AIR MINISTRY
May, 1944

CHAPTER 6

GLAZING AND SEALING OF AIRCRAFT COMPONENTS

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LIST OF ILLUSTRATIONS

General

1. Various sealing compounds are provided in order that weatherproof joints may be made for such components as windscreens, bomb-aimer's windows, riveted joints, cupolas, etc. The essential feature of these materials is their capacity for filling a joint to prevent the ingress of air and/or water, and the retention of this property for a reasonable period, yet allowing a certain amount of flexing between adjoining parts without cracking.

2. The success or otherwise of approved compounds in use depends to a great extent on the method and condition of their application and for this purpose the following information covering typical examples of such work has been compiled.

Glazing materials

3. An approved material for glazing is Bostik-B glazing compound (Stores Ref. No. 33C/591), which is used alone in some classes of work, or, when it is essential that the compound should also be impervious to the action of oils or fuel, Boscolyn lacquer is also used in conjunction with the glazing compound. When, in addition, rubber, felt, or other similar material is employed in a joint for the purpose of absorbing excessive vibration, Bostik-C adhesive compound is used to stick these materials in position, the glazing proper still being effected by Bostik-B.

Bostik-B glazing compound

4. This compound is available in blue-labelled collapsible tubes each containing approximately 6 oz., and with each tube an extruder key and a nozzle are provided (see fig. 1). The key is intended to engage with the flattened end of the tube which is subsequently rolled up by the key, and the material is thus exuded through the nozzle which is screwed on to the other end of the tube, after the end-cap has been removed.

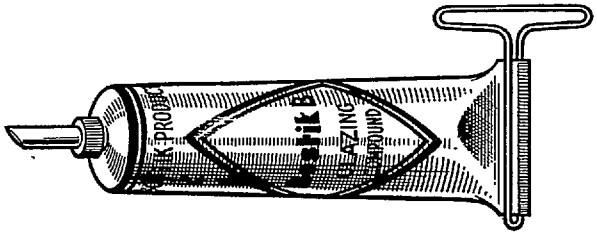

Fig. 1.—Collapsible tube of Bostik-B with nozzle and key

5. When using Bostik-B, the key should be threaded over the flattened end of the collapsible tube; it may be necessary to unroll the first layer of the clinched end in order to obtain a better grip with the key. With the nozzle in position and the work prepared, the key should be wound in a clockwise direction until the compound emerges from the nozzle. The nozzle should then be held near the joint where the compound is required and, turning the key, the tube should be moved at the same time steadily along the work at such speed that a continuous even strip of compound is exuded. Breaks or thickening of the bead of compound are caused by the feed being too slow or too fast, respectively, for the rate at which the tube nozzle is moved along the joint. A sound, weatherproof joint cannot be made by depositing dabs of compound at intervals along the joint.

Application of Bostik-B glazing compound

6. When applying the glazing compound all associated surfaces should be clean and the bead or beads of extruded compound should be so positioned that when the panel is fitted and pressed into position the compound will spread evenly and form a continuous seal along the edge of the mating components. Thus, for a glazed joint consisting of a simple rebate and fairing strip (see fig. 2) one continuous bead of compound laid along the corner will be sufficient, but for a channel section glazed joint two beads, one in each corner, should be applied (see fig. 3). Other examples of more complex joints are shown in figs. 5 and 6.

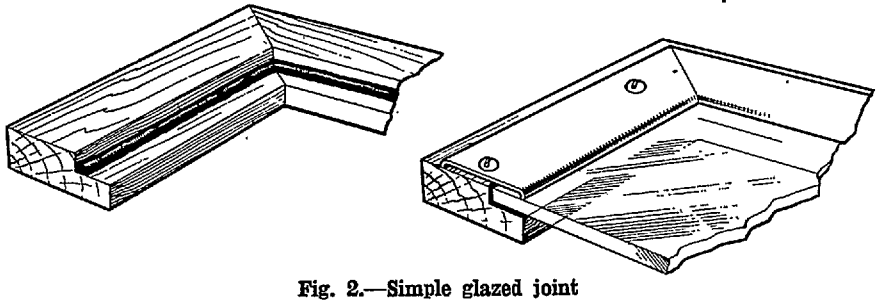

Fig. 2.—Simple glazed joint

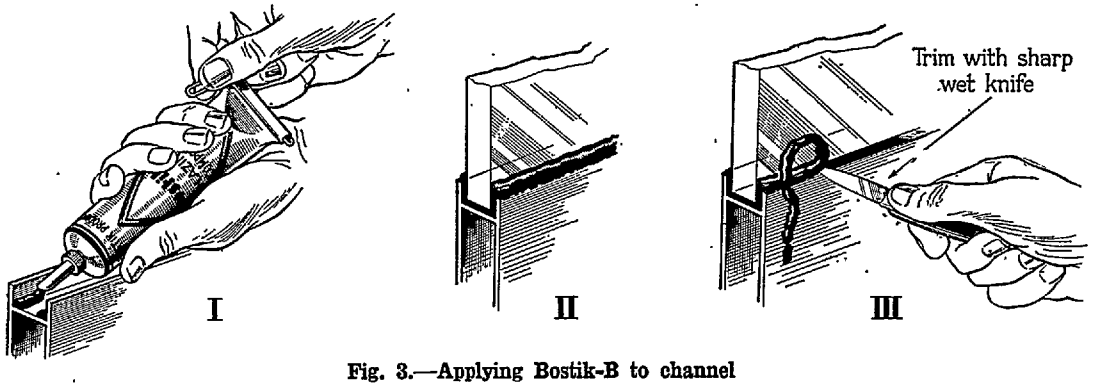

Fig. 3.—Applying Bostik-B to channel

7. The glazing compound can also be used for sealing the joints of electrical terminal and junction boxes and for weatherproofing electrical cable ferrules, etc. (see fig. 4). The compound can be pressed into the cavities, keeping the fingers wet with water while doing so. Surplus compound should be removed by means of a sharp knife wetted in water, but great care should be taken to avoid cutting or scratching the component during this operation.

