Aug. 2, 1949. D. R. ANGUS 2,477,563

CLOSURE FOR PROTECTIVE COVERS

Filed Sept. 21, 1945 2 Sheets-Sheet 1

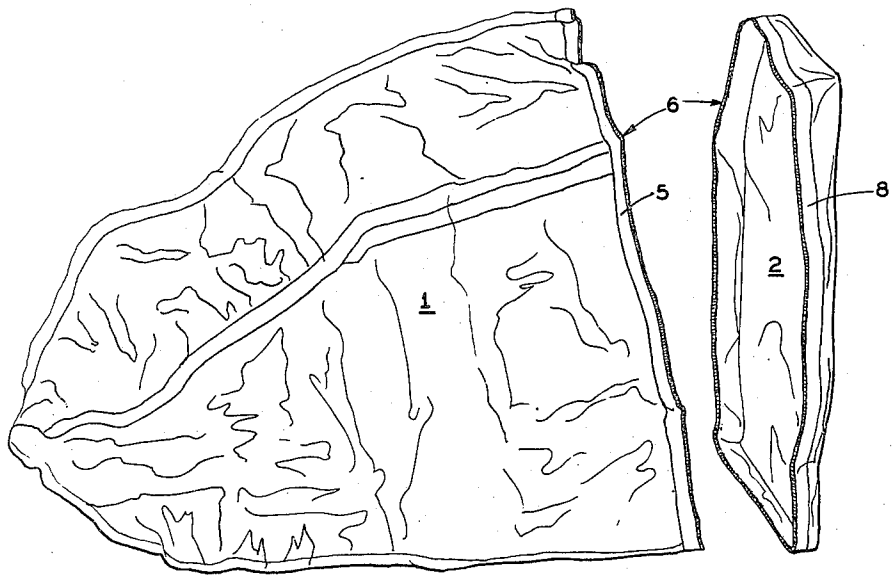


FIG. 1.



FIG. 2.

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CLOSURE FOR PROTECTIVE COVERS

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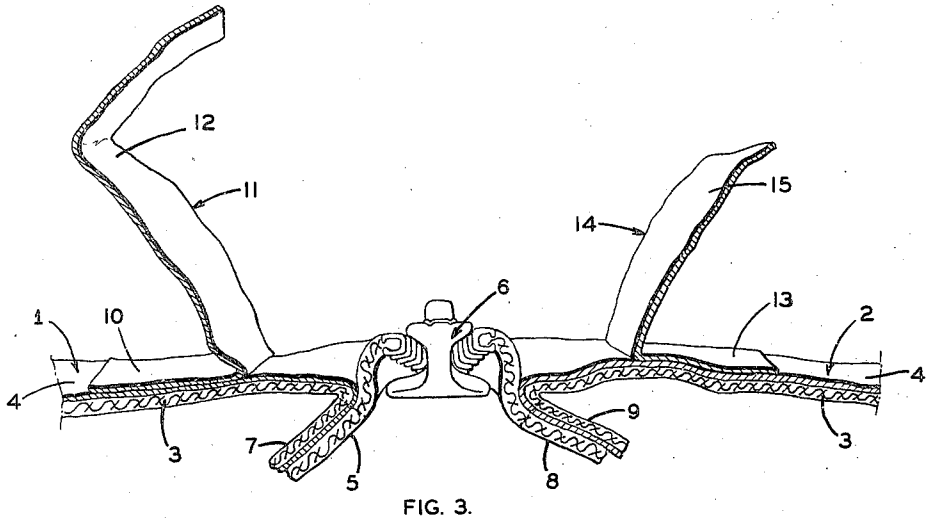


FIG. 3.

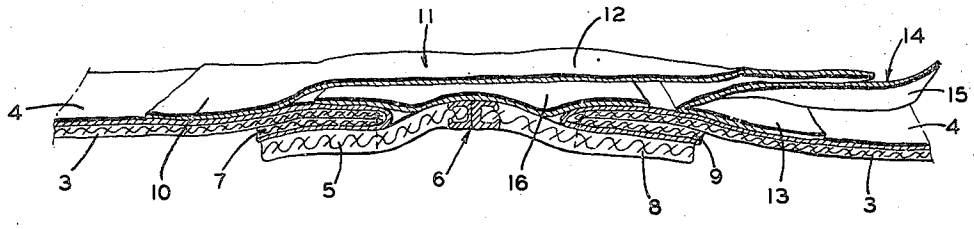


FIG. 4.

