Feb. 13, 1923. 1,445,454.

H. O. SHORT.

CONSTRUCTION OF WINGS AND LIKE PARTS OF AEROPLANE FLYING MACHINES AND OTHER AIRCRAFT

FILED SEPT. 11, 1922. 2 SHEETS—SHEET 1.

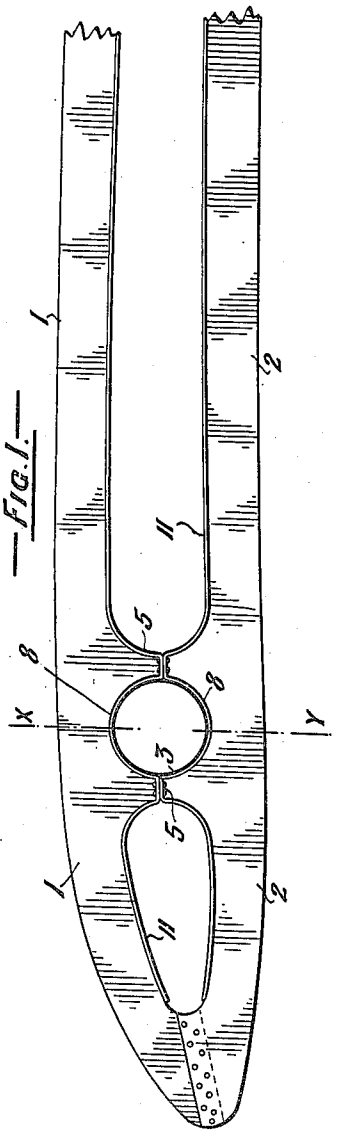


FIG. 1.

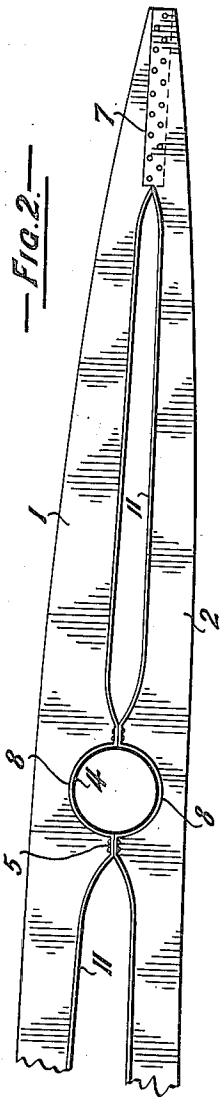


FIG. 2.

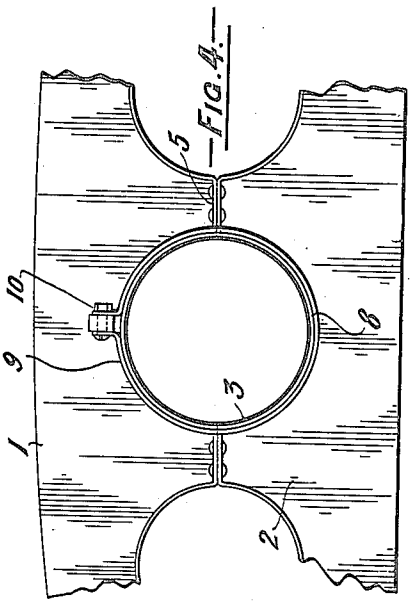


FIG. 4.

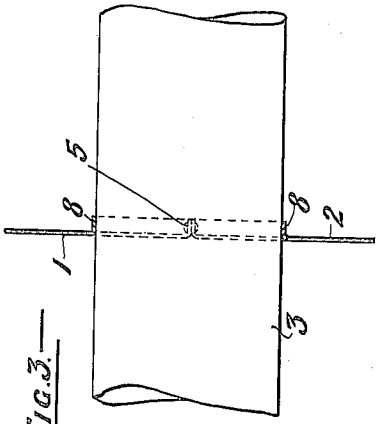


FIG. 3.

