

THE VICKERS "VULCAN" EIGHT-PASSENGER COMMERCIAL BIPLANE

360 H.P. Rolls-Royce "Eagle VIII" Engine

At the Weybridge works of Messrs. Vickers, Ltd., a new commercial aeroplane is nearing completion; in fact, by the time these notes appear, the first machine of the "Vulcan" class will probably have been put through its preliminary tests by Capt. Cockerell. As distinct from recent Vickers land machines of Mr. R. K. Pierson's design, the "Vulcan" is a single-engined biplane, although retaining in other respects many of the features which distinguish Vickers machines.

At the time of our visit to the works, the first of the "Vulcans" was not completed, and it has not, therefore, been possible to include in this description photographs of the machine. The scale drawings on p. 254, will, however, give a very good idea of the general lay-out. The first feature which one notices is the unusual depth of the fuselage, which extends right up to and serves as a support for the top plane. One result of this great depth is that in side view the fuselage looks somewhat stumpy, although the streamlining is uncommonly good. The width of the fuselage is not, of course, nearly so great, as will be seen from the plan view, and the resistance of the fuselage is probably very low.

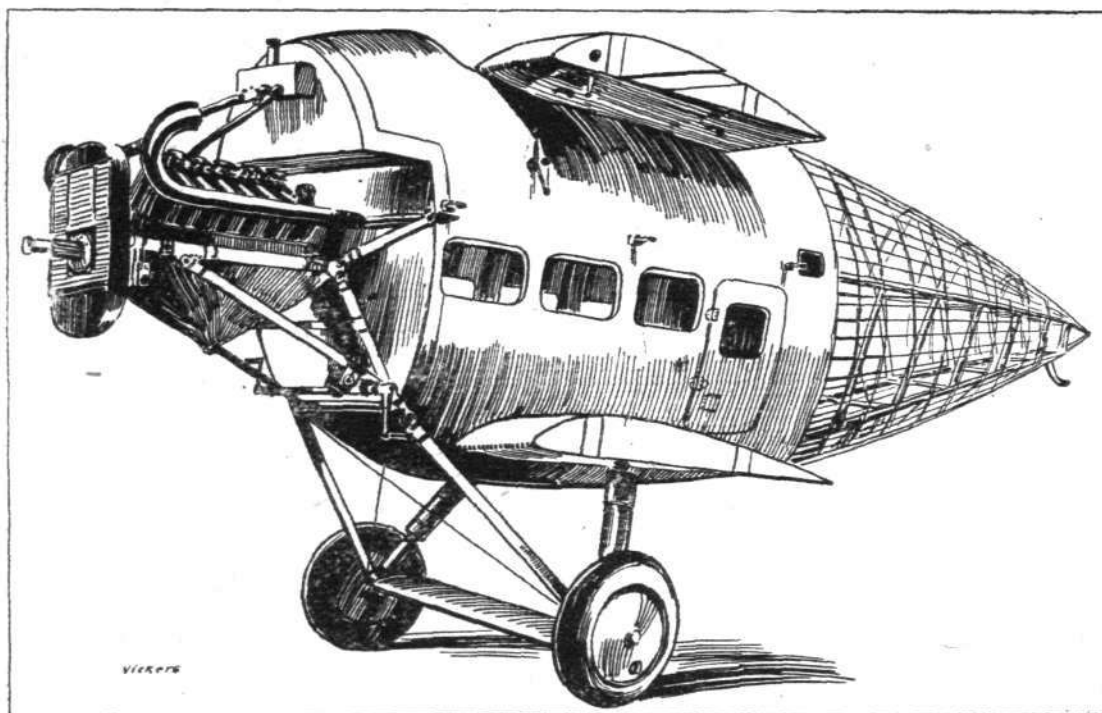
General Design

Although of considerable span—49 ft.—there is only one pair of interplane struts on each side. This reduction in the

expenditure is only 45 h.p. per passenger at full power, and a maximum speed of about 105 m.p.h. This should certainly bring the machine within sight of being able to show a profit without the aid of a Government subsidy. Furthermore, the low landing speed (about 40 m.p.h. on estimated figures) should make for safety, and should also enable the machine to get out of quite small fields. It is also possible that for a machine which lands so slowly, a lower insurance premium might be required, all of which are points in favour of the lightly-loaded and relatively slow commercial aeroplane.

The Fuselage

In the main, the fuselage construction is similar to that familiar from such Vickers machines as the Vimy-Commercial Vernon, Victoria, and Virginia. That is to say, the front portion, which forms the cabin, is of *monocoque* construction and elliptical cross-section, while the rear portion of the fuselage is a girder of *longerons* and struts, braced with tie rods. The wooden members of this girder are of the typical Vickers type, *i.e.* they are hollow tubes of wood. The manner of building up these tubes is very ingenious, and has been proved in practice to give great strength and resistance to hard wear. Each strut or *longeron* is built up of three pieces, spindled out from rectangular section strips to form a third of a circle. The three pieces are then glued together, with



The Vickers "Vulcan": Three-quarter front view of fuselage before engine cowl and fabric covering of rear portion are put on.

wing bracing has been made possible by the adoption of a thick section, high-lift wing. The actual section employed is one of the airscrew sections, No. 62, we believe, with flat bottom camber. The space available for spars is, therefore, considerable, and the long bays are further relieved by building up the wings as continuous beams. In the drawing, it will be noticed that the wing roots, both top and bottom, extend some distance out from the fuselage. The reason for this arrangement is that the joint between spar root and inner end of end section spar occurs at the point of contraflexure, where the bending moment is zero, and where, consequently, the fish plates of the joint have to resist shear only.

As regards general design, the "Vulcan" is a relatively low-powered weight-carrying commercial machine, in which economy in manufacture and operation have been given precedence over performance. Every endeavour has been made to make the "Vulcan" a truly commercial machine, and if it is not quite so fast as some modern commercial machines, it possesses other features which, in our opinion, more than outweigh the relatively low cruising speed of 90 m.p.h. To begin with, the machine carries eight passengers on one Rolls-Royce engine of 360 h.p., so that the power

tongues of hardwood, and the whole further strengthened by being bound with tape. At the ends, and, in the case of the *longerons*, where the strut fittings are attached, the three strips composing the tube are left solid, and the triangular space left is filled with a wood plug, making the *longeron* solid. The process of manufacture is, we understand, quite cheap, and, of course, for members which are loaded as struts the tubular section is the most efficient. The *longerons* work out very light, especially as they are of fairly large diameter, and the section thus has a large moment of inertia.

The sheet steel fittings are wrapped around the *longerons*, and in the "Vulcan" an improvement has been incorporated which allows of taking up any slack arising from shrinkage of the *longerons*. This is in the form of an aluminium packing piece on which the bolts are tightened up. If the *longeron* shrinks, as it might do to a certain extent in tropical climates, the bolts are removed and the packing piece replaced by a thinner one. The bolts are then put back and tightened up. The extreme rear portion of the fuselage of the "Vulcan" is a steel tube structure carrying the tail skid, and it terminates in a short transverse tube into which a tube or rod can be