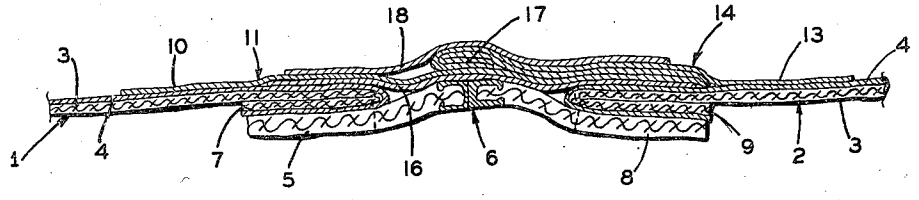


FIG. 5.

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CLOSURE FOR PROTECTIVE COVERS

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12 Claims. (Cl. 24—205.16)

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

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This invention relates to new and useful improvements in moisture and vapor-proof covers, and more particularly to moisture and vapor-proof closures for such covers.

In the maintenance and operation of aircraft, and particularly military aircraft, it is the practice to maintain reserve aircraft engines in a standby condition at the various bases and on board naval aircraft carriers so that in the event the engine or engines of a plane are in need of repair or overhaul, the plane need not be immobilized for a period longer than is necessary to remove the present engine or engines and install one or more of the available standby engines. One of the major difficulties encountered in this practice is the problem of protecting the engines from corrosion, rust and the like due to atmospheric conditions while in a standby status.

In the endeavor to provide adequate protection for aircraft engines against corrosion and the like while in a standby status as described, a cover material that is characterized by its efficient moisture and vapor-proof properties and is adapted to protect aircraft engines effectively from the deleterious effects of the atmosphere has been developed. In order to provide complete protection for the engine, covers therefor must be provided with suitable closure or connection means for the free edges of the cover structure that define the opening through which the cover is passed about the engine or other object, and one of the major problems encountered in providing an adequate cover structure has been the provision of a suitable cover closure that is wholly proof against the passage of moisture and vapor therethrough to the interior of the cover.

With the foregoing in mind, the principal object of the present invention is to provide a moisture and vapor-proof cover having a re-usable novel closure therefor that is entirely proof against the passage of moisture and vapor therethrough.

Another object is to provide a cover having a closure of the character described that is of relatively simplified construction and is opened or closed readily and easily as required.

A further object is to provide a novel cover closure having the features and characteristics set forth that is comparatively inexpensive, can be embodied readily in a cover structure, and is highly efficient and effective in use and operation.

These and other objects of the invention, and the various features and details of the construction and operation thereof, are hereinafter fully

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set forth and described with reference to the accompanying drawings in which

Fig. 1 is a view in perspective of a cover embodying a closure made according to the present invention, showing the component parts of the cover in detached relationship;

Fig. 2 is a view similar to Fig. 1 showing the component parts of the cover in assembled relationship, secured together by said closure;

Fig. 3 is an enlarged sectional view transversely through said closure showing the same in the process of being closed and illustrating certain features and structural details thereof;

Fig. 4 is a view similar to Fig. 3 showing further steps in effecting the closure; and

Fig. 5 is a view similar to Fig. 3 showing a completed form of closure.

A closure embodying the present invention is shown in conjunction with an aircraft-engine cover that comprises a main cover-section 1 and an end cover-section 2, the said sections being constructed and arranged to be secured together as shown in Fig. 2 by means of a moisture and vapor-proof closure embodying the present invention.

The cover sections 1 and 2 are fabricated of flexible laminated material that consists of an inner layer of fabric or paper 3, and an outer layer of metallic foil 4, such as aluminum foil. The inner fabric or paper layer 3 and the outer metallic-foil layer 4 are bonded together thermally to provide a composite structure by means of a suitable thermoplastic binder or adhesive such as Vinylite. A laminated material such as that described has been found to be entirely moisture and vapor-impervious and thus highly efficient for use as a protective cover for aircraft engines and other articles subject to deterioration as the result of contact with the atmosphere.

