

[54] **FACE MOUNTED HINGE**

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[52] **U.S. Cl.** **16/159; 85/83; 16/DIG. 13**

[51] **Int. Cl.²** **E05D 5/02; E05D 9/00**

[58] **Field of Search**..... **16/135, 159, DIG. 13; 24/73 P; 85/83, 84**

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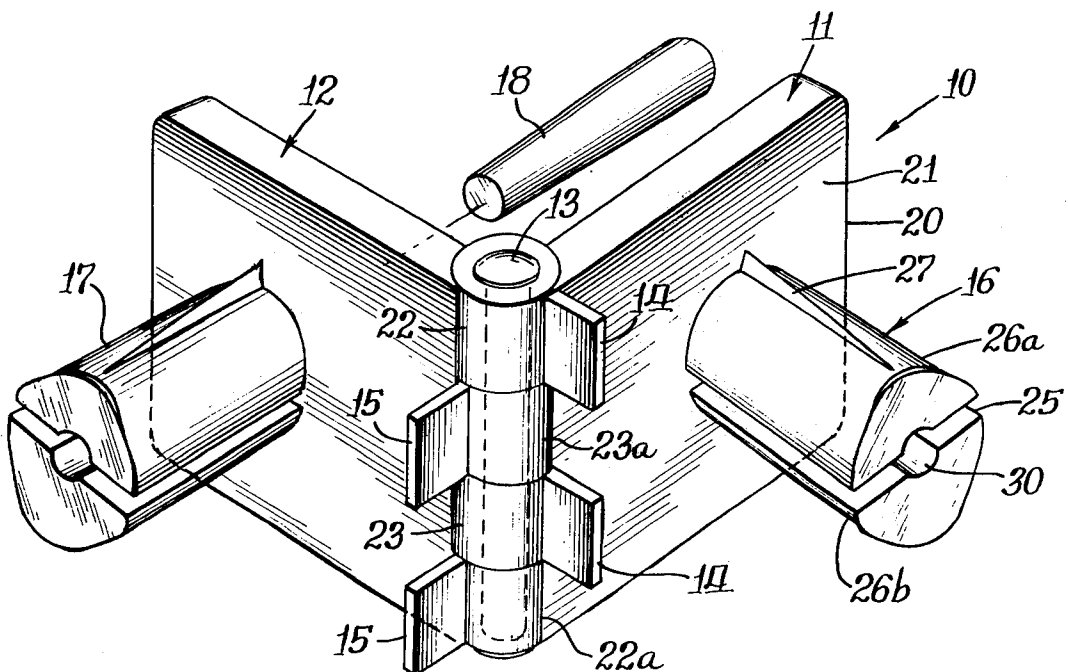
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[57]

ABSTRACT

A surface mounted hinge particularly useful between adjacent folding wood panels or doors comprising a pair of molded plastic leaf members pivotally joined by a hinge pin common thereto and each having a planar guide surface engageable with a panel face and guide means extending at right angles to said guide surface for engaging transverse edge surfaces of the panels to accurately align cooperating hinge leaves and provide predetermined spacing between adjacent panels. A generally cylindrical mounting plug projects integrally from the mounting surface of each leaf member for insertion into a mounting socket bored inwardly of the panel face on which the hinge leaf is mounted. Each mounting plug is split longitudinally and is expandable by an axially insertable pin to lock the plug portion in its mounting socket, such expansion serving to drive extending anchor portions thereon into the walls of the mounting socket; with the expansion of the mounting plug being confined to single direction paralleling the hinge axis to avoid lateral splitting of the wood panel.

