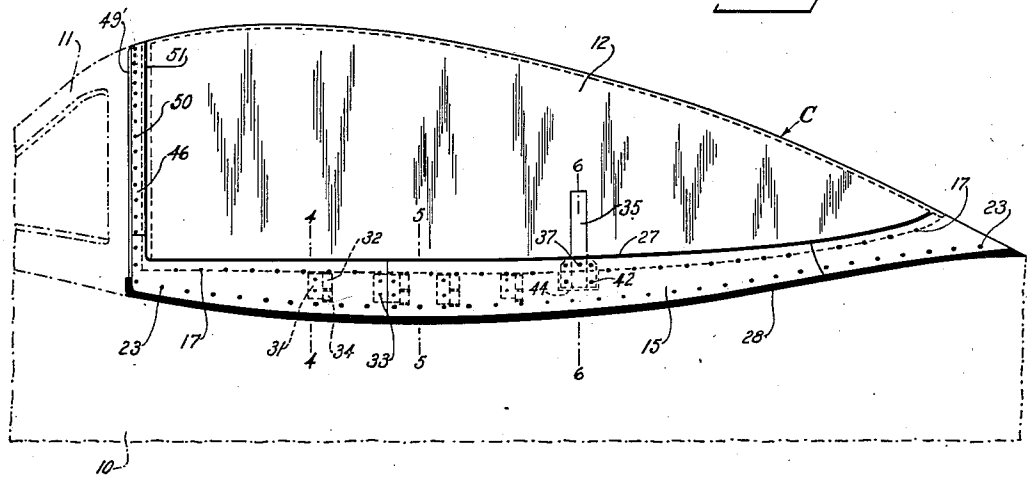
May 10, 1949. C. C. KING 2,469,436

CANOPY CONSTRUCTION

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Fig. 1



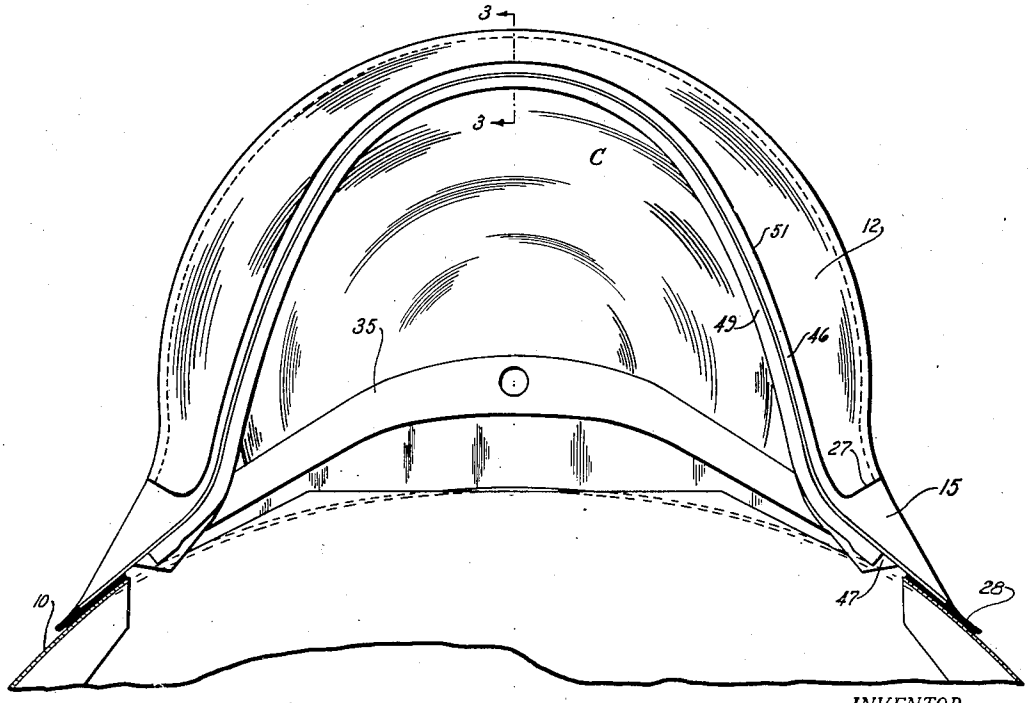


Fig. 2

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CANOPY CONSTRUCTION

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FIG. 3

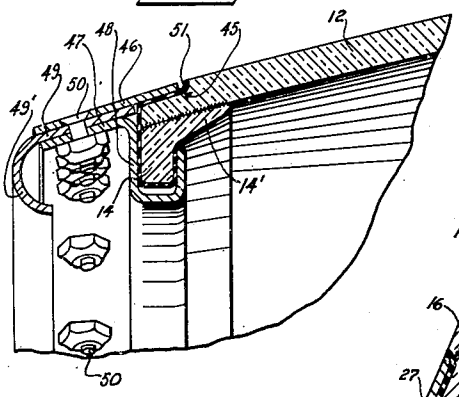


FIG. 4

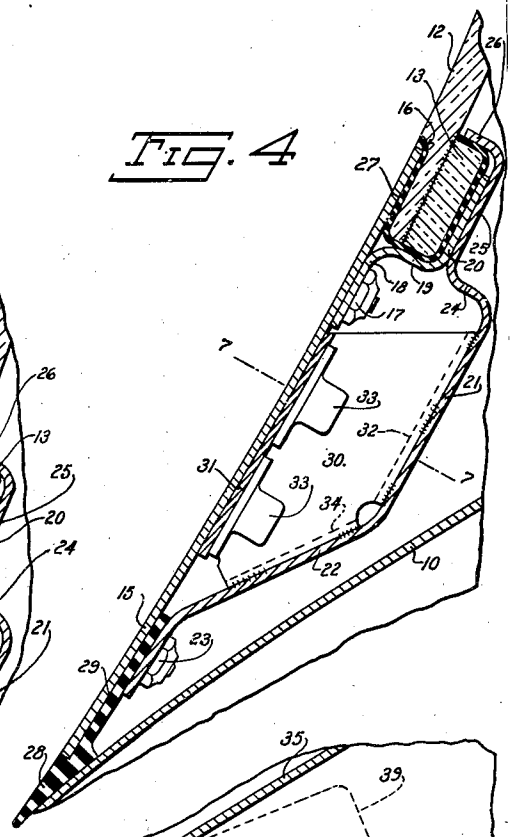
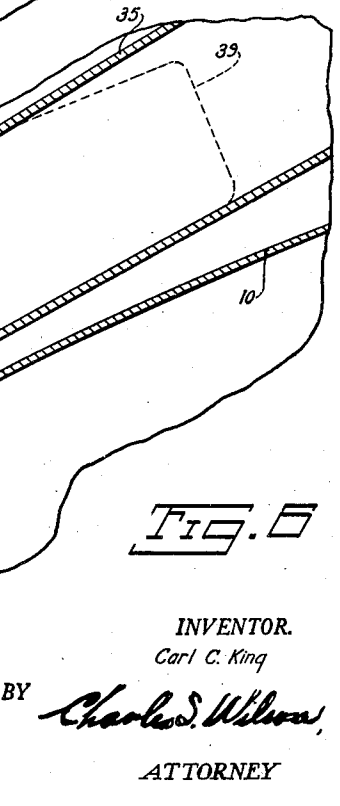


FIG. 5

FIG. 6



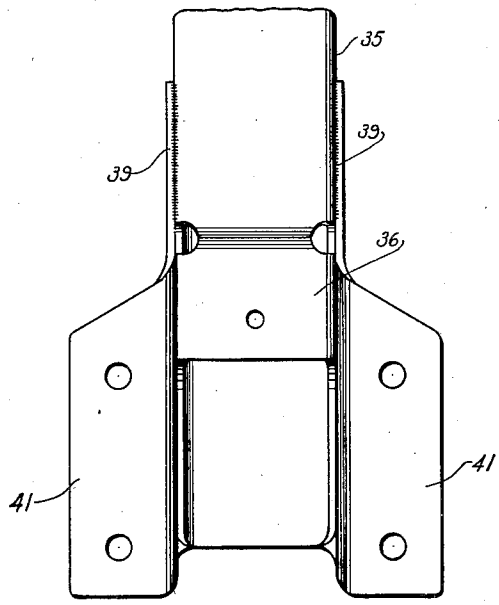
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Fig. 8



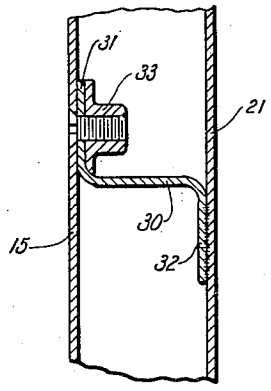


Fig. 7

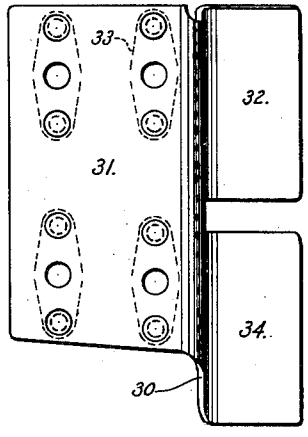


Fig. 9

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CANOPY CONSTRUCTION

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Application November 21, 1944, Serial No. 564,438

13 Claims. (Cl. 244—121)

1

This invention relates to aircraft canopy constructions wherein a transparent body, permitting vision in all directions, is firmly mounted in and engaged by a skirt or framepiece at its edges, whereby and through which the canopy may be positioned and carried by the fuselage of an aircraft.

