Feb. 14, 1939. K. SCHMIDT 2,146,768

AIRPLANE WING RIB CONSTRUCTION

Filed March 9, 1938

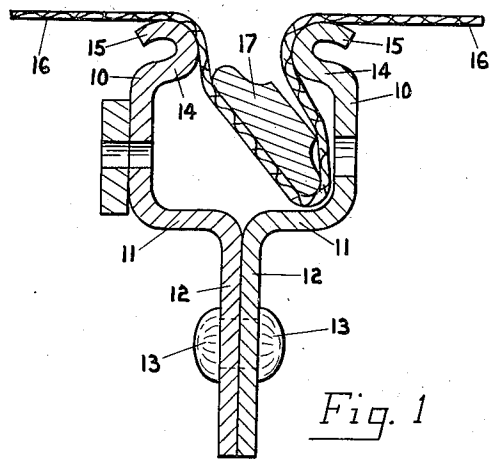


Fig. 1

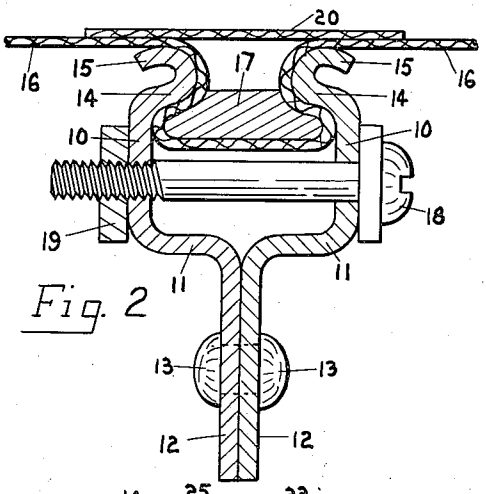


Fig. 2

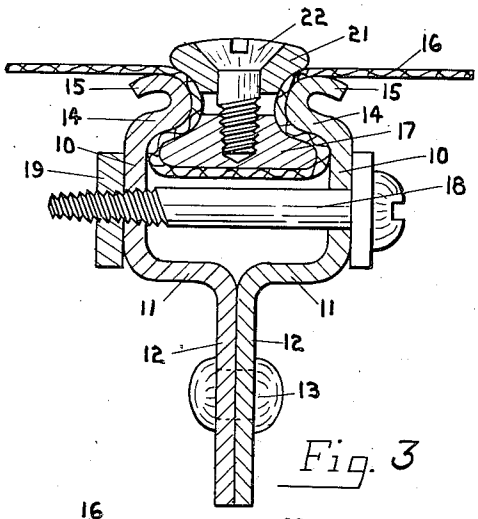


Fig. 3

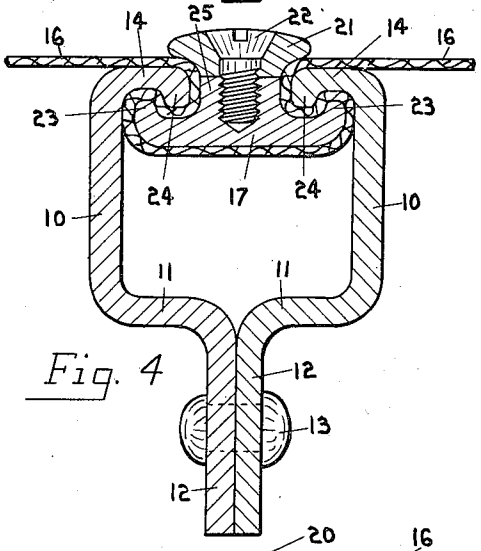


Fig. 4

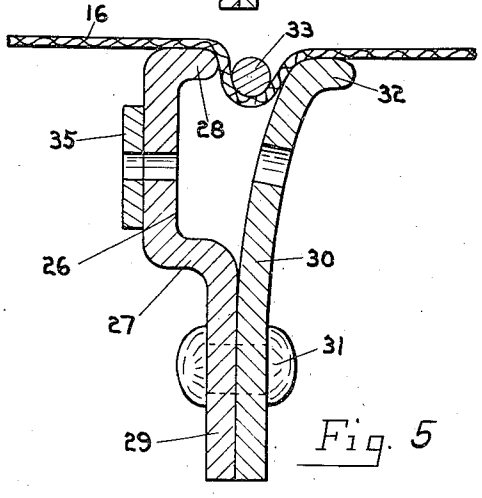


Fig. 5

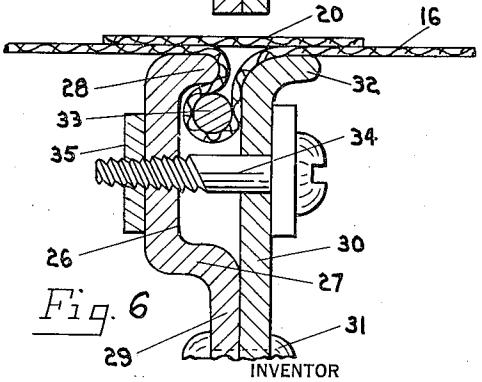


Fig. 6

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AIRPLANE WING RIB CONSTRUCTION

Karl Schmidt, United States Navy

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8 Claims. (Cl. 244—132)

(Granted under the act of March 3, 1883, as amended April 30, 1928; 370 O. G. 757)

This invention relates to airplane ribs and it has a particular relation to the capstrip portions thereof to which the envelope or covering is secured.

Heretofore it has been the practice to attach the fabric covering of an airplane wing to the capstrip of the rib member by a lacing cord looped around the capstrip and cover and knotted at intervals. In this method the fabric cover is stretched over the airfoil frame in contiguous relation to the capstrips of the rib members after which the usual reenforcing tape of a width equal to the capstrip is placed on the cover over the entire length of the capstrip and the two secured thereto by the lacing cord which is looped tightly around the capstrip at intervals.

The principal object of this invention is the provision of an airplane wing rib which is so constructed that the fabric covering may be attached thereto continuously throughout the entire length of the rib, thus avoiding localized strains and insuring that the covering is stretched tightly with evenly distributed tension so that the full strength of the cover fabric may be developed.

Another object of the invention is the provision of an airplane wing rib and a cooperating cover fastening device by means of which the fabric covering, when attached to the wing, will present a smooth cambered surface of high aerodynamic efficiency.

A further object of the invention is to provide means of attaching the fabric wing covering continuously over the full length of the airplane wing rib, the fabric covering neither being cut nor pierced with holes to effect the attachment.