3 Claims, 5 Drawing Figures



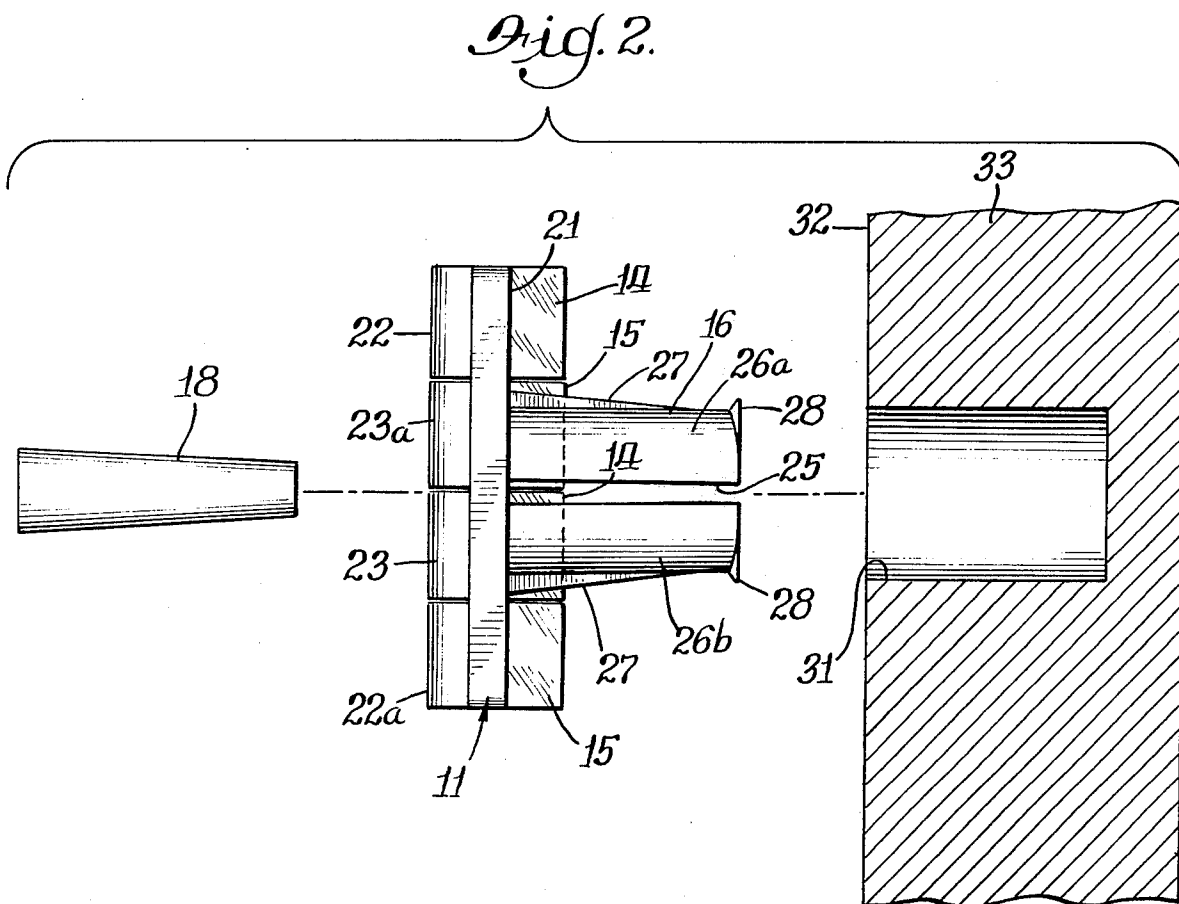
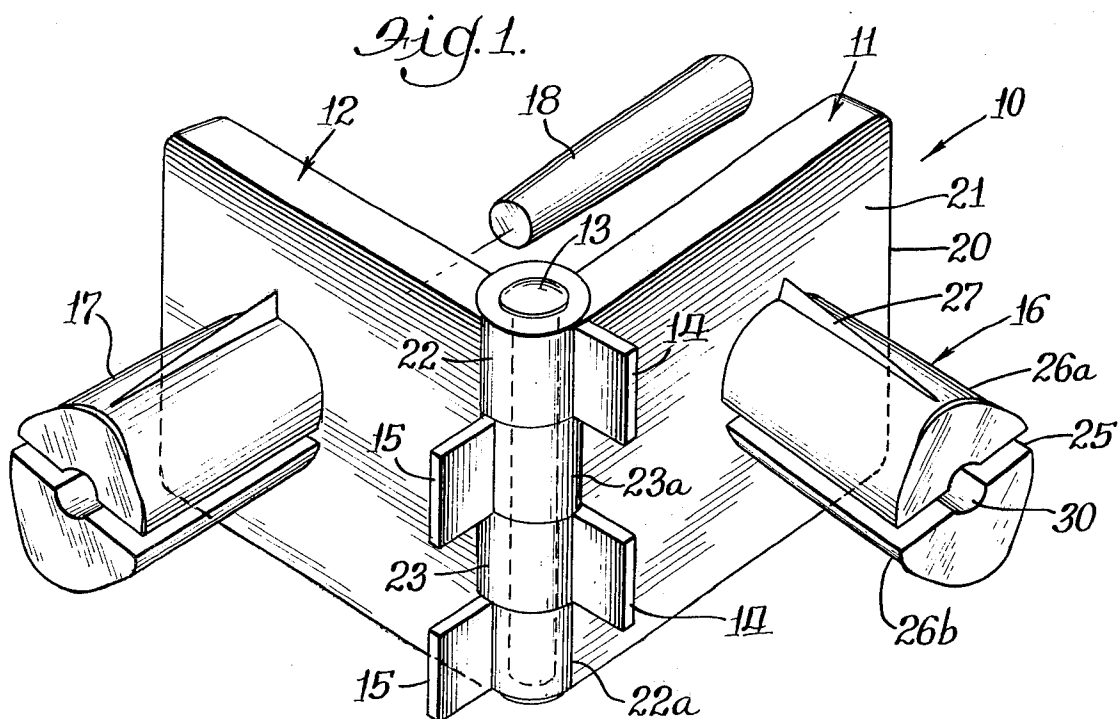


