

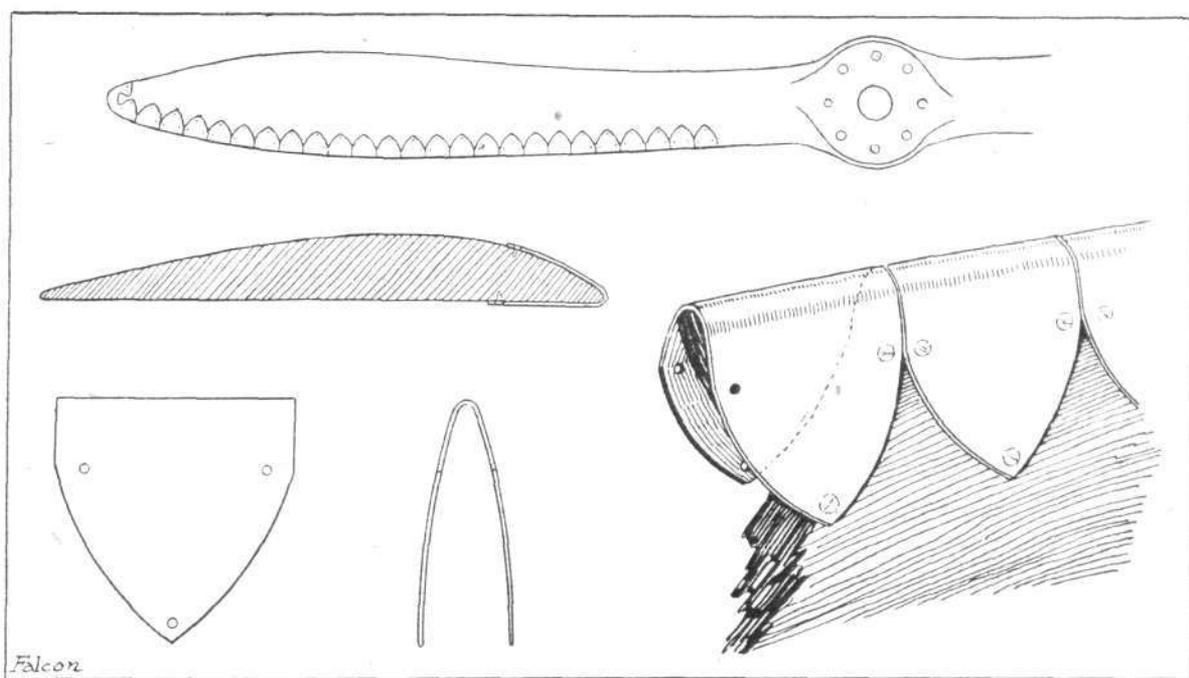
## THE FALCON METAL-TIPPING SCHEME FOR AIRSCREWS

PERHAPS one of the biggest items in the maintenance of an aeroplane, especially in commercial services, is the airscrew. In fact, it is quite surprising when one considers how comparatively short is the life of an airscrew on the average—quite apart from the question of accidental breakages. It is, of course, well known that at high speeds of rotation the blades of wooden air screws are subject to a certain amount of deformation, as a result of which the true shape of the leading edge is more or less altered, with a loss of efficiency in consequence. With the object of overcoming this trouble, it has been the usual practice for some time past to reinforce the leading edge of each blade with metal. This generally takes the form of a single narrow strip of sheet brass, bent to a V-shape in cross-section, which fits over the leading edge for varying lengths from the tip—which is usually completely covered. The metal is hammered to a close fit on to the blade, and secured in place by screws or rivets. While this undoubtedly strengthens the blade and protects the leading edge, it has the following disadvantage. Inasmuch as the wood of the blade is comparatively flexible, whilst the metal

covering we have one possessing a certain amount of flexibility, like the shell of a lobster, which can accommodate itself to the flexing of the blade without any tendency to buckle. The accompanying sketches show this arrangement quite clearly.

These sections can be formed by stamping out blanks, more or less diamond-shape, with the corners suitably rounded off, from sheet metal, the blanks then being bent over at the middle to give the V-section corresponding as near as possible to the angle of the leading edge. The clips thus formed are fitted on to the latter, and secured in the usual way by screws or rivets. It should be noted that owing to the pointed shape of these clips, a greater depth of blade reinforcement is obtained for the same weight than is the case with the single strip of metal.

In order to facilitate the stamping, or cutting out of the blanks, and prevent waste, a series of these joined together could be formed in a single strip, and then separated before or after bending. From a production point of view this system possesses considerable advantage over the old method,



**THE FALCON METAL-TIPPED AIRSCREW:** Our sketches show the general principle of this new system of metal reinforcement for airscrews. At the top is a complete blade with reinforcing clips in position. Below, on the left, a section of the blade and side and end elevations of a clip. On the right a detail view of the clips in position.

is to a certain extent rigid, there is a continual difference of opinion between the two at high rotation speeds. As a result of this it has been found in practice that in a very short time the metal buckles, and when this occurs it means, to all intents and purposes, a scrapped airscrew. The fact that the metal is often hammered in position over the blades must and does mean that the metal is thereby hardened somewhat, so that being brittle it will give rise to trouble all the sooner.

An attempt has been made to remedy this buckling by introducing transverse saw-cuts in the metal strip, but this has not met with any great success. It would seem, however, that in the invention of Mr. David Morgan Davies, of the Falcon Airscrew Co., 113, Cottenham Road, London, N. 19, a successful remedy is available, and one so simple that it is extraordinary that it has not been thought of before now.

Briefly, the principle of this new scheme is as follows. The leading edge of each airscrew-blade is reinforced by a plurality of separate sections or clips of metal, which are secured side by side along the leading edge of the blade, and, if necessary, the tip. Thus, instead of the rigid strip of metal

in spite of the fact that there are a number of units to be individually fitted. The clips are much easier to fit, and, what is more important, the metal is not rendered brittle by constant hammering in fitting.

Another advantage is that an effective securing of the clips to the blades is obtained owing to the fact that the apex of each limb of the clip extends sufficiently far back from the leading edge of the blade—the depth of the single strip hitherto employed being limited on the score of weight—as to enable the innermost holding-down screw to obtain a firm grip in a comparatively thick portion of the blade.

The clips need not, of course, necessarily be confined to the shape shown in the accompanying sketches, and a strip of two or more clips joined together can also be attached to the blade if desirable—near the boss, for instance.

We understand that this system of reinforcement has already given very satisfactory results in actual practice, some airscrews so fitted being employed on the London-Continental services. It is certainly a scheme well worth investigation, and we will watch its progress with interest.

### Review of Airscrew Theories

THIS was the title of a paper read by Major A. R. Low before the Royal Aeronautical Society on November 2. The paper was of a highly technical nature, as was naturally unavoidable in dealing with the subject of airscrews, and

was one which did not lend itself to publication in condensed form. As space does not permit of publishing the paper in full, we would advise readers interested in the subject to obtain a copy of the next issue of the *Aeronautical Journal*, which will doubtless contain Major Low's excellent paper.