With these and other objects in view, as well as other advantages that may be incident to the use of the improvements, the invention consists in the parts and combinations thereof hereinafter set forth and claimed, with the understanding that the several necessary elements constituting the same may be varied in proportion and arrangement without departing from the nature and scope of the invention, as defined in the appended claims.

In order to make the invention more clearly understood, there are shown in the accompanying drawing, means for carrying the invention into practical use, without limiting the improvements in their useful application to the particular construction, which, for the purpose of explanation, have been made the subject of illustration.

In the accompanying drawing:

Fig. 1 is a vertical transverse sectional view through a capstrip constructed in accordance with the invention and illustrating the manner in which the locking strip and fabric is positioned therein;

Fig. 2 is a similar view showing the lock strip in its final or fabric securing position; and

Figs. 3 to 6 are similar views of different forms of the invention.

Referring to the drawing and particularly to Figs. 1 and 2 thereof, the capstrip of a rib or other frame structure embodying the invention, is shown as comprising two channel members 10 having inner flanges 11 terminating in inwardly extending parallel flanges 12 secured together by rivets 13 and outer flanges 14 terminating in oppositely curved edges 15 which constitute the support for the fabric covering 16. The fabric 16 is secured between the channel members 10 by means of a locking strip 17 while the fabric is under an initial tension. The load-strip 17, being of greater width than the space between the flanges 14, it is tilted slightly, as indicated in Fig. 1, after which it is leveled and drawn outwardly by the fabric until the latter is gripped firmly between the locking strip and the flanges 14, as shown in Fig. 2. The channel members 10 are clamped together by means of self-tapping screws 18 which are threaded into a tapping plate 19. The opening between the flanges 14 is covered by tape 20 which is dope cemented to the fabric 16 so as to provide a smooth surface of low wind drag.

The capstrip structure shown in Fig. 3 is substantially the same as that above described with the exception that the tape 20 is omitted and a metal load-strip 21 secured in the space between the flanges 14 by screws 22 threaded into the locking strip 17.