Fig. 3.

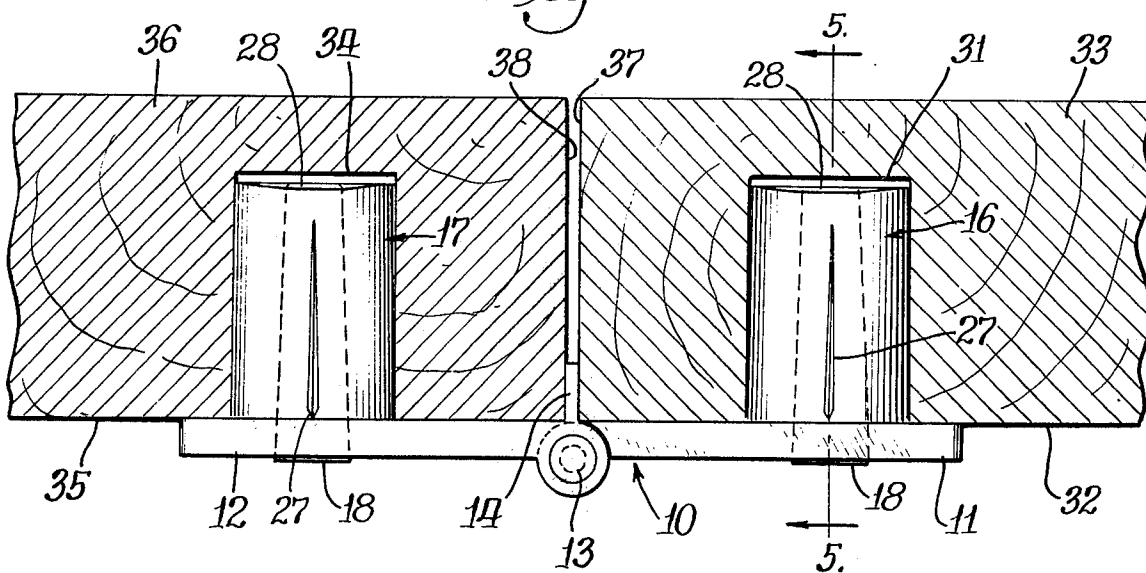


Fig. 4.