Among its other objects the instant invention contemplates a transparent canopy body which, while formed to permit full and general vision in all directions, may be of any practical shape and be secured and mounted on the fuselage of an aircraft at its edges or edge portions only.

The present structure proposes a transparent plastic canopy, having its body arched both longitudinally and transversely and having its edge portions fixedly secured to a metal frame or skirt in such manner that differences in the coefficients of expansion and contraction of the materials employed in said body and frame are accommodated and compensated for without setting up unbalanced forces within the plastic body and without causing any distortion or warping thereof.

With the above and other objects in view, as will be apparent, this invention consists in the construction, combination and arrangement of parts, all as hereinafter more fully described, claimed and illustrated in the accompanying drawings, wherein:

Fig. 1 is a side elevation of a canopy constructed in accordance with the present invention;

Fig. 2 is an elevation of the canopy looking aft from its forward end;

Fig. 3 is a vertical section taken along line 3—3 of Fig. 2 to illustrate the details of construction of the forward end of the canopy where it, in full forward position, coacts with the windshield;

Fig. 4 is a vertical section through the framepiece or skirt along line 4—4 of Fig. 1 to illustrate the construction of the skirt or framepiece, its cooperation with and its engagement of the transparent body of the canopy and the positioning and mounting of one of the bulkheads or spacers situated within the skirt or frame-piece;

Fig. 5 is a vertical section through the framepiece or skirt along line 5—5 of Fig. 1 to illustrate the structure employed in the frame-piece or skirt of the canopy and its cooperation with the transparent body at points intermediate of the bulkheads or spacers positioned within the frame-piece or skirt;

Fig. 6 is also a vertical section through the frame-piece or skirt along line 6—6 of Fig. 1 and illustrates the mounting of the transverse yoke

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positioned within the canopy and the cooperation thereof with, and the mounting thereof on, the frame-piece or skirt of the canopy;

Fig. 7 is a transverse section along line 7—7 of Fig. 4 to show the details of construction and mounting of one of the bulkheads or spacers employed within the frame-piece;

Fig. 8 is an end elevation of the yoke with the skirt or frame-piece removed to illustrate the structure by which the yoke is attached to said skirt or frame-piece; and

Fig. 9 is an elevation of one type of bulkhead or spacer employed within the skirt or frame and which differs from other types only in size and degree.

The present canopy construction embodies a transparent canopy of the "Bubble type" but may, of course, include any type of transparent canopy body capable of being secured at its edges to a skirt or frame-piece by which it is mounted upon the aircraft fuselage. While any type of transparent material may be employed in the body of the canopy the instant invention contemplates a transparent body made of synthetic resins and more particularly a body of acrylic resin. In materials of this kind there is a wide difference between the coefficient of expansion of the body of the canopy and the metallic frame-piece or skirt which frames and embraces its edges and by which it is mounted on and secured to an aircraft fuselage. This difference in the coefficients of expansion of the materials used and employed in the canopy structure must be accommodated and compensated for and to that end the present invention is designed to rigidly and permanently secure the plastic transparent body of the canopy to the skirt or frame-piece without setting up unbalanced forces and at the same time permit the free and untrammeled relative expansion and contraction of the several components of the canopy structure without injury to or distortion of the parts and to do so without using any of the usual and customary fastening means such as rivets, bolts, etc., passing through the transparent plastic body portion of the canopy structure.

In the drawings 10 designates the fuselage of an aircraft and 11 the windshield fixed against movement to the fuselage at the front end of the cockpit. The present canopy construction, generally designated as C is mounted for reciprocation over the cockpit and the fuselage 10 in a fore-and-aft movement toward and away from the windshield 11 in the usual conventional manner. It is to be understood that the mounting of

the canopy C for movement relative to the fuselage is not an essential hereof since a fixed or stationary canopy may readily employ the present construction. In its forward or closed position the front end of the canopy C contacts and abuts the windshield 11 thereby completely enclosing the cockpit. Reversely in its rearward or aft position the forward end of the canopy C is spaced from the windshield 11 thereby opening and permitting access to the cockpit.