A wholly moisture and vapor-proof closure for such a cover is provided by connecting the edges of the cover sections 1 and 2 by means of a slide or "zipper" type fastener, and then providing an effective moisture and vapor-proof seal overlying the slide fastener to prevent the entrance of moisture and vapor therethrough. To this end, one side portion 5 of a suitable slide fastener 6 is secured by means of stitching to the free edge-portion 7 of the main cover-section 1, and the other side portion 8 of the fastener 6 is secured similarly to the free edge-portion 9 of the cover end-section 2, the fastener 6 being operable in the conventional manner to secure the cover sections 1 and 2 together securely in the relation shown in Fig. 2 of the drawing.

For the purpose of providing an efficient moisture and vapor-proof seal over the slide fastener 6 when said fastener is closed, an edge portion 10 of a continuous strip 11 of metallic foil similar to the material of the outer layer 4 of the cover sections 1 and 2 is secured to the layer 4 of cover section 1 longitudinally adjacent and coextensive with said slide fastener. The metallic-foil strip preferably has a coating of a thermoplastic adhesive such as Vinylite, and its edge portion 10 is secured to the cover layer 4 by the application of heat to bond said edge portion 10 thermally to the exterior surface of the cover section 1. The strip 11 is made sufficiently wide so that, with the edge portion 10 thereof secured to the section 1 as described, a free strip portion 12 of substantial width is provided adjacent the fastener 6, as shown in Fig. 3 of the drawing.

In like manner, the edge portion 13 of a similar, continuous, metallic-foil strip 14 is secured to the exterior of the cover end-section 2, said strip 14 being arranged so that a substantial width of the strip adjacent the fastener 6 is left free, as indicated at 15. As shown, the free portion 15 of the strip 14 need not be as wide as the free portion 12 of the strip 11, and the dimensions of the two strips 11 and 14 can be correlated so that the portion 12 of the former laps the free portion 15 of the latter when it is folded outwardly or away from the fastener 6, as shown in Fig. 4 of the drawing.

After the cover sections 1 and 2 have been secured together by closing the slide fastener 6 in the usual manner, an adhesive strip 16, which is characterized by its high moisture and vapor-impervious properties is secured in external relation overlying the closed fastener 6. This strip 16 can be of the pressure sensitive type embodying a rubber base adhesively, and it must be of sufficient width so that it overlies the fastener 6, and the adjacent edge portions of the cover main and end-sections 1 and 2 (see Fig. 4).

With the fastener 6 closed and the seal strip 16 applied as shown and described, the free portion 15 of the external foil-strip 14 is folded outwardly away from the fastener 6, and the free portion 12 of the other external foil-strip 11 is positioned in overlying relation with respect to the seal strip 16 and the outwardly folded portion 15 of the external strip 14 as shown in Fig. 4 of the drawing. The ends of the thus lapped free portions 12 and 15 of the strips 11 and 14 then are folded over and the said free strip portions, with their folded ends, are folded in the direction of the fastener 6 so that the end fold thereof is disposed in longitudinally overlying relation with respect to the seal strip 16 and the slide fastener 6, as indicated at 17 in Fig. 5 of the drawing.

A closure constructed and arranged as described and shown provides a moisture and vapor-proof closure for covers of the type and character set forth that is highly efficient and capable of preventing the penetration therethrough of moisture and vapors for substantially indefinite periods of time. To provide further insurance against the passage of moisture and vapors through the closure and to obtain an effective substantially permanent seal, an adhesive strip 18 of good moisture and vapor-impervious properties is secured over the folded edge portion 17 of the strips 11 and 14. The strip 18 can be similar in its properties and composition to the strip 16 described previously. Furthermore, as the external strips 11 and 14 are coated with a suitable thermoplastic adhesive as hereinbefore described, the folded ends 17 of the strips 11 and 14 can be heat-sealed together effectively by the application of heat and pressure thereto.

