Nov. 8, 1932. R. I. MARKEY 1,886,708

FASTENING DEVICE FOR AIRPLANE WING COVERS

Filed Jan. 14, 1932

Fig. 1

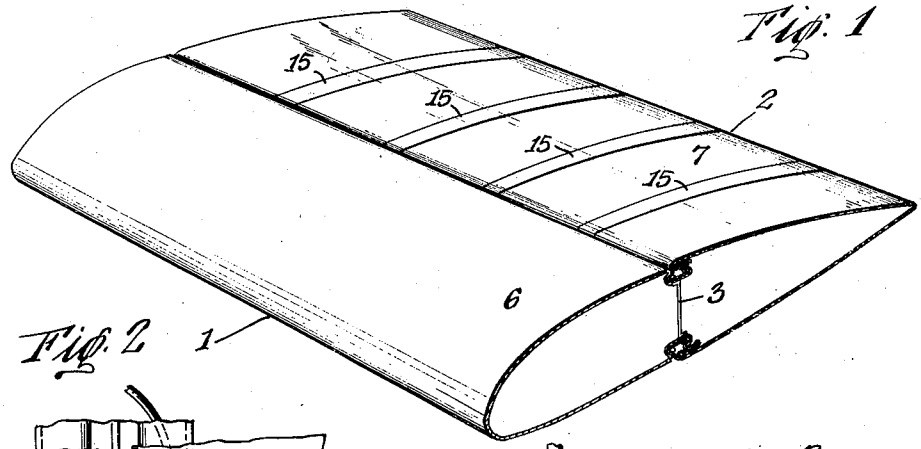


Fig. 2

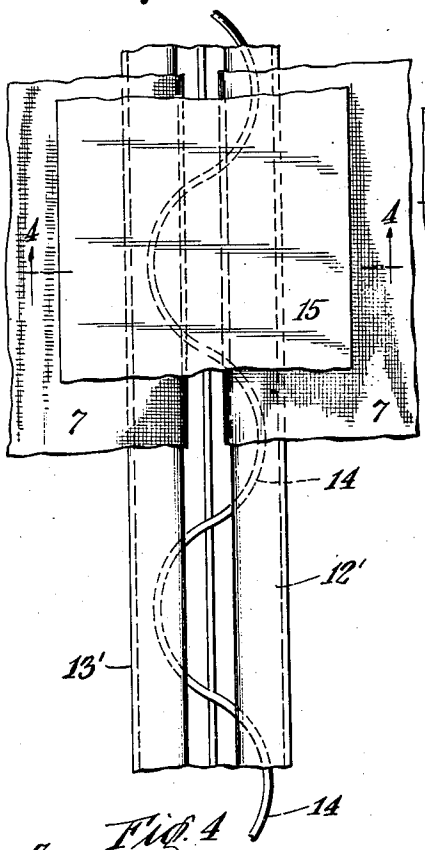


Fig. 3

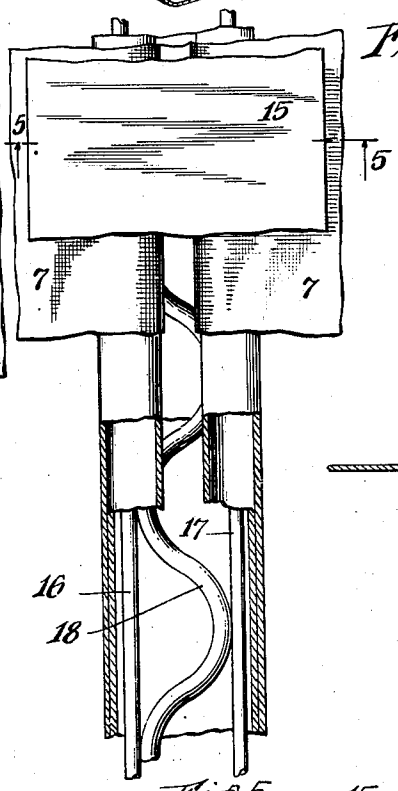


Fig. 6

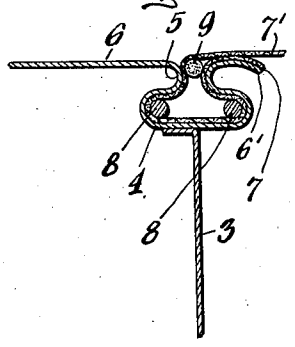


Fig. 4

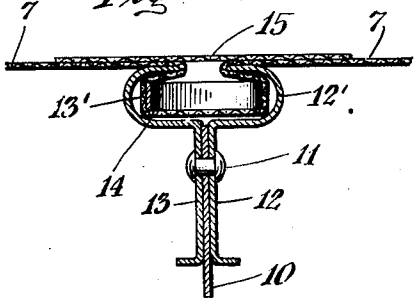
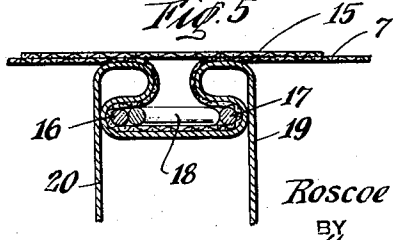


Fig. 5



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UNITED STATES PATENT OFFICE

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FASTENING DEVICE FOR AIRPLANE WING COVERS

Application filed January 14, 1932. Serial No. 586,497.

This invention relates in general to fastening devices and more particularly to devices for securing and locking in place the fabric covering for airplane surfaces.

The object of the invention is to provide such a fastening device that will eliminate the necessity of sewing the fabric and by which tautness of the fabric covering may be insured by means of ease of adjustment in installation and by means of virtual impossibility of slippage of the fabric after the installation has been completed.

A further object of the invention is to provide the various airplane parts, especially the sustaining and control surfaces of such design that will be suitable for receiving the fabric fastening devices.

With the foregoing and other objects in view the invention consists in the combination of parts and in the details of construction hereinafter set forth in the following specification and appended claims, certain embodiments thereof being illustrated in the accompanying drawing, in which:

Figure 1 is a view in perspective and partly in cross section of an airplane wing embodying the present invention.

Figure 2 is a top plan view showing one form of fastening device for securing edges of the fabric at wing ribs.

Figure 3 is a similar view showing another form of fastening device for the edges of fabric at wing ribs.

Figure 4 is a view in section taken along line 4—4 of Figure 2.

Figure 5 is a view in section taken along line 5—5 of Figure 3.

Figure 6 is a detail view in section taken along line 6—6 of Figure 1 showing the form of wing fabric slot lock for the end of the fabric for the front section of the wing which is metallic and the rear part of which is fabric covered.

Referring more particularly to the drawing, the wing shown in Figure 1 is formed of two main sections the front one 1 having a metallic skin and the rear one 2 being fabric covered. The problem presented in such construction is the provision of a suitable means of securing the end of the fabric and a suitable weatherproof joint between the front and rear wing sections.

