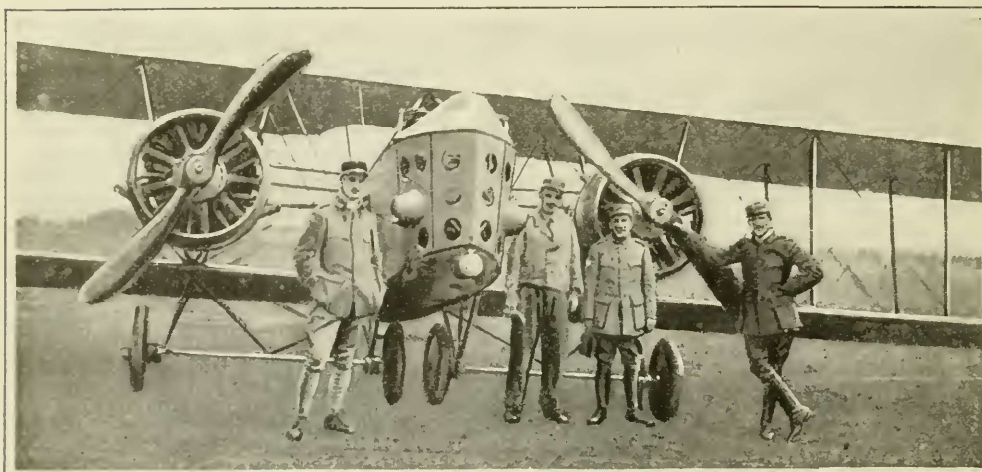


Portholes in an Airplane Hull

The engines are carried separately and the pilot occupies the fuselage alone



A Real Aero-Cruiser with an Enclosed Cabin to Shelter the Crew

This new Morane-Saulnier biplane carries two machine-guns and three passengers. Note that the engines are carried not in fuselage or body, as usual, but are in-

dependent of it. The fuselage itself is provided with portholes to admit light and to permit observation. The two funnels are used for taking photographs

EARLY in the war high-powered, weight-carrying airplanes appeared which were driven by two engines. But the engines were not housed in the fuselage or body in which the pilot sits, but were actually separated from it. The system has since been improved, as the accompanying photograph shows.

As soon as the engines are taken out of the central fuselage or body, new possibilities begin to appear. The designer has full liberty to shape his fuselage as he pleases. Since it no longer need house machinery, it becomes a regular ship's cabin with portholes.

In the accompanying photograph of the three-seated French two-engine biplane which has been designed by Morane-Saulnier works, the last stage in this development is presented. The plane itself is of rather average size, and yet it is driven by two light but high-powered rotary engines. It must be a speedy machine because of its sheer power and lightness. When the engines are taken out of the central fuselage and mounted between the planes at either side of that

fuselage, there is always a saving in structural weight. In the interest of high speed, the fuselage is made deep enough to enclose the three passengers completely so that they are well sheltered from the icy blast that accompanies fast flying at high altitudes.

But how are the men to see? Obviously by portholes. And so we find that the walls of the fuselage are pierced with some fourteen portholes covered with artificial mica (cellon).

Two of these portholes are set in curious short funnels projecting from either side. Obviously they are intended to give a lateral view. But the funnels, useless to an observer, serve to house a long-focus camera and to protect it from the wind. Thus it becomes possible to take photographs in any direction.

Most of the portholes are used to throw light into the fuselage; only the upper ones are needed for observation.

Of course such machines as these could not be used for fighting purposes as they are too unwieldy and too slow of handling.