From the foregoing, it will be apparent that the present invention provides a novel closure for cover structures that is entirely proof against the inleakage of moisture and vapors. The invention also provides a novel cover closure of the character stated that is of relatively simplified construction, and that can be closed or opened readily and easily as required. Furthermore, the invention provides a novel cover closure having the features and characteristics set forth that is comparatively inexpensive, can be embodied readily in a cover structure, and that is highly effective and efficient in use and operation.

While a particular embodiment of the present invention has been illustrated and described herein, it is not intended that the invention be limited to such disclosure, and changes and modifications can be made therein and thereto within the scope of the claims.

The invention described herein may be manufactured and 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. In a moisture and vapor-proof cover structure having an opening defined by a pair of edge portions of the structure, a moisture and vapor-proof closure for said opening comprising a slide fastener having a part thereof secured to one edge of the cover and another part thereof secured to the other edge of said cover and operable to secure the same together, and moisture and vapor-impervious flexible metallic-foil strips having an edge portion secured to the exterior surface of the cover structure inwardly adjacent and coextensive of the edge portions thereof and providing strip portions interfolded in overlapping relation outwardly of said slide fastener.

2. In a moisture and vapor-proof cover structure having an opening defined by a pair of edge portions of the structure, a moisture and vapor-proof closure for said opening comprising a slide fastener having a part thereof secured to one edge of the cover and another part thereof secured to the other edge of said cover to secure the same together, moisture and vapor-impervious flexible metallic-foil strips having an edge portion secured to the exterior surface of the cover structure inwardly adjacent and coextensive of the edge portions thereof and providing strip portions interfolded in overlapping relation outwardly of said slide fastener, and means to maintain and secure said strips in said interfolded relation.

3. In a moisture and vapor-proof cover structure having an opening defined by a pair of edge portions of the structure, a moisture and vapor-proof closure for said opening comprising a slide fastener having a part thereof secured to one edge of the cover and another part thereof secured to the other edge of said cover to secure said edges together, a moisture and vapor-impervious seal strip secured externally and lengthwise of the slide fastener, and moisture and vapor-impervious flexible metallic-foil strips having an edge portion secured to the exterior surface of the cover structure inwardly adjacent and coextensive of the edge portions thereof and providing strip portions interfolded in overlapping relation outwardly of said slide fastener.

4. In a moisture and vapor-proof cover structure having an opening defined by a pair of edge

portions of the structure, a moisture and vapor-proof closure for said opening comprising a slide fastener having a part thereof secured to one edge of the cover and another part thereof secured to the other edge of said cover to secure said edges together, a moisture and vapor-impervious seal strip secured externally and lengthwise of the slide fastener, and moisture and vapor-impervious flexible metallic-foil strips having an edge portion secured to the exterior surface of the cover structure inwardly adjacent and coextensive of the edge portions thereof and providing strip portions interfolded in overlapping relation outwardly of said slide fastener, and means to maintain and secure said strips in the interfolded relation outwardly overlying said slide fastener.

5. In a cover structure having an opening defined by a pair of free edge-portions of said structure, a closure for such opening comprising a slide fastener having a part thereof secured to one free edge of the cover and another part thereof secured to the other free edge of such cover, said fastener being operable to secure said edges together, a first strip having an edge-portion secured to the exterior surface of such cover structure adjacent and coextensive with an edge-portion thereof and extending over a second strip having an edge portion secured to the exterior surface of such cover structure adjacent and coextensive with the other edge-portion thereof and lapped back over the extending portion of said first strip, said strips being also lapped together back over themselves.

6. In a cover structure having an opening defined by a pair of free edge-portions of said structure, a closure for such opening comprising a slide fastener having a part thereof secured to one free edge of the cover and another part thereof secured to the other free edge of such cover, said fastener being operable to secure said edges together, a first strip having an edge portion secured to the exterior surface of such cover structure adjacent and coextensive with an edge-portion thereof and extending over a second strip having an edge portion secured to the exterior surface of such cover structure adjacent and coextensive with the other edge-portion thereof and lapped back over the extending portion of said first strip, said strips being also lapped together back over themselves, and a third strip secured to a portion of the exterior surfaces of said first and second strips.