Any suitable means may be employed to interiorly brace the front and rear sections and to effect a connection of the two sections together, the dividing line between which is represented by the partition member 3. Attached by any suitable means to the partition member or otherwise supported is a longitudinal metallic member 4 the bottom of which is enlarged with a restricted opening 5 and overlapping edges to form a longitudinal slot. The metallic slot member 4 may be secured to or be an integral extension of the metallic skin of the front wing section, in which case in Figure 6, 6 would represent the metallic skin of the front section and would terminate rearwardly at 6′.

The front part of the fabric cover 7 is forced downwardly into the slot made by the member 4 and kept in place by subsequently slipping into the slot on top of the fabric a device such as a tortuous resilient spring 8 (shown in section in Figure 6). Then a fabric cord 9 of the size to substantially fill the restricted opening 5 is placed therein and the edge of the fabric brought back and lapped over itself at 7′ and secured by airplane dope or the like. The fabric 7 is lapped back on itself because of the fact that the upper layer 7′ may be readily secured thereto by doping and thus securely fasten the edge against slipping which could not be accomplished by thus attempting to secure fabric to the metal skin on the other side of the slot.

The fabric covering of the rear wing section for the purpose of strength and tautness is connected to the various wing ribs and this is accomplished without sewing, nailing or otherwise penetrating or injuring the fabric. All or less of the ribs may have their extremities shaped to form a slot or may have a slot member secured to and carried thereby for receiving the fabric in locked engagement against slippage.

In the embodiment shown in Figures 1 and 4 the wing rib 10 may have bolted thereto at 11 a pair of parallel members 12 and 13 which are curved at 12′ and 13′ and extended inwardly to form a slot for receiving the fab-

ric 7. After the fabric has been fed into the slot a flat spring element 14 with convolutions is forced into the slot on top of the fabric which latter is pulled taut and extended past the other side of the slot. A covering fabric strip 15 is then placed to overlap the slot and doped to the fabric covering as a weatherproofing means for the slot and as a means working in conjunction with the slot arrangement and retention spring element to insure against slippage of the fabric skin and maintain its tautness.