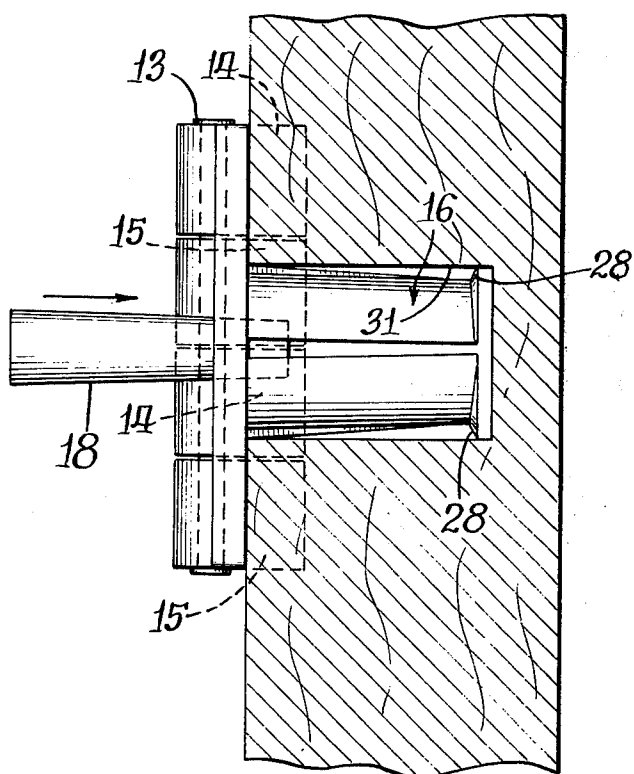
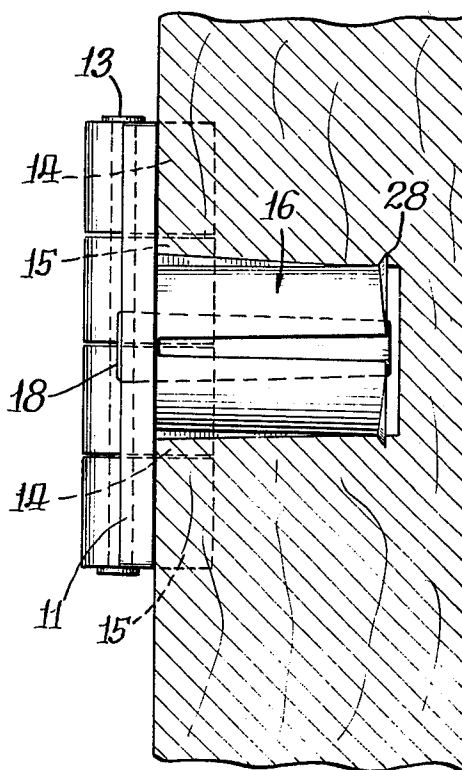


Fig. 5.



FACE MOUNTED HINGE

BACKGROUND OF THE INVENTION

Conventionally known face mounted hinges are usually attached between adjacent panels or between a panel and a stationary support by means of a plurality of individual fasteners, such as wood screws. Such hinges are difficult to mount accurately, particularly when attempting to coaxially align the axes of spaced hinges and therefore the same usually require a skilled installer or the use of auxiliary jig means to properly align the hinges and gap or space adjacent panels between which the hinges extend.

By way of improving over such conventional known face mounted hinges, my copending application Ser. No. 422,321 filed Dec. 6, 1973, describes the features of an improved face mounted hinge particularly suited for use with bifolding door panels, which eliminates the requirement for conventional mounting screws. In brief, such prior described hinge incorporates cooperating leaves having projecting mounting plug portions insertable into mounting sockets therefor bored in one face of a door panel and anchor means in the form of a plurality of projecting tangs for radially gripping the interior walls of the mounting socket in response to the insertion of a pin driven axially into the mounting plug.