The present invention is only concerned with the canopy C which comprises a transparent plastic body portion 12 permanently engaged at all of its edges by a frame or skirt-piece. To that end the inner surfaces of the transparent body 12 of the canopy has a bead or rib 13 cemented or otherwise permanently secured to its inner surface at and adjoining its longitudinal edges and a similarly formed bead or rib 14 attached to its inner surface at and adjoining its transverse edge, viz: the forward edge thereof which in closed position contacts with the windshield 11. These beads or ribs 13—14 project inwardly from the edge portions of the transparent body 12 of the canopy. The bead 13 is of substantially rectangular cross-section and is of a uniform thickness at least equal to the thickness of the body 12 of the canopy and by extending inwardly from the edge of the canopy a distance greater than its thickness presents a substantial structure to be engaged and clamped. The bead 14 at the transverse or forward edge of the body 12 is somewhat greater in thickness than the body and adjacent the edge of the body is appreciably thicker than the bead 13. At its rear edge this bead 14 merges into the integral, sloping extension 14' resting flush against and, like the bead itself, cemented or otherwise permanently attached to the inner face of the body 12.

The skirt or frame-piece which is secured to the longitudinal edges of the canopy C for clamping and engaging cooperation with said edges and with the beads 13 at said longitudinal edges, comprises a skirt-plate 15 which overlaps the outer surfaces of the longitudinal edges of the body 12 of the canopy at its upper or inner edge and projects beyond the limits of said body 12 at its lower edge. The outer surface of the body 12 has the recess 16 adjacent and parallel to each of its longitudinal edges for the reception of the upper edge of the skirt plate 15. Secured to the inner surface of the skirt plate 15 in any suitable manner, as, for instance by the bolts or rivets 17, is an intermediate supporting plate 18 which adjoining its lower edge rests flush against the inner surfaces of the skirt plate 15 just below and parallel to the upper edge of said plate. This supporting plate 18 is Z-shaped in section, being bent inwardly, as at 19, to rest against the lower longitudinal edges of both the body 12 and the bead 13 and in alignment with the inner surface of the bead 13 being bent upwardly to create a section 20 thereof to rest flush against the head and terminate just below the upper longitudinal edge thereof.

An inner clamping plate 21 is spaced from and, medially of its width, is disposed substantially parallel to the skirt plate 15. Adjacent its lower edge a portion 22 of the plate 21 slopes toward the lower longitudinal edge of the skirt where it is bent to create an edge flange situated parallel to the plate 15 and where it is permanently secured by the bolts or other suitable fastening means 23, piercing both plates 15 and 21. At its upper edge the clamping plate 21, through part of its length, has a right angular portion 24 positioned in the plane of the part 19 of the supporting plate 18. In approximate alignment with the inner surface of the bead 13, the angular portion 24 bent upwardly to form a clamp 25 bearing flush against the extension or section 20 of the plate 18. A transverse flange 26 is provided at the extremity of the clamp 25 to extend over and cap the upper longitudinal edge of the coacting bead 13. Thus the longitudinal edge of the body 12 of the canopy is clamped firmly and permanently to the frame-piece or skirt and is held in place against movement transversely of the frame-piece in one direction by the supporting plate 18 and against movement relative to the frame-piece in the opposite direction by the portions 25 and 26 of the clamping plate 21. The structure just described comprises the construction of the skirt or frame-piece throughout the major portion of its length, viz: forward of the yoke or arch 35. Aft of this yoke or arch 35 the construction of the frame-piece or skirt is modified somewhat, as will be hereinafter described, because of the pronounced convergence of the opposed sides in the particular canopy shape here used as an example of one embodiment of this invention.

To cushion the junctions between the metallic members 15, 20 and 26 and the transparent plastic body 12 and bead 13, and to take up any irregularities which may occur in either, a compressible flexible gasket 27, of rubber or similar material, is positioned in the recess 16 between the body 12 of the canopy and the upper longitudinal edge of the skirt plate 15, and crosses the lower longitudinal edges of the body 12 and the bead 13 to lie between the section 20 of the supporting plate 18 and the inner face of the bead 13 as well as between the flange 26 of the clamping plate 21 and the upper longitudinal edge of the bead 13.