In the embodiment shown in Figure 3, instead of using one flat fabric retention spring element as 14 there may be used a pair of round bars 16 and 17 at the side extremities of the slot and a round convoluted spring element 18 between and bearing against the straight bars forcing the latter against the inner side walls of the slot so as to hold the fabric taut and insure it against slippage.

As shown in Figure 5 which is a view in section taken through Figure 3, the rib itself may be formed of two parallel metal elements 19 and 20 curved and continuous so as to form the slot, to the elimination of the structural web element 10 of Figure 4.

Thus by the above described devices and arrangement the fabric skin may be retained taut in all directions without employing penetrating fastening devices tending to injure the fabric and also an effective and weatherproof joint may be effected between the front and rear wing sections in spite of the different nature of the metal and fabric skins.

Having thus described my invention, I claim:

1. In an interiorly braced airplane part having a fabric skin, structurally formed slots in the bracing members means for maintaining said skin taut and insuring against slippage, said means comprising non-penetrating laterally expandible spring fastening devices superimposed upon said skin in said slots whereby the latter is secured to said interior bracing members.

2. In an interiorly braced airplane part having a fabric skin, means for maintaining said skin taut and insuring against slippage, said means comprising non-penetrating fastening devices whereby said skin is secured to said interior bracing members, said fastening devices comprising structurally formed slots carried by said bracing members for receiving said fabric, and spring members for forcing the fabric against the inner side walls of said slot.

3. An airplane part having a fabric skin, said part having structurally formed slots to receive said fabric, and laterally expandible locking means for retaining said fabric in said slot against slippage.

4. An airplane part having a fabric skin, said part having structurally formed slots to receive said fabric, and laterally expandible non-penetrating locking means for retaining said fabric in said slot against slippage.

5. An airplane part having a fabric skin, said part having structurally formed slots to receive said fabric, and non-penetrating locking means for retaining said fabric in said slot against slippage, said locking means including a spring element arranged within the slot.

6. An airplane part having a fabric skin, said part having structurally formed slots to receive said fabric, and non-penetrating locking means for retaining said fabric in said slot against slippage, said locking means including a spring element arranged within the slot and a fabric cover strip for said slot secured to said skin by an adhesive medium.

7. A composite airplane part the front section of which has a metallic skin and the rear section a fabric skin, a structurally formed slot arranged longitudinally of the wing along the line of connection of the two-wing sections to receive said fabric, non-penetrating locking means for retaining said fabric in said slot against slippage and a filler cord placed in the throat of said slot, the front part of said fabric being doubled back over said cord.

8. A composite airplane part the front section of which has a metallic skin and the rear section a fabric skin, a structurally formed slot arranged longitudinally of the wing along the line of connection of the two-wing sections to receive said fabric, non-penetrating locking means for retaining said fabric in said slot against slippage, said locking means comprising a spring element within said slot adapted to force the fabric against the inner side walls thereof.

9. A composite airplane part the front section of which has a metallic skin and the rear section a fabric skin, a structurally formed slot arranged longitudinally of the wing along the line of connection of the two-wing sections to receive said fabric, non-penetrating locking means for retaining said fabric in said slot against slippage, said locking means comprising a spring element within said slot adapted to force the fabric against the inner side walls thereof, the front edge of said fabric being doubled back over a portion of the remaining fabric skin without the slot and adhesively secured.

10. A composite airplane part the front section of which has a metallic skin and the rear section a fabric skin, a structurally formed slot arranged longitudinally of the wing along the line of connection of the two-wing sections to receive said fabric, non-penetrating locking means for retaining said fabric in said slot against slippage, said locking means comprising a spring element within said slot adapted to force the fabric against the inner side walls thereof, the front edge of

said fabric being doubled back over a portion of the remaining fabric skin without the slot and adhesively secured, a filler cord placed in the throat of said slot over which said fabric edge is doubled back.

11. An airplane part provided with bracing webs and fabric covering, structural slots carried by said webs for forming means of connection between the webs and covering, structural slots for connecting the front edge of said fabric covering, non-penetrating locking means including spring elements carried in said slots for forcing said fabric against the side walls of said slots, fabric and adhesive means for weather-proofing said slots and for aiding the locking effect of said spring elements.

In testimony whereof, I have signed my name to this specification this 11th day of January, 1932.

ROSCOE I. MARKEY.