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FILED SEPT. 11, 1922. 2 SHEETS—SHEET 2.

FIG. 5.

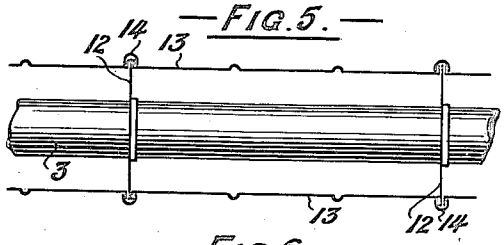
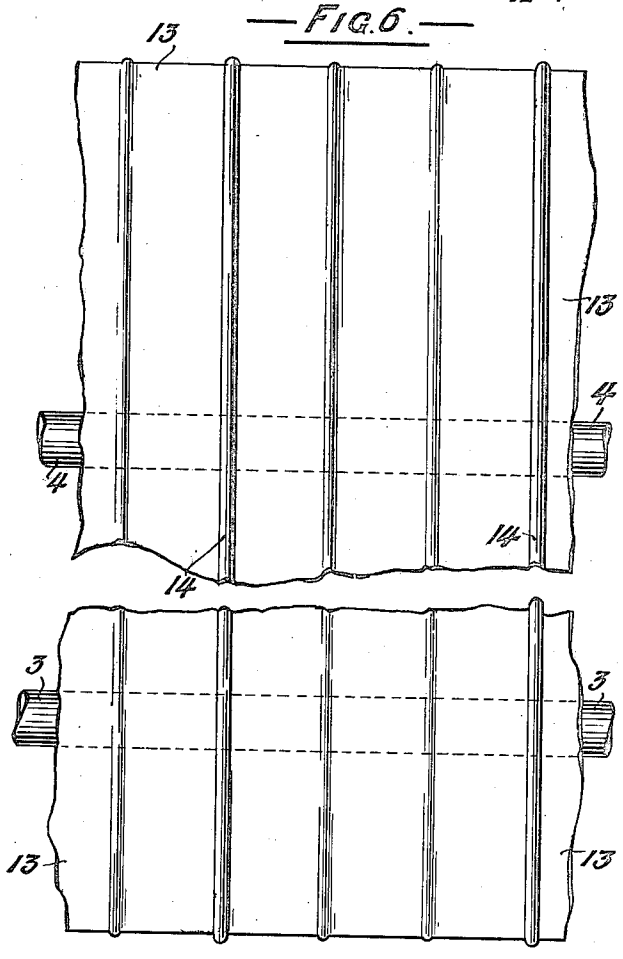


FIG. 6.



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Patented Feb. 13, 1923. 1,445,454

UNITED STATES PATENT OFFICE.

HUGH OSWALD SHORT, OF ROCHESTER, ENGLAND.

CONSTRUCTION OF WINGS AND LIKE PARTS OF AEROPLANE FLYING MACHINES AND OTHER AIRCRAFT.

Application filed September 11, 1922. Serial No. 587,559.

To all whom it may concern:

Be it known that I, HUGH OSWALD SHORT, a subject of the King of Great Britain, residing at Norfolk Lodge, Borstal Road, Rochester, Kent, England, have invented certain new and useful Improvements in or connected with the Construction of Wings and like Parts of Aeroplane Flying Machines and other Aircraft, of which the following is a specification.

In wings and like parts (hereafter termed wings) of aeroplane flying machines and other aircraft as at present constructed, the ribs which extend in the direction of flight are built or are threaded upon the spars of the wings and permanently fixed in position thereon, said spars extending transversely through the ribs, and should it become necessary to remove one of the ribs owing to it being damaged, it is common practice to remove those ribs from the spars which are located between the damaged rib and the ends of the spars, before a new rib can be placed in position, and such a proceeding obviously entails considerable labour, expenditure of time, and expense.

Now the object of the present invention is to enable damaged ribs in the wings of aircraft to be replaced by new ribs without calling for the removal of adjacent ribs, which remain undamaged, from the spars.