A flexible lip of rubber or other suitable material 28 projects below the lower longitudinal edge of the skirt plate 15 and has an inwardly extending flange 29 gripped between the edge flange of the sloping portion 22 of the clamping plate 21 and the inner surface of the skirt plate 15 adjacent its outer longitudinal edge. This lip 28 bears against the skin 10 of the fuselage as illustrated in Figs. 2, 4, 5 and 6, and constitutes a seal between the frame-piece or skirt and the fuselage.

At intervals, bulkheads or spacers are interposed between the clamping plate 21 and the inner surface of the skirt-plate 15 and therefore are situated within the frame-piece or skirt. Each of these bulkheads or spacers comprises a vertical plate 30 positioned transversely within the skirt or frame-piece and provided with oppositely extending flanges 31—32 at its vertical edges, which in the assembled structure respectively rest flush against the inner faces of the skirt plate 15 and the clamping plate 21 below the longitudinal edge of the body 12 and its bead 13. The flange 31 is secured to the skirt plate 15 in any suitable manner, as for instance by the bolts or rivets 33, while the flange 32 may be welded or otherwise attached to the inner face of the clamping plate. The lower edge of the plate 30 of the bulkhead or spacer is sloped to correspond to the slope of the section 22 of the clamping plate 21 and is there provided with an angularly disposed flange 34 resting flush against the inner surface of the sloping portion 22 of the clamping plate 21 to be welded or otherwise se-

cured to the plate 21 at that point. In this manner a rigid plate 30 is interposed between the skirt plate 15 and the clamping plate 21 and overcomes any tendency of these plates to collapse or move one toward the other, the bulkhead or spacer 30 being secured to the skirt plate 15 and to the clamping plate 21 and its sloping section 22 by the flanges 31, 32 and 34 formed integrally from the bulkhead 30 and resting flush against the inner surfaces of the coacting plates. The connections between the flanges 31—32 and the plates 15—21 not only secure the bulkhead in its transverse position within the skirt or frame-piece, but also reinforce the coacting elements or components of the skirt or frame-piece. Manifestly the width of the flanges 31 of the several bulkheads or spacers 30 coacting with the inner surface of the skirt-plate 15 may vary, some of the flanges 31 being wider than others, as illustrated in dotted lines in Fig. 1 without departing from the concept of this invention.

A yoke or arch 35 is interposed between the longitudinal sides of the skirt or frame-piece toward the aft end of the canopy C and serves the double purpose of spacing the two longitudinal sides of the skirt or frame-piece with respect to each other and of providing a support for mounting of the aft end of the canopy. This yoke is curved upwardly, as illustrated, so that it can, on occasion, operate over the top surface of the fuselage aft of the cockpit and also to provide additional strength to the yoke.

This yoke 35 is made of sheet metal and is rectangular in cross section. At each of its ends it is provided with an ear 36 formed integrally from the top side of the yoke and bent inwardly of the yoke to lie parallel to the outer face of the clamp 25 of the clamping plate 21. A bolt or other suitable fastening means 37 pierces this ear 36, the clamp 25 of the plate 21, as well as the section 20 of the supporting plate 18, and thereby secures the yoke 35 to the skirt or frame-piece. To provide additional support for the yoke 35 and to additionally secure it to the skirt or frame-piece, a plate 39 is welded, or otherwise secured, to each vertical side of the yoke at its ends and is held flush against the outer face thereof. Each of these plates 39 is provided with a transversely disposed flange or lip 41 at its outer end which projects laterally away from the coacting face of the yoke to rest flush against the outer surface of the clamping plate 21 where it is secured by suitable bolts or other fastening means 42 completely piercing the frame-piece or skirt below the lower edges of the body 12 of the canopy and the cooperating bead 13, as illustrated in Fig. 6. Since the flanges or lips 41 are positioned beyond the plane of the end of the yoke 35 and of the ear 36 thereof, a washer 43 is positioned around each of the bolts or fastening means 37 to fill the space between the ear 36 and the clamping plate 21. This arrangement prevents any tendency on the part of the ear 36 to become distorted by reason of the pressure of the rivets or bolts 37.

Below the longitudinal edge of the body 12 of the canopy and the coacting bead 13 affixed thereto and at the points where the yoke 35 joins the frame-piece or skirt, a spacer or compression block 44 is inserted between the clamping plate 21 and the skirt plate 15 and is held in place by the bolts 42. This compression block overcomes any tendency on the part of the skirt or frame-piece to collapse under the pressure of the bolts or other fastening means 42.

