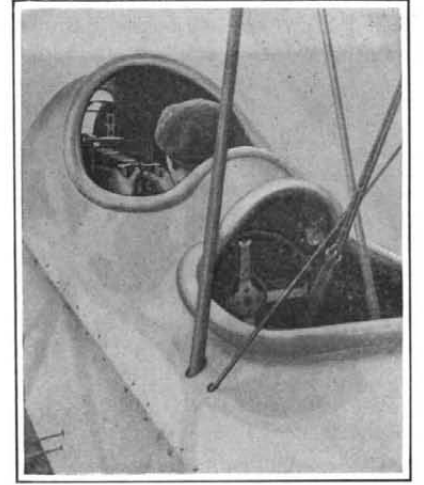


How the gun in the Vickers machine looks to the gunner.

## Novelties in Aeroplane Design

### A Sixty-Mile-an-Hour Gun-Carrying Biplane of Steel

### A Flying Machine Which is a Mechanical Equivalent of a Soaring Bird



The gunner in the Vickers machine sits in front of the pilot.

#### A Gun-carrying Biplane

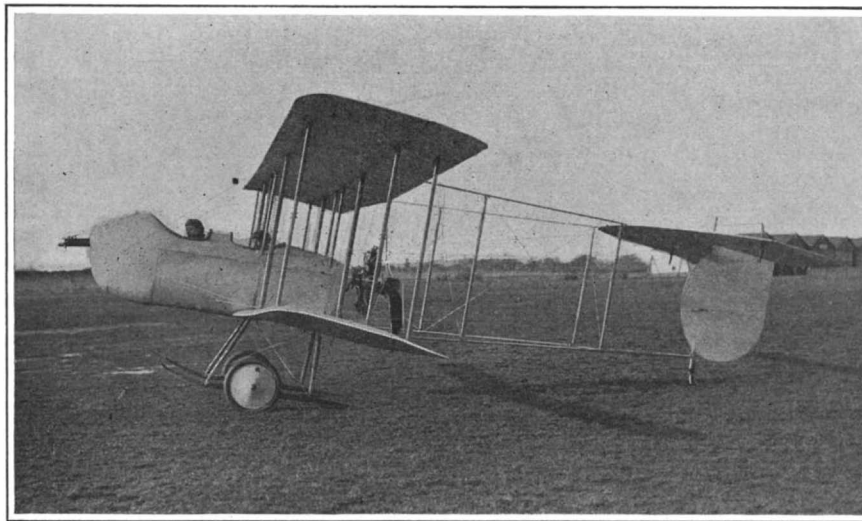
By Major H. Bannerman-Phillips

UP to the present progress in aeronautics, from the military point of view, has been directed mainly toward obtaining the best possible method of aerial transport for purposes of reconnaissance, although the question of offense, by means of guns and dropped projectiles, has not been lost sight of, and many experiments have been made with both airships and aeroplanes, though with results which can hardly be called conclusive, in so far as they concern fighting in the air between aircraft. There are many who still hold that the business of the latter is scouting, and that, for the present at any rate, speed is more essential than ability to attack, since the fast light scout will have the advantage of the armed machine, which, having to carry a gunner besides guns and ammunition, is bound to be heavy and slow in pursuit, and will not be able to get within range of the fugitive, the single occupant of which will obtain all the information which it is possible for an overhead observer to get, in spite of threatened opposition.

Others again hold that the opposition of the fighting aeroplane will be effective to prevent other aircraft from prosecuting a successful reconnaissance, and that, if information is to be obtained, it will have to be fought for in the air.

The fighting aeroplane is being evolved to suit the latter view, and, although we have nothing definite, in the way of past experience, to go upon, it is none the less interesting to watch the evolution of the avowedly militant types of aircraft which are now being built, and which are especially designed to carry a gun, and one of these is the Vickers fighting biplane, which is shown in the accompanying illustrations. It is designed for weight carrying and for a variable speed of from 40 to 70 miles per hour. The machine, so far as tests show up to date, has flown at speeds varying between 45 and 66 miles per hour. Messrs. Vickers, Limited, as a large armament firm, have every reason to know the value of steel in construction, and they have used it throughout in building this biplane, except as regards the main wing spars and two wooden struts in the landing carriage, the reason for this being that, although wood is not actually more elastic than steel, it will, in practice, bend to a greater extent and spring back again, without acquiring a permanent "set." In the later type of this machine, stabilizing flaps are used on the wings, instead of warping the whole wing. The gun is a small Vickers automatic gun, covered in front by a hemispherical shield, which is mounted on the barrel and moves