According to this invention, the rib is formed of two separable sections, being divided about centrally in the direction of its length, the sections having coinciding recesses at their meeting parts, the recesses being so formed and in such positions as to receive the spars when said sections of the rib are brought together from above and below said spars. Thus when one section of the rib is placed upon the spars so that the latter are partly received in the recesses of that section and the other section or part has been placed in proper conjunction with the first section or part and the two sections are secured together, the rib will then completely embrace the spars, which pass through it.

The invention, which is particularly applicable for the construction of ribs of sheet metal, will now be described with reference to the accompanying drawings.

Fig. 1 is a side elevation of the front portion of a rib, Fig. 2 is a similar view of the rear portion of the said rib shown fitted to the front and rear spars, and Fig. 3 is a transverse section on the line X—Y of Fig. 1.

Fig. 4 is an elevation of a portion of a rib at one of the spars, showing a device for holding the parts of the rib to the spars hereafter described.

An application of the particular ribs which are illustrated in the preceding figures to the wing of an aeroplane flying machine is shown by way of example at Figs. 5 and 6, where Fig. 5 is a vertical section taken transversely of the wing in the direction of flight, and Fig. 6 is a part plan view of Fig. 5.

Referring to Figs. 1, 2 and 3, the rib, which is illustrated as constructed of sheet metal, is divided about centrally in the direction of its length into two sections 1, 2, said section having recesses at their meeting parts, said recesses being so formed and in such positions as to receive the front and rear spars 3, 4 when said sections 1, 2 are brought together from above and below said spars 3, 4, and means are employed, such as rivets, for connecting the meeting parts of the said sections 1, 2 of the rib together.

For the purpose of this description it will be assumed that the spars 3, 4 are of metal tube and are circular in cross section, and in this connection the lower section 2 of the rib is formed with a semi-circular gap to receive a part of each spar 3, 4, and similarly the upper section 1 of the rib is formed also with a semi-circular gap for each spar, so that when the lower section 2 of the rib is brought up to the spars 3, 4 the spars will enter the gaps in the lower section of the rib 2, and then the upper section 1 of the rib is brought down upon the spars 3, 4 so that the spars are wholly embraced between the two sections of the rib.

The contacting edges of the two sections 1, 2 of the rib are formed with flanges 5 as shown, and the ends of the two sections 1, 2 of the rib can then be constructed to overlap as at 6, 7 and can be riveted together; or obviously the edges at the forward and rearward parts of the rib could abut upon each other and be held together by a cover plate riveted to the respective parts.

The edges of what have been termed semi-circular gaps in the ribs to receive the spars are preferably flanged as at 8, so that when

the two sections of the rib are brought together the flanges 8 embrace the spars 3, 4, as is clearly shown at Fig. 3.

When thus constructed with the flanges 8 embracing the spars, a clamping band 9, as shown at Fig. 4, may be fitted, consisting of a strip of metal which embraces the flanges 8 of the two sections 1, 2 embracing the spar, and the ends of the clamping band 9 are secured together as by the bolt 10 (Fig. 4) and tightened up, and so the clamping band 9 serves to hold the two sections 1, 2 of the detachable rib in position upon the spars and facilitates the work of securing the two sections 1, 2 together as above described, that is holding the sections together while the flanges 5 and the joints 6, 7 of the ribs are riveted together. In order to decrease the weight, gaps such as 11 may be formed in the web of the rib, and the edges of such gaps are preferably flanged as indicated.

The detachable ribs, which have been shown by way of example in the accompanying drawings, are, as previously mentioned, preferably constructed from strips of sheet metal, and in some cases the upper and lower edges of the ribs may be provided or formed with flanges by bending the upper and lower edges of the ribs, or by riveting angle section strips thereto so as to constitute upper and lower booms. The ribs, however, as shown on the drawings, are particularly applicable to all-metal wings, such as have been heretofore constructed by myself, and at Figs. 5 and 6 a construction is shown where ribs of the kind described are illustrated as applied to a wing constructed of sheet metal.