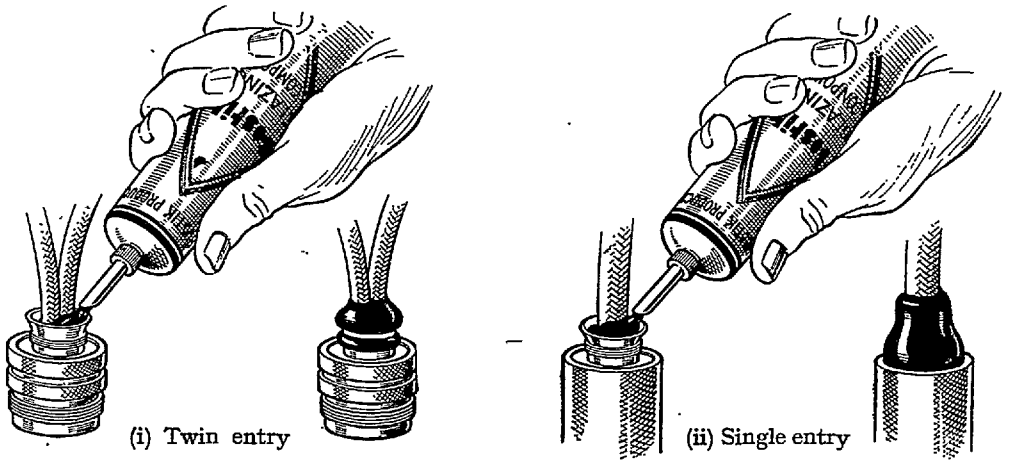

Fig. 4.—Sealing cable end-fittings

Protecting joint against oil and fuel

8. After a joint has been made using Bostik-B glazing compound, it may be necessary to proof the joint against the action of oil or fuel, in which case the joint should be allowed to stand for 24 hours and any surplus compound trimmed off by means of a sharp, wet knife. The exposed surface of the compound should then be coated with Boscolyn Lacquer (Stores Ref. No. 30C/590 or 668), applied by a fairly stiff bristle brush. The lacquer should be allowed to dry thoroughly before it is handled.

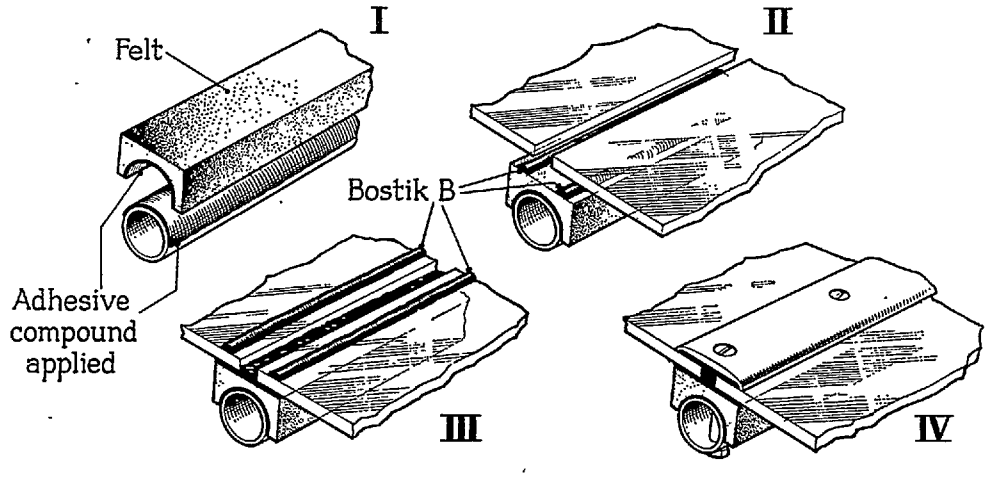

Fig. 5.—Attachment of felt to airframe for mounting Perspex and other panels

Bostik-C adhesive compound

9. This adhesive (Stores Ref. 33C/605) is supplied in yellow-labelled, gallon, quart and half-pint containers, and is used for the attachment of such materials as cork, rubber, felt, fabric and other similar materials to metal or wood, as for example, for interior and exterior walkways and for the attachment of moulded rubber beading to cabin doors, escape hatches, etc. (see figs. 5 and 6).

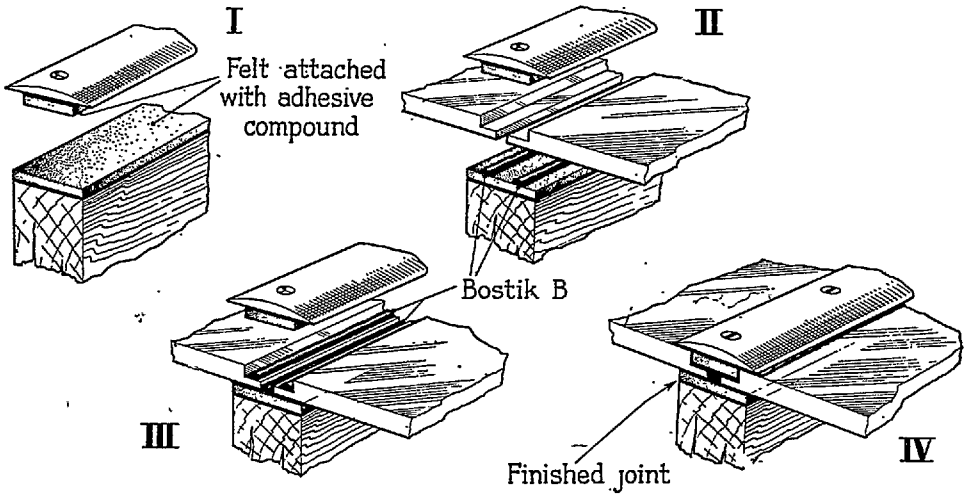

Fig. 6.—Attachment of felt strip to wooden frame and metal fairing strips

10. The mating surfaces should both be cleaned and coated with an even film of the Bostik-C adhesive compound, which should be allowed to dry until it can be touched without showing signs of tackiness, after which the two surfaces should be pressed together, applying the maximum pressure obtainable without damaging the components; a roller weighing about 7 lb. will be found suitable for the majority of jobs of this kind. If the material to be attached to a component is of plywood then it should be held in position additionally by means of sandbags for a period of from 4 to 5 hours (see fig. 7).