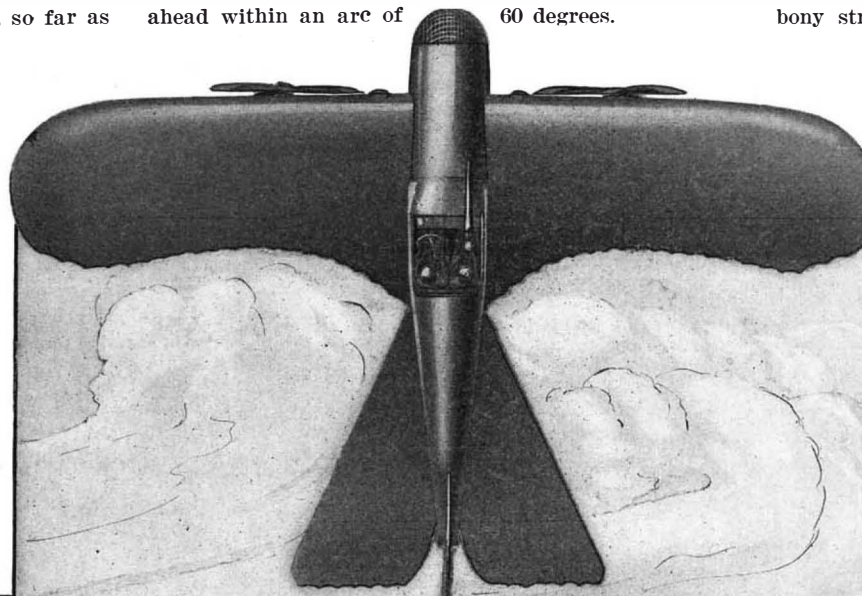
with it. The shield is provided with mica windows, to protect the gunner's eye from the draught of wind caused by the rapid movement of the machine through the air. The muzzle projects through the nose of the fuselage, which itself is entirely covered in, and is carried well forward of the wings. Those who understand the handling of such a gun will appreciate the fact that this is an ideal position for it, affording the utmost obtainable range of view and facility for traversing



The new Vickers gun-carrying biplane.

right and left, and for elevation and depression. This gun-position, of course, involves the necessity for the biplane itself to be of the "pusher" and not of the "tractor" type.

The requirements of the British military authorities are complied with, namely, that the machine gun shall have a clear field of fire in every direction up to 30 degrees from the line of flight, or, in other words, that the man behind the gun should be able to fire directly ahead within an arc of 60 degrees.



#### Analytical Comparison of the Bird and Monoplane

By James F. Blanchard, D.O., M.D.

FROM the dawn of time man's greatest desire has been to follow the birds through space; but not until the present gasoline motor made its appearance has that longing been realized.

If the minds that developed these wonderful machines which carry us through the air like the birds had kept away from the box-kite idea and followed more closely the anatomy of our feathered friends, the writer (who, by the way, is a physician, but one who has spent considerable time along mechanical lines) believes that more rapid progress would have been made in both pleasure and commercial air-craft.

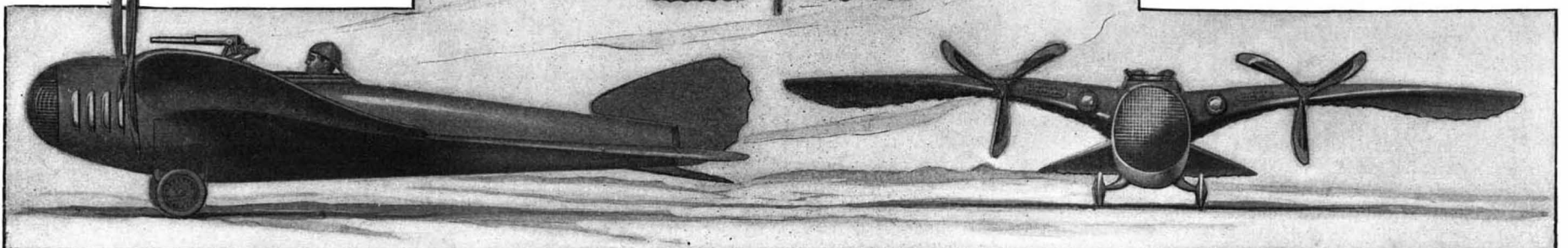
His interest was greatly stimulated along these lines while spending a winter in Florida, several years ago. The birds of that part particularly interested him, and from these came his inspiration to build more closely along Nature's lines. The gull furnished him with the thought for the water plane, and the buzzard the idea of the land craft. His experience with the anatomy and physiology of these creatures he applied to his experiment, and the results were very gratifying.

After months of exhaustive investigation it was found that the structure of the present-day machines was weak and contrary to the laws of Nature as represented by the original denizens of the air.

It was plain to see that the mechanical bird, to be a success, must be a duplicate of Nature's air-craft, and in order that success shall be obtained, the principles of physiology and anatomy must be applied to this structure.

Pressed steel in suitable form is substituted for the bony structure of the bird. This forms the fuselage, rear appendages, main planes, and landing chassis. Trussing of light steel-tubing and laminated wood give a fine substitute for muscles, tendons, and ligaments. Fire-proof cloth, sheet steel, and aluminium take the place of skin and feathers. The motor and radiator are substituted for heart and lungs; water, gasoline, and the oiling system for the lymphatics and vascular system; steering-wheel and controls for the nervous system. The special senses are represented by searchlights, wireless, and an efficient aviator. The flexor surfaces of the wings and tail-appendages are strengthened proportionally to extensor surface, according to the functions they have to perform. In this construction, strength and lightness are

(Concluded on page 472)



A monoplane built to imitate a bird.