At Fig. 5, two ribs 12, such as described, are illustrated, the front and rear spars 3, 4 (Fig. 6) passing through the ribs. The outer covering of the wing is then applied, such outer covering consisting of strips 13 of sheet metal extending in the direction of flight, each strip 13 having flanges at its side edges so that the edges of the ribs 12 become interposed between the adjacent flanges of the covering sheets 13, channel section strips 14 of sheet metal are then passed over and cover the flanges of the sheet metal strips 13 of the covering and the interposed edges of the ribs, and the whole are then riveted together.

What I claim as my invention and desire to secure by Letters Patent is:—

1. In aircraft wings and like parts comprising spars extending transversely of the line of flight, ribs fixed to said spars and extending at right angles to the length thereof, and a covering for said wings; ribs, each divided about centrally in the direction of its length into two sections, said sections having recesses at their meeting parts so shaped and in such positions as to receive and embrace said spars when said sections are brought together from above and below said spars, and means for connecting together the meeting parts of said sections.

2. In aircraft wings and like parts comprising spars extending transversely of the line of flight, ribs fixed to said spars and extending at right angles to the length thereof, and a covering for said wings; ribs constructed of sheet metal, each divided about centrally in the direction of its length into two sections, said sections having recesses at their meeting parts so shaped and in such positions as to receive and embrace said spars when said sections are brought together from above and below said spars, flanges on the meeting edge of each section adjacent said recesses to contact with each other when said sections are applied to said spars and brought together, and means for connecting said contacting flanges to each other.

3. In aircraft wings and like parts comprising spars extending transversely of the line of flight, ribs fixed to said spars and extending at right angles to the length thereof, and a covering for said wings; ribs constructed of sheet metal, each divided about centrally in the direction of its length into two sections, said sections having recesses at their meeting parts so shaped and in such positions as to receive and embrace said spars when said sections are brought together from above and below said spars, flanges formed around the edges of said recesses in said sections to bear upon said spars, flanges on the meeting edge of each section adjacent said recesses to contact with each other when said sections are applied to said spars and brought together, and means for connecting said contacting flanges to each other.

4. In aircraft wings and like parts comprising spars extending transversely of the line of flight, ribs fixed to said spars and extending at right angles to the length thereof, and a covering for said wings; ribs constructed of sheet metal, each divided about centrally in the direction of its length into two sections, said sections having recesses at their meeting parts so shaped and in such positions as to receive and embrace said spars when said sections are brought together from above and below said spars, flanges formed around the edges of said recesses in said sections to bear upon said spars, flanges on the meeting edge of each section adjacent said recesses to contact with each other when said sections are applied to said spars and brought together, each of said sections having further recesses to form apertures therethrough when said sections are brought together, and flanges around the edges of said apertures, said apertures extending through said rib about centrally of the length thereof from adjacent one spar

to adjacent the other spar, and from adjacent each end of said rib to adjacent each spar, means for connecting said contacting flanges of said sections adjacent said spars to each other, and means for connecting the forward and rearward ends of said sections together.

5. In aircraft wings and like parts comprising spars extending transversely of the line of flight, ribs fixed to said spars and extending at right angles to the length thereof, and a covering for said wings; the combination with ribs constructed of sheet metal each divided centrally in the direction of its length into two sections, said sections having recesses at their meeting parts so shaped and in such positions as to receive and embrace said spars when said sections are brought together from above and below said spars, and means for connecting together the meeting parts of said sections; of a sheet metal outer covering, said outer covering comprising strips of sheet metal extending in the direction of flight, each strip having outwardly bent extending flanges at its side edges to contact with said ribs adjacent the edges thereof, channel section strips of sheet metal passing over and covering said flanges of said sheet metal strips and said interposed edges of said ribs, and means for connecting together said channel section strips, said flanges of said covering strips and said interposed edges of said ribs.

In witness whereof I have hereunto set my hand in the presence of two witnesses.

HUGH OSWALD SHORT.

Witnesses:

JAMES HENRY WOOD,

HENRY MILTON RELPH.