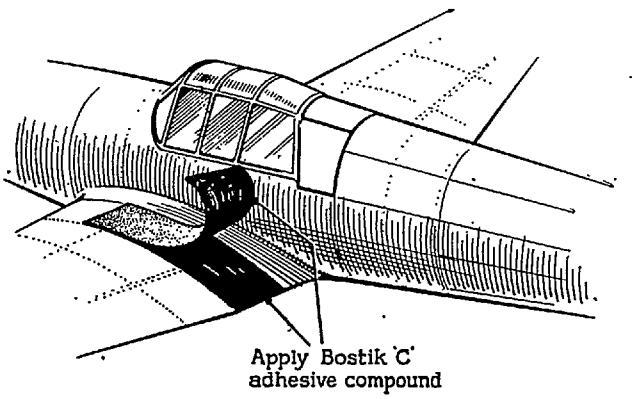

Fig. 7.—Attachment of walkway

11. The time taken by the solvent in the compound to dry out and so leave it in a non-tacky state will vary according to the surrounding temperature and humidity of the atmosphere, but a minimum period of 30 minutes should always be allowed between the application of the compound and the making of the joint; this period allows a margin sufficient to permit the bond to attain its maximum strength more rapidly than if a shorter drying period is allowed. Joints made by the use of this adhesive can be proofed against the action of oil or fuel by means of Boscolyn lacquer applied along the exposed edges of the joint.

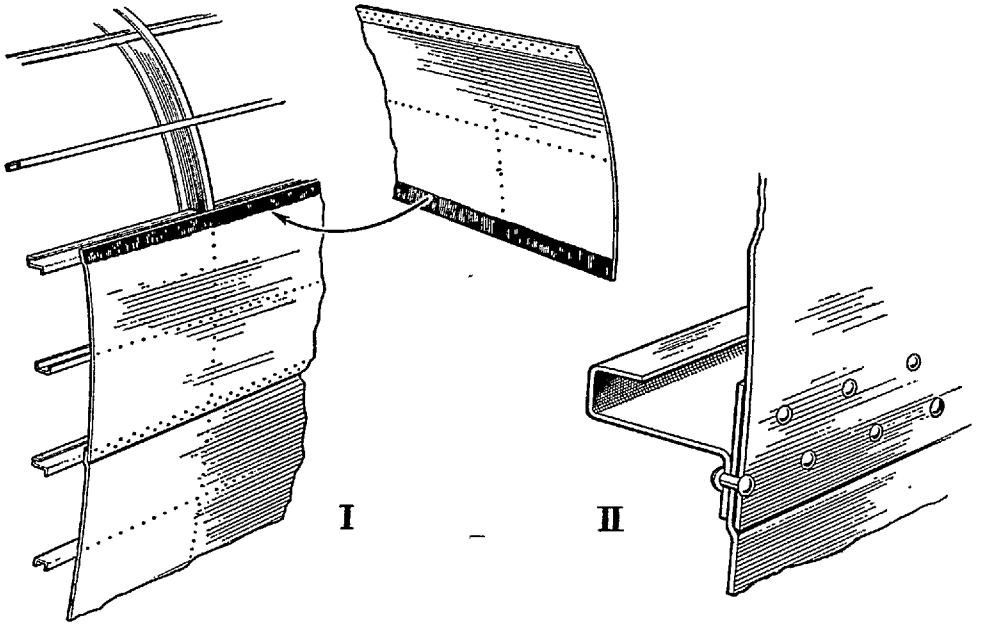

Fig. 8.—Weatherproofing riveted joints by Bostik cement No. 321

Bostik cement No. 321

12. This cement (Stores Ref. 33C/594) is used for overlap (see fig. 8) or butt-joints between similar metals on airframes, and is supplied in similar containers to the adhesive compound but the labels are in orange and white. In use the cement should be applied liberally to the borders forming the mating surfaces of the joint, which have been cleaned previously. The cement should be allowed to dry for a period of approximately 20 minutes, after which the parts to be joined can be riveted or bolted together in the normal manner.