7. In a cover structure having an opening defined by a pair of free edge-portions of said structure, a closure for such opening comprising a slide fastener having a part thereof secured to one free edge of the cover and another part thereof secured to the other free edge of such cover, said fastener being operable to secure said edges together, a first strip having an edge-portion secured to the exterior surface of such cover structure adjacent and coextensive with an edge-portion thereof and extending over a second strip having an edge portion secured to the exterior surface of such cover structure adjacent and coextensive with the other edge-portion thereof and lapped back over the extending portion of said first strip, said strips being also lapped together back over themselves, and a third strip having an adhesive backing secured removably to a portion of the exterior surfaces of said first and second strips.

8. In a cover structure having an opening defined by a pair of free edge-portions of said structure, a closure for such opening comprising a slide fastener having a part thereof secured to one free edge of the cover and another part thereof secured to the other free edge of such cover, said fastener being operable to secure said edges together, a first strip having an edge-portion secured to the exterior surface of such cover structure adjacent and coextensive with an edge-portion thereof and extending over a second strip having an edge portion secured to the exterior surface of such cover structure adjacent and coextensive with the other edge-portion thereof and lapped back over the extending portion of said first strip, said strips being also lapped together back over themselves, and a third strip having an adhesive backing secured removably to a portion of the exterior surfaces of said first and second strips coextensive the lengths thereof.

9. In a cover structure having an opening defined by a pair of free edge-portions of said structure, a closure for such opening comprising a slide fastener having a part thereof secured to one free edge of the cover and another part thereof secured to the other free edge of such cover, said fastener being operable to secure said edges together, a first moisture and vapor-impervious strip having an edge-portion secured to the exterior surface of such cover structure adjacent and coextensive with an edge-portion thereof and extending over a second moisture and vapor-impervious strip having an edge portion secured to the exterior surface of such cover structure adjacent to and coextensive with the other edge-portion thereof and lapped back over the extending portion of said first strip, said strips being also lapped together back over themselves.

10. In a cover structure having an opening defined by a pair of free-edge portions of said structure, a closure for such opening comprising a slide fastener having a part thereof secured to one free edge of the cover and another part thereof secured to the other free edge of such cover, said fastener being operable to secure said edges together, a first moisture and vapor-impervious strip having an edge-portion secured to the exterior surface of such cover structure adjacent and coextensive with an edge-portion thereof and extending over a second moisture and vapor-impervious strip having an edge portion secured to the exterior surface of such cover structure adjacent and coextensive with the other edge-portion thereof and lapped back over the extending portion of said first strip, said strips being also lapped together back over themselves, and a third strip secured to a portion of the exterior surfaces of said first and second strips.

11. In a cover structure having an opening defined by a pair of free edge-portions of said structure, a closure for such opening comprising a slide fastener having a part thereof secured to one free edge of the cover and another part thereof secured to the other free edge of such cover, said fastener being operable to secure said edges together, a first moisture and vapor-impervious strip having an edge-portion secured to the exterior surface of such cover structure adjacent and coextensive with an edge-portion thereof and extending over a second moisture and vapor-impervious strip having an edge portion secured to the exterior surface of such cover structure adjacent and coextensive with the other edge-portion thereof and lapped back over the extending portion of said first strip, said strips being also lapped together back over themselves, and a third strip having an adhesive backing secured re-

movably to a portion of the exterior surfaces of said first and second strips.

12. In a cover structure having an opening defined by a pair of free edge-portions of said structure, a closure for such opening comprising a slide fastener having a part thereof secured to one free edge of the cover and another part thereof secured to the other free edge of such cover, said fastener being operable to secure said edges together, a first moisture and vapor-impervious strip having an edge-portion secured to the exterior surface of such cover structure adjacent and coextensive with an edge-portion thereof and extending over a second moisture and vapor-impervious strip having an edge portion secured to the exterior surface of such cover structure adjacent and coextensive with the other edge portion thereof and lapped back over the extending portion of said first strip, said strips being also lapped together back over themselves, and a third strip having an adhesive backing secured removably to a portion of the exterior surfaces of said first and second strips coextensive the lengths thereof.

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