In Fig. 4 a capstrip structure is illustrated which is quite similar to that shown in Fig. 3 except that the clamping bolt 18 is omitted. In this construction the channel members 10 are prevented from separating under strain by forming the locking strip 17 with outwardly curved edges 23 which interlock back of inwardly curved edges 24 formed on the outer flanges 14 of the channel members 10. Also, in this construction the locking strip 17 is formed with a longitudinal rib 25 which extends outwardly between the inwardly curved edges 24 of the flanges 14 for abutting engagement by the load-strip 21.

Figs. 5 and 6 show a construction in which the capstrip is formed with a channel 26 on one side thereof having inner and outer laterally extending flanges 27 and 28, the former merging into an inwardly extending flange 29. The channel 26

is normally closed by a resilient plate 30 which is secured to the flange 29 by rivets 31. This plate is formed with a laterally extending outer flange 32 which cooperates with the outer flange 28 in providing a supporting surface for the covering 16. In securing the covering 16 to the capstrip, the plate 30 is flexed laterally as shown in Fig. 5 and the covering 16 forced into the channel 26 by a locking member in the form of a rod 33 after which the plate 30 is clamped in the position shown in Fig. 6 by self-tapping screws 34 which are threaded into a tapping plate 35. The sealing tape 20 is next cemented to the covering and the entire surface applied with the usual dope varnish.

The structures hereinabove described may be further modified in proportion and arrangement of the parts by those skilled in the art without departing from the nature and scope of the invention as defined in the appended claims.

The invention described herein may be manufactured and/or used by or for the Government of the United States of America for governmental purposes without the payment of any royalties thereon or therefor.

I claim:

1. An airplane wing rib construction comprising a capstrip to which a covering is adapted to be secured, said capstrip embodying a channel member having overhanging flexible side flanges, a locking strip disposed within said channel beneath said overhanging flanges for gripping the covering therebetween and beneath which the covering extends when gripped thereby, and means for clamping said flanges together to maintain said locking strip against displacement.

2. An airplane wing rib construction comprising a capstrip to which a covering is adapted to be secured, said capstrip embodying a channel member having overhanging side flanges, a locking strip disposed within said channel beneath said overhanging flanges for gripping the covering therebetween and beneath which the covering extends when gripped thereby, and a load-strip disposed between said flanges and secured to said locking strip.

3. An airplane wing rib construction comprising a capstrip to which a covering is adapted to be secured, said capstrip embodying a channel member having overhanging flexible side flanges, a locking strip disposed within said channel beneath said overhanging flanges for gripping the covering therebetween and beneath which the covering extends when gripped thereby, means for clamping said flanges together to maintain said locking strip against displacement, and a load-strip disposed between said flanges and secured to said locking strip.

4. An airplane wing rib construction comprising a capstrip to which a covering is adapted to be secured, said capstrip embodying a channel member having inwardly and downwardly extending side flanges, and a locking strip disposed within said channel and having upwardly extending edges for interlocking engagement with said side flanges to grip the covering therebetween and beneath which the covering extends when gripped thereby.

5. An airplane wing rib construction comprising a capstrip to which a covering is adapted to be secured, said capstrip embodying a channel member having inwardly and downwardly extending side flanges, and a locking strip disposed within said channel and having upwardly extending edges for interlocking engagement beneath said side flanges to grip the covering therebetween and beneath which the covering extends when gripped thereby, said locking strip being formed with a longitudinal rib disposed between said side flanges.

6. An airplane wing rib construction comprising a capstrip to which a covering is adapted to be secured, said capstrip embodying a channel member having inwardly and downwardly extending side flanges, a locking strip disposed within said channel and having upwardly extending edges for interlocking engagement beneath said side flanges to grip the covering therebetween and beneath which the covering extends when gripped thereby, and a load-strip disposed between said flanges and secured to said locking strip.

7. An airplane wing rib construction comprising a capstrip to which a covering is adapted to be secured, said capstrip embodying a channel member having inwardly and downwardly extending side flanges, a locking strip disposed within said channel and having upwardly extending edges for interlocking engagement beneath said side flanges to grip the covering therebetween and beneath which the covering extends when gripped thereby, said locking strip being formed with a longitudinal rib disposed between said side flanges, and a load-strip secured to said rib.

8. An airplane wing rib construction comprising a capstrip to which a covering is adapted to be secured, said capstrip having a channel formed in one side thereof, a locking strip disposed within said channel beneath which the covering extends, a flexible plate secured to said capstrip and extending over said channel for confining said locking strip and covering within said channel, and means for clamping said flexible plate to said channel to prevent the displacement of said locking strip and covering from said channel.

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