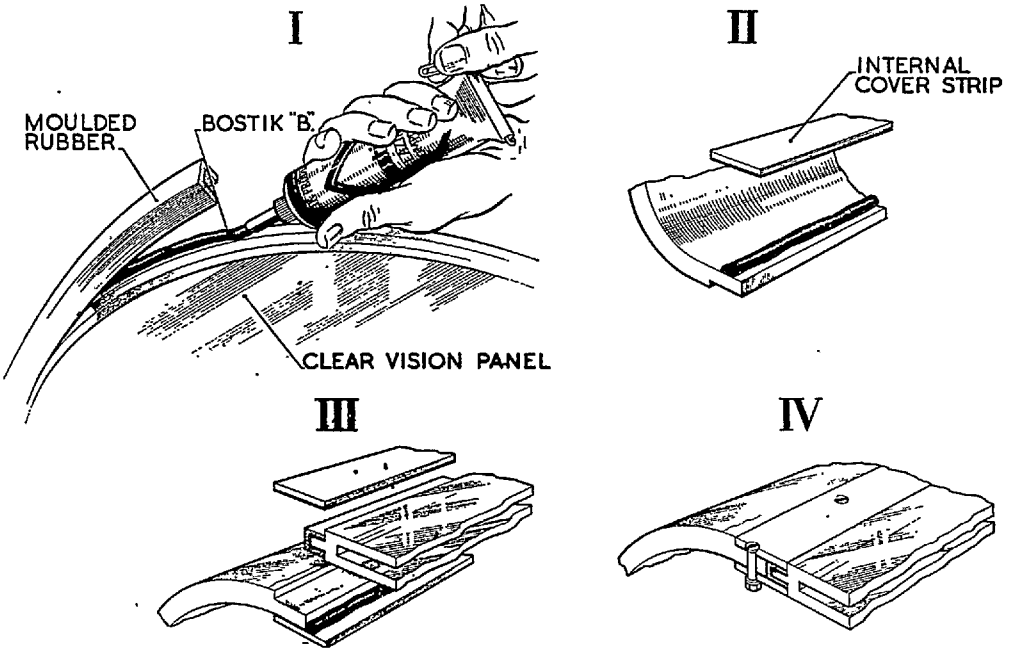

Fig. 9.—Glazing of clear vision panels

Glazing of clear vision panels

13. Clear vision panels should be fitted using Bostik–B glazing compound. The compound should be extruded around the edge of the clear vision panel, and the moulded rubber section carefully drawn into position (see fig. 9, sketch I). A liberal and continuous bead of glazing compound should then be extruded all around the internal edge of the curved glazed panels, after which the internal cover strip should be immediately attached with temporary bolts (see fig. 9, sketch II). The curved panel should then be reversed, and a liberal bead of glazing compound extruded into the angle formed by the cover strip and the edge of the curved glazed panel (see fig. 9, sketch III). The clear vision panel should now be pressed firmly into position, and two continuous beads of Bostik–B extruded into the channel for the reception of the external cover strip, which is secured by bolts (see fig. 9, sketch IV).

Glazing of flush fitting panels

14. Two examples of glazing flush fitting panels are illustrated in figs. 10 and 11. When glazing in accordance with the method shown in fig. 10, Bostik–C adhesive compound should be brushed thinly over the contacting surfaces of the relative anti-vibration materials, framing and cover strip (see fig. 10, sketch I). The adhesive compound should be allowed to dry for 30 minutes before placing the various parts together. The glazed panels should then be placed on the frame, and a continuous bead of Bostik–B glazing compound extruded into the rebate (see fig. 10, sketch II), after which the prepared cover strip should be bolted into position (see fig. 10, sketch III). After 24 hours the surplus compound can be trimmed off with a wet knife.

15. Another method of glazing flush fitting panels necessitates the use of Bostik–B glazing compound only. A liberal and continuous bead of compound should first be extruded on to the frame member (see fig. 11, sketch I), after which the glazing panel should be pressed into position so that a complete seal is obtained. The operation should be repeated for the second panel. Two further beads of Bostik–B must then be extruded on to the moulded recesses of the glazing panel (see fig. 11, sketch II), over which the masking or glazing strip should be placed in position and immediately secured with the bolts (see fig. 11, sketch III), leaving the bolts half a turn slack. After 24 hours the surplus compound can be trimmed off with a wet knife.

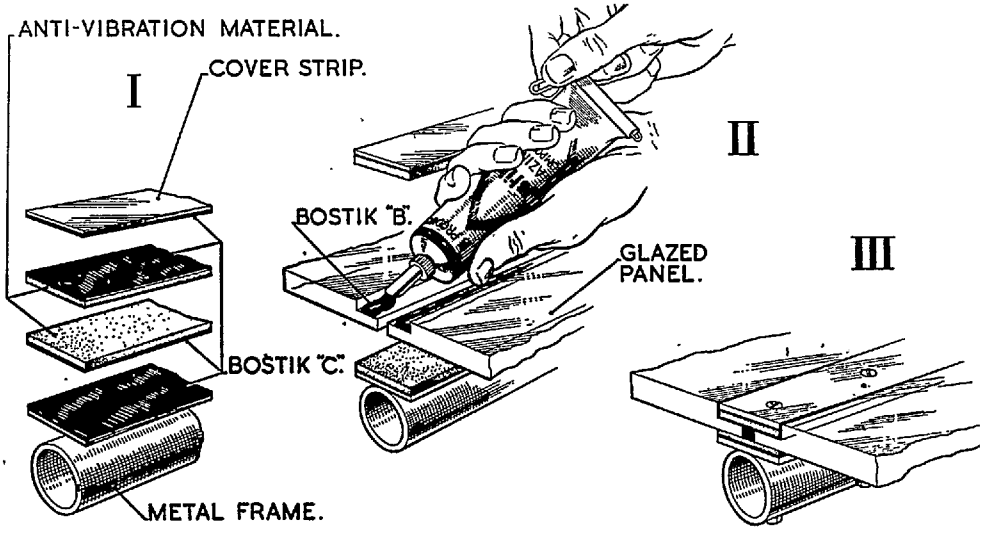

Fig. 10.—Glazing of flush fitting panels (A)

Sealing of butt joints

16. Butt joints should be sealed by applying a liberal and continuous bead of Bostik–B glazing compound to both face surfaces. The components should then be jointed immediately and bolted up in the usual manner (see fig. 12, sketches I, II, and III).