At and aft of the yoke 35 the clamping plate 21 is formed differently than it is forward of the yoke, in that it does not embody the right angularly bent portion 24 terminating in the clamp 25, but is so formed that the clamp 25 and plate 21 are coextensive. Therefore the plate 21, in fact, extends upwardly to rest directly flush against the section 20 of the supporting plate 18 and terminates in the capping flange 26. Thus the flanges 41 of the plates 39 rest flush against the clamping plate 21 throughout their abutting surfaces and the ear 36, at the end of the yoke 35, rests parallel to the clamping plate 21 but is spaced therefrom by the thickness of the washer 43. The construction shown in Fig. 6 continues throughout the entire length of the longitudinal sides of the skirt or frame piece aft of the yoke 35 so that the angularly disposed portion 24 of the clamping plate is completely eliminated, and the clamping plate 21 itself forms a continuation of the clamp 25 all as illustrated in Fig. 6. If desired, the construction and relative positioning of the components of the assembly as shown in Fig. 6 may continue forward of the yoke 35, in which event the structural arrangement shown in Fig. 4 would be modified to conform to the structural arrangement shown in Fig. 6.

The foregoing describes the skirt or frame-piece positioned at and engagingly and clampingly supporting the longitudinal edges of the transparent body 12 of the canopy. The forward transverse edge of the body 12 of the canopy is provided with a relatively thick bead 14 on its inner surface adjacent in alignment with said edge which has a sloping rearward extension 14' resting flush against the inner face of the body 12 aft of the bead 14. The bead 14 and its extension 14' are cemented or otherwise permanently attached to the inner face of the body 12 of the canopy C at its forward transverse edge. The outer surface of the transverse edge portion of the canopy is recessed, as at 45, to receive the inner edge of the skirt plate 46 which is a transverse continuation of the skirt plate 15 and extends from the skirt plate 15 on one side of the canopy 12 to the skirt plate 15 upon the other side of the canopy. The plate 46 may be made integrally with the skirt plates 15 on each longitudinal side of the canopy if desired. A clamping plate 47 is positioned to cooperate with the inner face of the plate 46 and is provided with an angular disposed, pocketed engaging extension 48 to seat over and grip the relatively thick bead 14. Interposed between the plate 46 and the clamping plate 47 is an intermediate plate 49, having an inwardly curved abutment 49' at its outer edge extending beyond the outer edges of the plates 46 and 47. The three plates 46, 47 and 49 are secured together by a series of rivets, bolts or other suitable fastening means 50 whereby a unitary structure results. To cushion the engagement between the plates 46—47 and the pocketed extension 48 of the plate 47 and the transparent plastic body 12 and its bead 14, a gasket 51 is disposed in the recess 45 and rests flush against all exposed surfaces of said body and bead engaged by the plates 46 and 47 or parts thereof. This gasket 51 takes up all irregularities and cushions the joint.

When the canopy is in its full forward position as illustrated in Fig. 1, the abutment 49' at its forward transverse edge contacts with the windshield 11 thereby closing the cockpit. In any other position the abutment constitutes a finishing member for the forward edge of the transparent body 12 of the canopy C.

From the foregoing it is manifest that the transparent body 12 of the canopy is firmly and permanently engaged at its edges by the skirt or frame-piece and by the plates 46 and 47, and that it can expand and contract longitudinally and transversely relative to the metallic parts of the skirt or frame-piece and the plates 46 and 47. Because of the difference in the coefficients of expansion of the several materials of the canopy and because of the extreme range of temperatures to which the canopy is subjected, the body 12 thereof must, in expanding and contracting, be able to move relatively to the skirt or frame-piece while being firmly engaged against displacement from said skirt or frame-piece. This is accomplished by the present invention and in being so engaged the plastic, transparent body 12 is not pierced by any openings or holes or by any rivets, bolts or other attaching means. In this manner the plastic body 12 is protected from any weakening apertures and by the employment of the clamping structure of the skirt or frame-piece such as herein described all unbalanced forces or loads are overcome and eliminated.

What is claimed is:

1. In the canopy of an aircraft, the combination with a transparent body, of a skirt-plate bearing against the outer surface of said body and forming an unbroken continuation thereof, a bead upon the inner surface of the body at and adjoining and in transverse alignment with its edge, a supporting plate fixed to said skirt-plate and bent to be positioned under the outer edges of the bead and canopy and to bear against the inner surface of said bead, a clamping plate spaced from the skirt-plate and provided with a portion overlying that part of the supporting plate bearing against the inner surface of said bead, an angularly disposed flange at the inner extremity of the clamping plate extending over and bearing against the inner edge of the bead, and means for securing said clamping plate to said skirt-plate below the outer edges of the bead and the canopy.

