The present invention deals with a structure of airplane wings and seeks to develop a form of wing which may be assembled from stock parts by means of relatively unskilled labor and operations.

It is also an object of my invention to reduce the number of different parts used in the assembly of such wings, thus facilitating the replacement of damaged parts.

I have also found that a wing assembled in the manner hereinafter described is an improvement upon former practice by reducing the weight of the parts while at the same time increasing their mechanical strength. The time consumed in fabrication is also materially lessened with consequent reduction in costs.

By way of example I have shown one form of my invention on the accompanying drawings, in which—

Fig. 1 is a perspective view of my improved wing structure;

Fig. 2 is a longitudinal vertical section on the line 2—2 of Fig. 1;

Fig. 3 is a perspective view of the transverse spars; and

Fig. 4 is a vertical section on the line 4—4 of Fig. 1.

A preferred form of wing structure embodying my invention and illustrated by way of example in the drawings, consists of a plurality of wing sections 5—5 of identical character. Each section is built up from a pair of longitudinal ribs. The end rib 6 is made of flat sheet metal or analogous material and may be termed blank as it is not perforated or cut out to reduce weight.

The intermediate ribs 7 are punched out to form the openings 8—8 as shown in Fig. 2 and further strength may be given the ribs by transverse corrugations where desired. The contour of the ribs is that of a stream line as is customary.

Adjacent ribs 6 and 7 are held in spaced parallel position by the intermediate transverse spars 9 and 10. The forward spar 9 is shown to be formed from sheet metal having a rear portion 11, a bottom 12, a front wall 13 and a top 14. The edge between the rear wall 11 and the top 14 is riveted as shown in Fig. 3 and thus forms a hollow tubular sheet metal spar. While I have shown this to be made from a single piece of sheet metal, convenience may require its manufacture from several pieces or even by molding, casting in desired cross section such as round, oval, oblong, triangular, rectangular or I-shaped.

The free ends of the spar 9 are open and surrounded by upstanding flanges 15—15 which extend at right angles to the planes of the adjacent walls of the spar. These flanges are perforated as at 16 to accommodate the rivets by which the several parts are assembled. It will be noticed that the top 14 conforms in its slope to the adjacent cover of the wing section.

The flanges at the edges of the rear wall 11 carry at their opposite ends the corner plates 17, 17 which are also punched to receive rivets that pass through the openings 16 of the flanges. The plates 17 have lateral extensions 18 with eyes 19 by which the corner bracing is attached.

The rear spar 10 is formed in the same manner as has been described for the front spar 9 with the exception that the top wall 20 slopes to the rear and is attached by rivets or other fastenings to the front wall 13 rather than to the rear wall 11. Similar flanges 15—15 form upstanding parts of the free ends of the tubular members. The corner plates 17—17 are mounted upon the front flanges 15 in the manner already described.

Diagonal bracing members 21, 22, 23 and 24 extend between the corner fittings 17, 17. Each bracing member carries a turn-buckle 25 by which the desired tightness may be given or they may be rigid such as tubes or solid members and have integral fittings.

The framework built up from the ribs 7 and the transverse spars 9 and 10 is covered by means of longitudinal sections 26—26 that may consist of formed sheet metal, wood, cloth, or a combination of either two. The connection between the spars on opposite sides of a single rib is in the form of bolts 26 or rivets 27 which pass through the intermediate rib. The side edges of the sections of the cover 26 are likewise flanged to meet the edges of the ribs 7. In this manner a cover strip 28 may be placed over the adjac-
cent edges of the rib 7, the flanges 15, 15 and the corresponding flanges 29, 29 of the cover 26. The rivets 27 may thus serve to bind the cover strip in place and at the same time hold the parts above mentioned in firm contact.

As many sections may thus be assembled as the design of the plane demands. The maximum rigidity is accomplished between the several sections by reason of the form of the transverse spars, the connection of opposite spars through the intervening ribs and the internal bracing between the spars of each rib section. The design permits the quantity production of a minimum of parts and at the same time the easy assembly into the final form. Where any part requires replacement by reason of damage or other defect only the section involved need be disturbed and by reason of the standardization of parts the minimum of time and labor is required in the replacement.

While I have described the preferred form of my invention it will be readily apparent that the same is not limited to the form described but the scope of the invention will provide for minor variations in details and proportions within the scope of the appended claims.

What I claim is:

1. In an airplane wing, a pair of longitudinal ribs, a pair of transverse tubular spar sections having end flanges in abutting engagement with the ribs, bracing means between opposite end flanges of the spar sections, a cover extending between the ribs and cover strips over the edges of the ribs.

2. An airplane wing section having a cover, a parallel longitudinal rib on each side of the cover, rigid tubular sheet metal spar sections therebetween, flanges on the ends of the spar sections and means connecting the flanges to the ribs.

3. A sectional airplane wing comprising cover sections, parallel longitudinal ribs between adjacent cover sections, rigid tubular sheet metal spar sections therebetween, flanges on the ends of the spar sections and means connecting the flanges of adjacent spar sections through the intervening rib.

4. A sectional airplane wing comprising cover sections, parallel longitudinal ribs between adjacent cover sections, rigid tubular sheet metal spar sections extending transversely between the ribs and flanges in abutting relation thereto.

5. A sectional airplane wing comprising cover sections, parallel longitudinal ribs between adjacent cover sections, a plurality of rigid tubular sheet metal spar sections extending transversely between each pair of ribs and flanged thereto.

6. A sectional airplane wing comprising cover sections, longitudinal ribs between adjacent cover sections, a plurality of rigid tubular spar sections extending transversely between each pair of ribs, means connecting the spar sections to the ribs and means for bracing the device between the spar sections.

In testimony whereof, I affix my signature.

WM. C. LAMBERT.