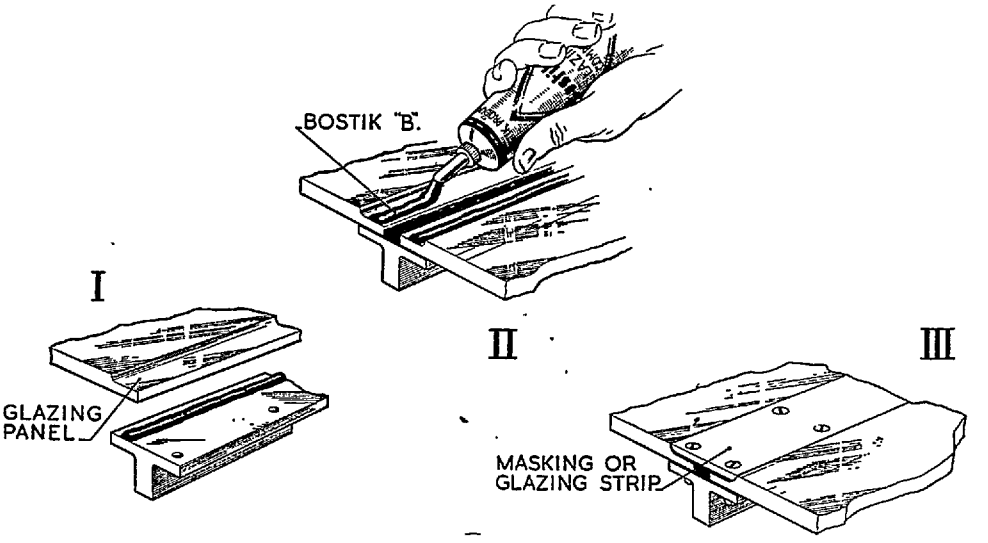

Fig. 11.—Glazing of flush fitting panels (B)