While the employment of the hinge of my prior invention is generally satisfactory, particularly with door panels of synthetic or plastic material, for example, or with wooden panels wherein the mounting sockets are located inwardly of the lateral door edges by relatively generous distances, certain problems have been encountered when employing the same with relatively light weight or thin wooden panels. Specifically when the sockets for the mounting plug portions are located or separated from the lateral door edges by a relatively narrow or thin margin there is a tendency to laterally split the wood of the door by reason of the radial expansion of the mounting plug portions productive of forces over the entire circumference of the mounting socket walls.

In brief, the present invention provides an improved structure for face mounted hinges in which individual leaf elements thereof are rigidly affixed over the face of adjacent door panels or a door and stationary jamb by means of projecting mounting plug portions insertable into bored sockets; such plug portions being anchored in their mounting sockets by controlled expansion in a single direction paralleling the hinge axis to avoid the above noted splitting problem. In addition, improved means are provided on the individual leaf elements for engaging the opposing lateral edges of adjacent panels on which the same are mounted whereby to accurately locate and maintain the hinge elements in a desired mounted position while simultaneously effecting a desirable predetermined uniform spacing between such opposing door edges. The present invention also includes an improved anchoring system responsive to controlled expansion of the mounting plug portions and which is productive of manufacturing economies.

An important object of this invention is to provide an improved face mounted hinge assembly comprising cooperative surface engaging leaf elements having projecting mounting plug portions insertable into bored mounting sockets therefor and having improved means for anchoring the hinge elements by controlled directional expansion of projecting mounting plug portions.

An additional object of this invention is to provide an improved face mounted hinge as aforesaid for use with wooden doors which include improved means for anchoring mounting plug portions thereof to avoid splitting the section of the wood doors between the mounting sockets and an adjacent door edge.

A still further and important object of this invention is to provide an improved and simplified face mounted hinge structure leading to economies of production, simplicity of installation and improved operational reliability.

Having thus described my present invention, the above and foregoing objects, features and advantages thereof will be recognized by those familiar with the art from the following detailed description of a preferred embodiment thereof illustrated in the accompanying drawings and representing the best mode presently contemplated to enable those skilled in this art to practice my invention.

In the drawings:

FIG. 1 is a perspective view of a hinge assembly in accordance with my invention;

FIG. 2 is an exploded view in side elevation illustrating the improved anchoring means of this invention;

FIG. 3 is a cross sectional view with the hinge assembly in top plan elevation, mounted between a pair of panels;

FIG. 4 is a cross-sectional view in a vertical plane coincident with vantage line 5—5 of FIG. 3 to illustrate the functioning of the anchor pin in anchoring the hinge assembly in a mounting socket therefor; and

FIG. 5 is a cross-sectional view similar to FIG. 4 taken substantially along vantage line 5—5 of FIG. 3 and showing the positioning parts in the fully anchored condition.

Turning now to the specific details of the preferred embodiment of this invention illustrated in the accompanying drawings, initial reference is made to FIG. 1 showing the general features of the improved surface mounted hinge assembly 10 according to this invention. As there shown, assembly 10 comprises a first leaf element 11 and a cooperating second leaf element 12 interjoined therewith by a hinge pin 13. Such leaf elements are further formed with projecting guide means comprising leaf members 14 and 15, respectively, adjacent one margin thereof. In addition, the leaf elements 11 and 12 are provided with integrally formed mounting plug portions 16 and 17, respectively, each of which cooperates with a tapered anchor pin means 18 functioning to unidirectionally expand its associated mounting plug portion when driven thereunto.

Inasmuch as the two leaf elements 11 and 12 are identical in formation but are reversibly positioned in assembly, as illustrated in FIG. 1, a principal description of element 11 will generally suffice for both. To that end, leaf element 11 preferably is molded of plastic material to comprise a generally rectangular shape main body portion 20 having a first planar guide surface 21 adapted to engage and fit closely against the opposing face of a door panel over which the same is mounted. At one end of the body portion 20 are a pair of generally cylindrically shaped spaced hub elements 22, 23 adapted to interfit with corresponding hub elements 22a, 23a of the cooperating leaf element 12 in assembly for coaxial reception of the elongated metal hinge pin 13, the latter preferably being riveted over at its opposite ends after insertion through the hub ele-

ments. Extending at right angles to the guide surface 21 and in a plane common with the axis of hub elements 22 and 23 are two rectangular planar guide leaf members 14, 14. Similarly, two guide leaf members 15, 15 project outwardly from the respective hub portions 22a and 23a of hinge leaf element 12.