2. In the canopy of an aircraft, the combination with a transparent body, of a skirt-plate bearing against the outer surface of said body and forming an unbroken continuation thereof, a bead upon the inner surface of the body at and adjoining its edge and in transverse alignment with the edge portion of the body, a supporting plate fixed to said skirt-plate and bent to be positioned under edges of the bead and canopy and to operate against the inner surface of said bead, an inner clamping plate spaced from the skirt-plate and resting against that part of the supporting plate bearing against the inner surface of said bead, an angularly disposed flange at the extremity of the clamping plate overlying the inner longitudinal edge of the bead, bulkheads introduced at intervals between the skirt-plate and the clamping plate, each having angularly disposed flanges resting flush against and secured to the adjoining surfaces of the skirt and clamping plates, and means for securing the clamping plate to the inner surface of the skirt plate below the limits of the bulkheads aforesaid.

3. In an aircraft canopy, the combination with a transparent body, of a relatively wide flat bead permanently affixed to the inner surface of said body adjacent to and coextensive with the edge portions thereof, a skirt plate having its upper edge portion positioned against the outer surface of said canopy in transverse alignment with

said bead and forming a substantial continuation of the outer surface of the canopy, a supporting plate secured to the inner surface of the skirt plate below the edges of said canopy and bead and having a portion thereof bent inwardly and upwardly to be disposed below the outer edge of the bead and to bear aaginst the inner face of the bead, an inner clamping plate formed to have a section resting flush against that portion of the supporting plate bearing against the inner face of the bead, an adjacent central section resting substantially parallel to the skirt plate and a lower section sloping toward the inner surface of the skirt plate, a series of spaced bulkheads interposed between the skirt plate and the central section of the clamping plate, each being fixedly secured to the skirt plate and the clamping plate, and means for securing the extremity of the sloping section of the clamping plate to the skirt plate adjacent the outer edge thereof.

4. In an aircraft canopy, the combination with a transparent body, of a relatively wide flat bead permanently affixed to the inner surface of said body adjacent to and coextensive with the edge portions thereof, a skirt plate having its upper edge portion positioned against the outer surface of said canopy in transverse alignment with said bead and forming a substantial continuation of the outer surface of the canopy, a supporting plate secured to the inner surface of the skirt plate below the edges of said canopy and bead and having a portion thereof bent inwardly and upwardly to be disposed below the outer edge of the bead and to bear against the inner face of the bead, an inner clamping plate formed to have a section resting flush against that portion of the supporting plate bearing against the inner face of the bead, an adjacent central section resting substantially parallel to the skirt plate and a lower section sloping toward the inner surface of the skirt plate, a series of spaced bulkheads, interposed between the skirt and clamping plates, a series of angularly disposed flanges on each bulkhead to cooperate with and be attached to the inner surfaces of the skirt plate, the clamping plate and the sloping lower section of the latter, and means whereby the lower edge portion of the sloping section of the clamping plate may be secured to the inner surface of the skirt plate.

5. In an aircraft canopy, the combination with a transparent body, of a skirt plate positioned to partly overlap and form a continuation of said body, a clamping plate spaced from the skirt plate and partly overlapping said body to cooperate with the skirt plate to clampingly engage the edge portion of said body, a section of said clamping plate sloping toward and terminating adjoining the outer edge of the skirt plate, and a bulkhead interposed between said skirt and clamping plates having opposed edges substantially parallel and flush with the inner surfaces of the skirt and clamping plates and one end edge parallel to and flush with the sloping section of the clamping plate and provided with a lateral flange at each of said edges lying flush against and fixed to the adjoining plate surfaces.

6. In the canopy of an aircraft, the combination with a transparent hollow member having boundary edge portions of a frame-piece clampingly engaging the edge portions of said member and forming a continuation thereof, and a yoke interposed between opposed sides of said frame-piece and secured to the inner surfaces thereof.

7. In an aircraft canopy, the combination with a hollow transparent member having boundary

edges of a frame-piece clampingly engaging the edges of said member and forming a continuation thereof, a yoke interposed between the inner sides of said frame-piece comprising a body rectangular in cross section, an ear projecting inwardly from the upper side of said body at each of its ends and secured to the inner surface of the frame-piece, a plate permanently attached to each vertical side of said body at each of its ends, an angularly positioned flange at the outer extremity of each plate resting flush against the inner surface of the frame-piece, and means for securing the flanges of said plates at each end of the body to the corresponding and adjoining portions of the frame-piece.