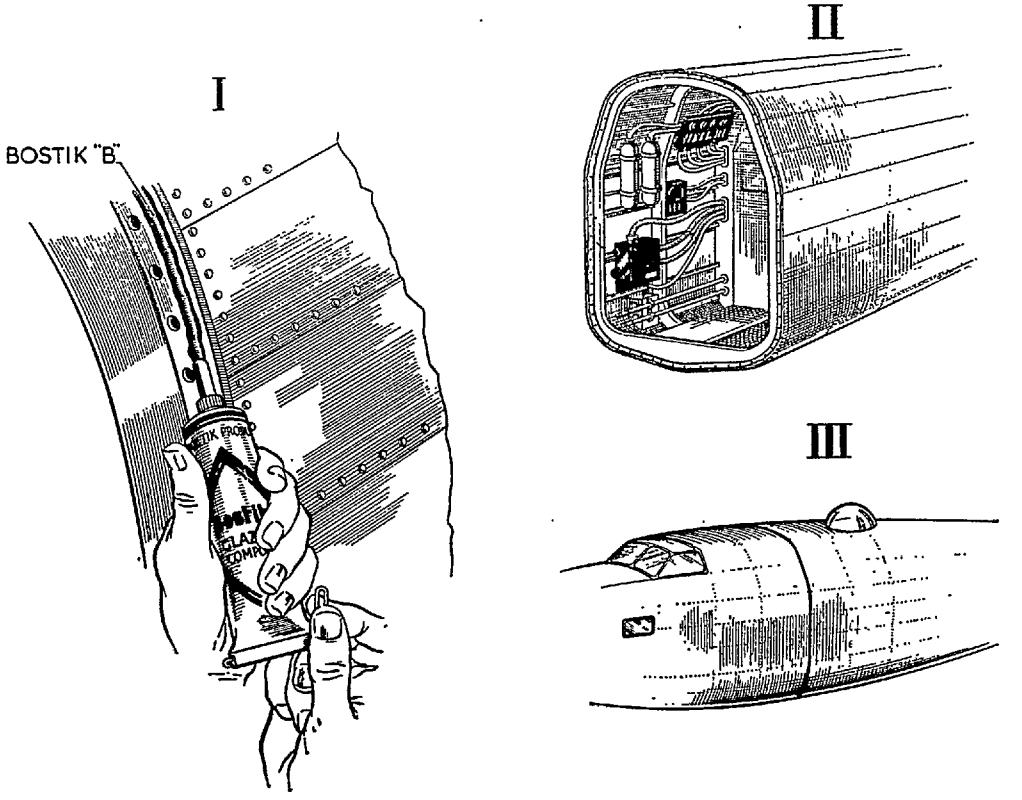

Fig. 12.—Weatherproofing and sealing of butt joints

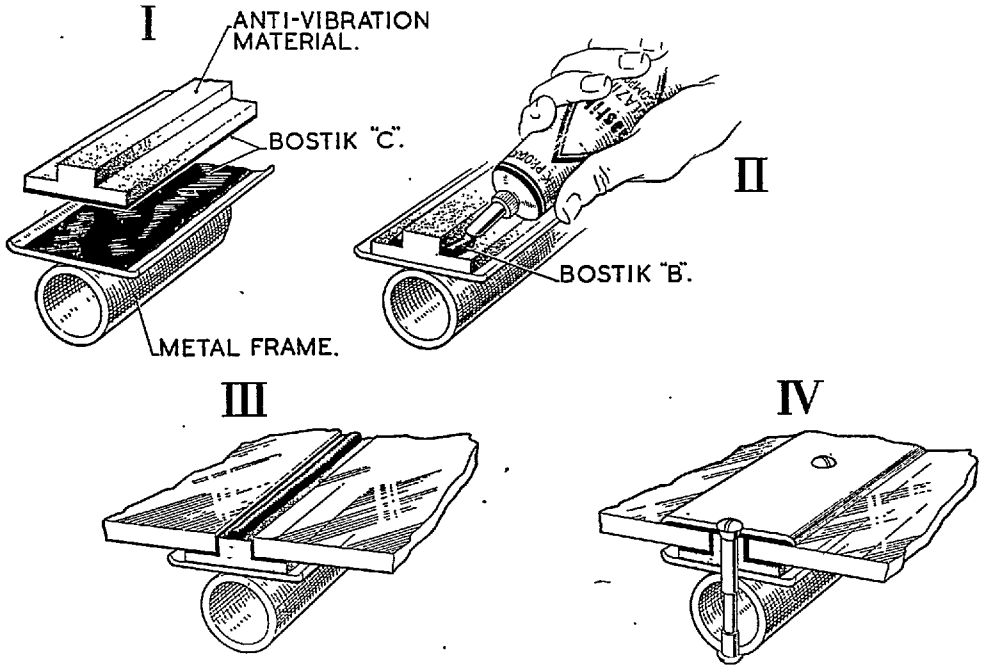

Fig. 13.—Glazing with anti-vibration material

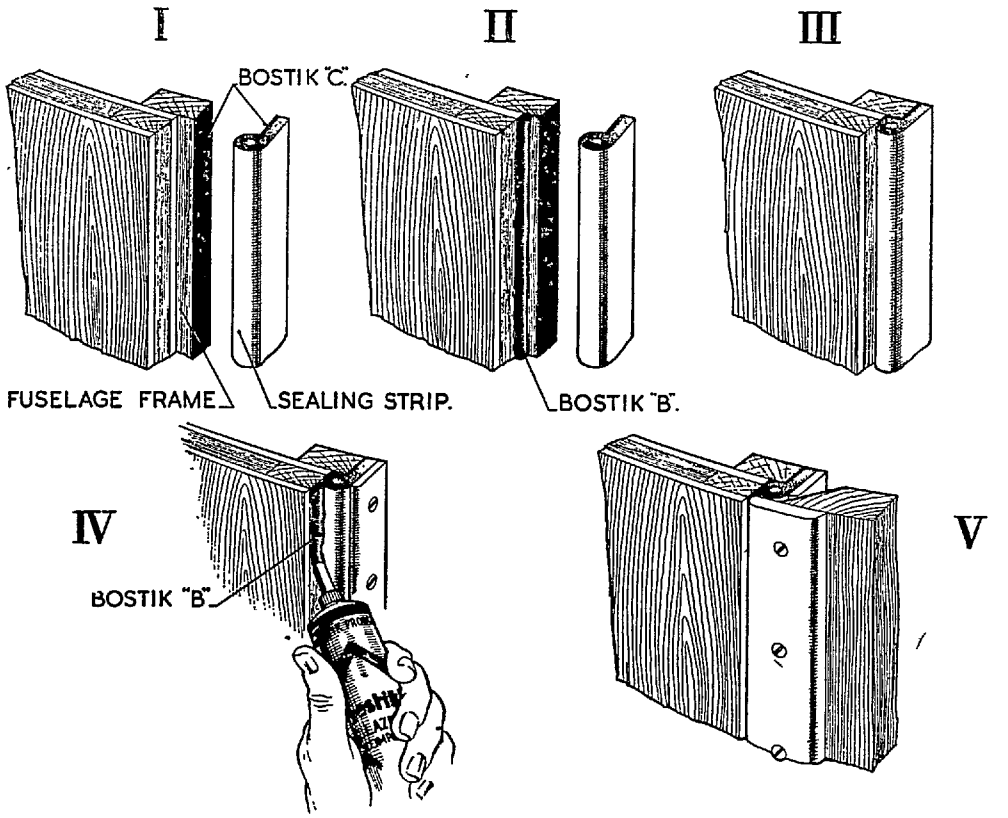

Fig. 14.—Attachment of sealing strips to entry doors, etc.

Glazing with anti-vibration material

17. Bostik–C adhesive should be brushed thinly over both contacting surfaces (see fig. 13 sketch I) and allowed to dry for 30 minutes before pressing together. A continuous bead of Bostik–B glazing compound should then be extruded into the angle of the anti-vibration material (see fig. 13, sketch II), following which the glazing panels should be pressed into position so that a complete seal is formed. A bead of glazing compound should then be extruded liberally on to the top centre of the anti-vibration material (see fig. 14, sketch III). The cover strip should then be placed in position and bolted immediately (see fig. 14, sketch IV), the surplus compound being trimmed off after 24 hours.

Attachment of sealing strips to entry doors, etc.

18. Sealing strips are attached to entry doors, hatches, etc., in order to prevent moisture from attacking the wood of fuselage frames, etc. Bostik–C adhesive should be brushed on to the contacting surfaces of the fuselage frame and sealing strip (see fig. 14, sketch I), allowing the adhesive to dry for 30 minutes. Before attaching the sealing strip, a fillet of Bostik–B should be applied to the frame angle (see fig. 14, sketch II). The sealing strip should then be placed in position (see fig. 14, sketch III), applying pressure by hand before attaching metal cover strip and screwing into position. An external fillet of Bostik–B should then be applied in the angle formed by the round section of sealing strip and fuselage frame (see fig. 14, sketch IV). After 24 hours this external seal should be painted with Boscolyn lacquer to provide protection against oil or petrol.

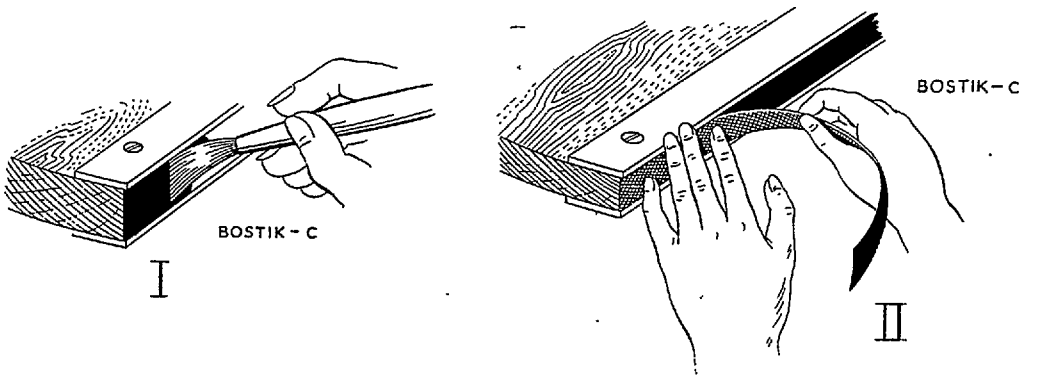

Fig. 15.—Attachment of sealing strips to bomb-bay doors, etc.

Attachment of sealing strips to bomb-bay doors, etc.

19. To attach rubber to metal, a procedure different from that detailed in para. 18 should be followed. The attachment of sealing strips to bomb-bay doors is a typical example. Prior to applying the adhesive, the contacting surfaces should be cleaned thoroughly with a cloth sprinkled with No. 1 Bostik Cleaner (Stores Ref. 33C/589) and then wiped with a piece of clean cloth. The surfaces should then be covered with an even film of Bostik-C applied with a stiff bristle brush (see fig. 15, sketch I). The adhesive should be allowed to dry for a minimum period of 30 minutes, after which the mating surfaces should be pressed together by hand, working gradually along the strip to make sure that no air is trapped (see fig. 15, sketch II). The process should be completed by carefully rolling the strip with a hand roller.

Method of sealing external components

20. When external components are attached to the fuselage, the joints should be sealed and the external edges protected by Bostik-B glazing compound. Bostik-C adhesive compound should also be used if anti-vibration material is fitted between the component and the fuselage.

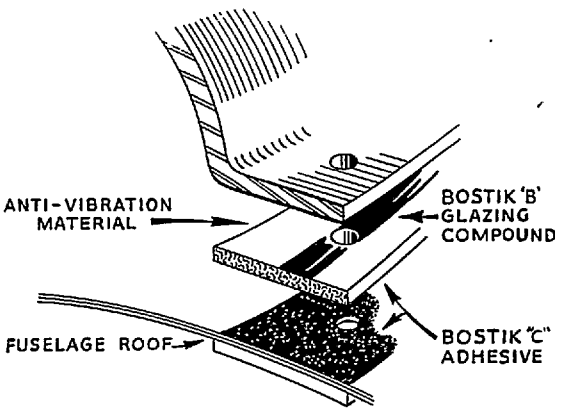

Fig. 16.—Method of affixing anti-vibration material

(i) *Method of affixing anti-vibration material.*—The metal surface should first be given a vigorous rubbing with a soft cloth moistened with the No. 1 Bostik cleaner, after which it should be dried with a piece of clean cloth. An even film of Bostik-C adhesive compound should then be applied to the mating surfaces (see fig. 16) and allowed to dry for 30 minutes. The surfaces should then be pressed together by the maximum pressure obtainable without damaging the components.

(ii) *Method of mounting Perspex moulding.*—A continuous bead of Bostik-B glazing compound should be extruded along the upper surface of the anti-vibration material (see fig. 16). The Perspex moulding should then be pressed down on this bead and secured by bolts.

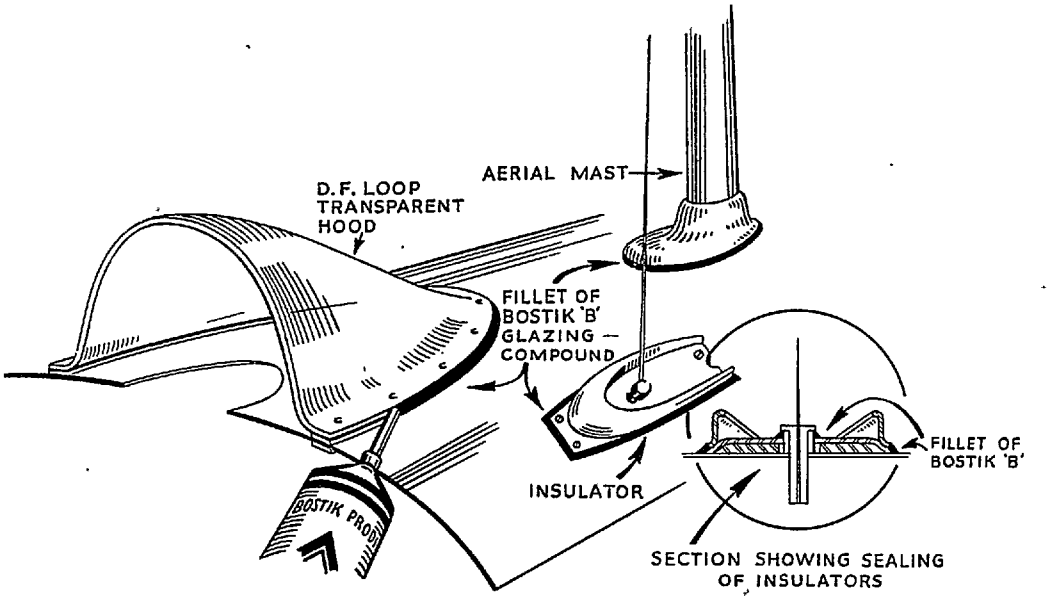

Fig. 17.—Sealing of external components

(iii) *Method of sealing exposed edges.*—A continuous fillet of Bostik-B should be extruded along the edge of the joint and should be thick enough to fill completely the junction of the component and the fuselage (see fig. 17). Where the moulding is of cellulose acetate this fillet should cover the exposed edge of the joint.

Other examples of sealing external components are shown in fig. 17.

Method of sealing buoyancy chambers

21. When buoyancy chambers are being sealed, Bostik-B glazing compound should be used. The metal surfaces should be thoroughly cleaned and a liberal fillet of the compound extruded along the angle joints (see fig. 18). A continuous bead should also be extruded on to the outer lip of the buoyancy compartment, thus sealing the edges of the cover plate. After 24 hours, the surplus compound may be trimmed off with a wet knife.

Boscoprene cement No. 551

22. Boscoprene cement No. 551 is employed for attaching oil resisting rubber to metal, and for sealing inspection panels, cover plates, etc., where resistance to oil is required. The cement consists of Part A (Stores Ref. 33C/740), which is provided in a half-pint tin, and Part B (Stores Ref. 33C/741), which is supplied in a small bottle. The cement is used on surfaces previously treated with Boscotex primer No. 5R (Stores Ref. 33C/739). Maximum adhesion is not obtained until 3–5 days after the joint is made and it should not, therefore, be allowed to come into contact with oil until this period has elapsed.