8. The combination with a transparent aircraft canopy body having a forward, arched transverse edge and longitudinal edges converging aftward therefrom, of a projecting bead permanently affixed to the edge portions of said body, a frame clampingly engaging said transverse edge of said body to form a projecting continuation thereof, and a skirt assembly associated with the ends of said frame and clampingly engaging and projecting from the aforesaid longitudinal edges.

9. The combination with a transparent aircraft canopy body having an arched forward edge and longitudinal side edges aftwardly convergent from the ends of said transverse edge, the body sloping aftward from the transverse edge toward the point of convergence of said longitudinal edges, a substantially continuous skirt plate positioned to overlap all of the aforesaid edges of the body and project therefrom to constitute an approximate continuation coplanar of the surface of the body, and a clamping plate disposed in opposition to said skirt plate for the clamping engagement of the edge portion of the body between it and the skirt plate aforesaid.

10. The combination with a transparent aircraft canopy having an arched forward transverse edge and longitudinal edges converging aftwardly from the ends of said transverse edge, the body sloping aftwardly and downwardly from the transverse forward edge toward the point of convergence of its longitudinal edges and the exterior surfaces of the edge portions of the canopy having a coextensive recess, of a bead permanently affixed to the inner face of the body in substantial opposition to the recess aforesaid, a skirt plate having its inner longitudinal edge portion seated in said exterior recess of the canopy whereby said plate constitutes a flush continuation of the canopy, a clamping plate engaging over the interior bead aforesaid and secured to the skirt plate beyond the limits of the body thereby clampingly engaging the edge portions of the body and the bead between the skirt and clamping plate, and contact members secured to the inner surface of the outer edge of the skirt plate and to project beyond said outer edge.

11. The combination with a transparent aircraft canopy having an arched forward transverse edge and longitudinal edges converging aftward from the ends of said transverse edge, the body sloping aftwardly from the transverse edge toward the point of convergence of the longitudinal edges and having a coextensive recess in the exterior surfaces of the edge portions of the body, of a bead permanently affixed to the inner face of the body in substantial transverse alignment with the recess aforesaid, a skirt plate having its inner longitudinal edge portion seated in the exterior recess of the body whereby said plate constitutes a flush continuation of the body, a clamping plate engaging over the interior bead aforesaid and secured to the skirt plate beyond the limits of the body thereby clampingly engaging the edge portions of the body and the bead between the skirt and clamping plates, and a plate secured between the skirt and clamping plates coacting with the transverse edge of the canopy having an abutment formed therefrom extending beyond the edge of said skirt plate.

12. The combination with a transparent aircraft canopy having an arched forward transverse edge and longitudinal edges converging aftwardly from the ends of said transverse edge, the body sloping aftwardly from the transverse edge toward the point of convergence of the longitudinal edges and having a coextensive recess in the exterior surfaces of the edge portions of the body, of a bead permanently affixed to the inner face of the body in substantial transverse alignment with the recess aforesaid, a skirt plate having its inner longitudinal edge portion seated in the exterior recess of the body whereby said plate constitutes a flush continuation of the body, a clamping plate engaging over the interior bead aforesaid and secured to the skirt plate beyond the limits of the body thereby clampingly engaging the edge portions of the body and the bead between the skirt and clamping plates, and a resilient lip projecting beyond the outer edge of the skirt piece and provided with a flange secured between the adjacent edges of the skirt and clamping plates.

13. The combination with a transparent aircraft canopy having a forward transverse edge and converging longitudinal edges, the exterior surfaces of the edge portions of the body being provided with a coextensive recess, of a bead permanently affixed to the inner face of the body in substantial transverse alignment with the recess aforesaid, a skirt-plate having its inner longitudinal edge portion seated in the exterior recess of the body whereby said plate constitutes a flush continuation of the body, a clamping plate engaging over the interior bead aforesaid and secured to the skirt plate beyond the limits of the body thereby clampingly engaging the edge portions of the body and the bead between the skirt and clamping plates, a resilient lip along the longitudinal edges of the body projecting beyond the outer edge of the skirt piece and having a flange secured between adjoining edges of the skirt and clamping plates, and a plate secured between the skirt and clamping plates coacting with the transverse forward edge of the canopy having an abutment formed therefrom extending beyond the edge of said skirt plate.

CARL C. KING.

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