Method of mixing the cement

23. All the contents of the bottle, having been thoroughly shaken, should be poured into those of the tin, stirring thoroughly while pouring. Stirring should continue for 2 or 3 minutes to ensure a thorough mixing. The mixed cement becomes unfit for further use 12–18 hours after mixing and so must be used within that time.

Attachment of oil-resisting rubber to metal

24. When an oil-resisting rubber is to be attached to metal, the contacting surfaces should be cleaned with No. 4 Bostik cleaner applied on a cloth and should then be wiped with a clean cloth. A thin, even coating of Boscotex primer No. 5R should be applied to the metal surface and also to the contacting surface of the oil-resisting rubber. The primer should then be allowed to dry—a process requiring about one hour. An even film of the mixed cement should now be applied with a brush or a spreader knife to the primed surfaces of both the metal and the rubber and should be left to dry for 20 minutes.

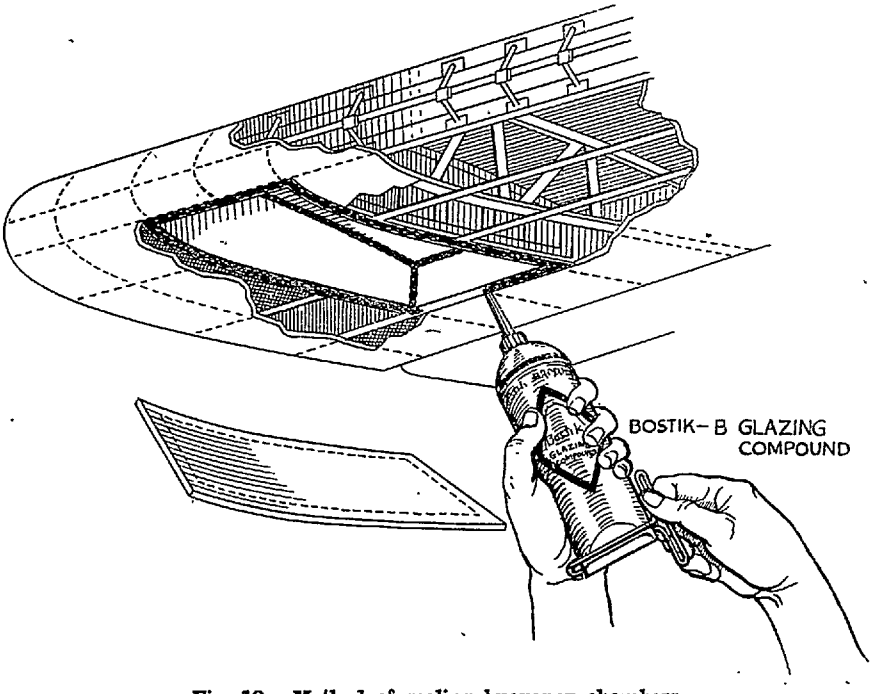

Fig. 18.—Method of sealing buoyancy chambers

25. The rubber should now be applied to the cement-covered metal and should be held in one hand and gradually pressed on the metal, care being taken to ensure that no air is trapped between the contacting surfaces. The rubber should finally be well handrolled where possible.

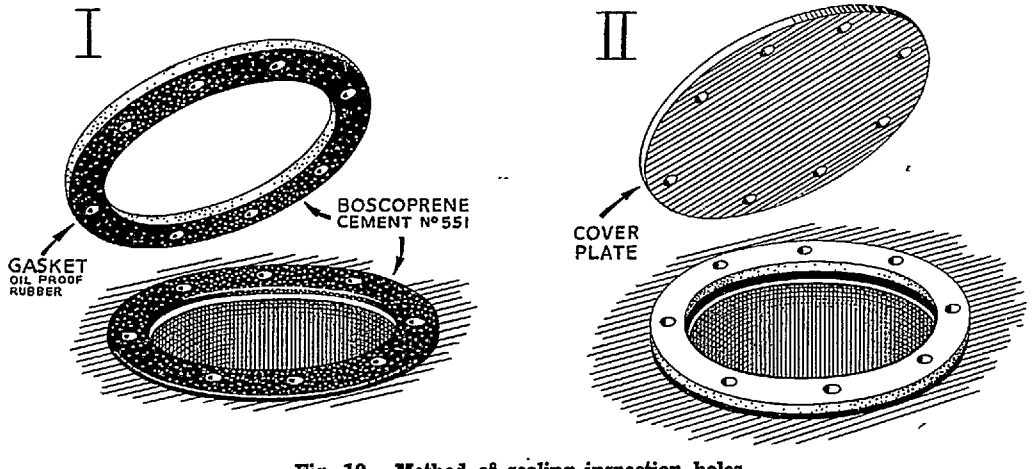

Fig. 19.—Method of sealing inspection holes

Method of sealing inspection holes

26. When inspection holes are sealed, the gasket is cemented to the seating of the inspection hole before the cover plate is attached. The metal seating should be cleaned with No. 4 Bostik cleaner and one side of the rubber gasket with No. 1 Bostik cleaner. After the cleaners have completely evaporated, an even coating of Boscotex primer No. 5R should be applied with a cloth, using a circular motion. The primer should then be allowed to dry, a process requiring from one to two hours. If the gasket is to be attached to wood, no primer is required. One coat of mixed Boscoprene 551 cement should be applied to one side of the rubber gasket and to the seating of the inspection hole (see fig. 19, sketch I). After being allowed to dry for 15 minutes, the cemented surfaces should be pressed together with the maximum pressure obtainable without causing damage to the components. Finally, the cover plate should be attached in the usual manner (see fig. 19, sketch II).

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