In addition, leaf element 11 is formed integrally with an outwardly extending generally cylindrical mounting plug portion 16 having a longitudinal axis at right angles to the guide surface 21 and located generally medially of that surface. It will be recognized, of course, that a corresponding mounting plug portion 17 is formed on leaf element 12. Mounting plug portion 16 is split longitudinally by a kerf or slotted opening 25 coincident with a central plane thereof which intersects the hinge pin 13 axis at right angles. The exterior half surfaces of the two generally semicylindrical portions 26a and 26b formed by the slotted opening 25, each bear an outwardly extending, thin, triangular shaped rib 27, the apex of which is adjacent the outer end of the mounting plug portion 16. (See FIG. 2). At the extreme outer end of the portions 26a and 26b and symmetrically disposed with respect to the ribs 27, in a plane of formation normal to the axis of the plug portion 26, are a pair of coplanar anchoring lip portions 28, each of which importantly merges with the cylindrical outer surface of its respective semi-cylindrical portion 26a or 26b adjacent the slotted opening 25. The interior of the two half portions 26a and 26b are each provided with a generally semi-cylindrical half portion of a central tapered opening 30 which merges into a cylindrical formation as it passes through the leaf element 11 for reception of the anchor pin means 18.

As best shown in FIG. 2, insertion of the anchor pin 18 into opening 30 serves to separate the two half portions 26a and 26b in a direction transverse to the plane of the slotted opening 25. This latter feature serves to effectively drive the lip portions 28 into the side walls of a mounting socket, such as socket 31 bored inwardly of one face 32 of door panel 33. As shown best in FIG. 2, assembly of the hinge of this invention with two door panels is brought about by thrusting the mounting plug portions 16 or 17 into respectively related mounting sockets 31 or 34 (see FIG. 3) formed inwardly of corresponding faces 32 and 35 of adjacent door panels 33 and 36. It will be noted that the axes of the mounting sockets are coincident with a common horizontal plane in the illustrated case.

With particular reference to FIG. 3 of the drawings, the assembled condition of the hinge assembly 10 of this invention with the panels 33 and 36 is illustrated. It will be noted in particular that the guide leaf members 14 and 15 are located between and engage opposing edges 37 and 38 of the adjacent panels so as to accurately gap or space such edges upon entry of the mounting plug portions 16 and 17 into their respective mounting sockets. Such elements 14 and 15 also serve to accurately align the hinge elements and prevent rotation thereof relative to the mounting sockets. Anchoring of the hinge assembly to the panels is carried out by driving a tapered pin 18 into the central opening 30 of the two mounting plug portions 16 and 17, thereby expanding the same to positively lock the hinge in mounted position.

With special reference to FIGS. 4 and 5, the above mentioned anchoring function will be better understood. As shown in FIG. 4, as the mounting plug por-

tions of the assembly 10 are inserted into their respective sockets 31 or 34, as the case may be, the guide elements 14 and 15 are disposed between the opposing adjacent edges of the cooperating panels as previously noted. During initial entry of the portions 16 and 17 into their mounting sockets, the anchoring pin means 18 are not assembled therewith. As a consequence, the mounting plug portions 26a and 26b, for example, assume a substantially cylindrical alignment. This is brought about by virtue of the resilient nature of the plastic material, which permits the two plug portions 26a and 26b to bias inwardly toward the slotted opening 25 for free entry into the cylindrical mounting socket. Thereafter, driving the tapered anchor pins into the central openings 30 expands or separates the semi-cylindrical plug portions in a controlled direction (vertically as illustrated in FIGS. 4 and 5). This drives the anchor lip portions 28, 28 into the cylindrical side walls of the mounting sockets and, in conjunction with the insertion of the plug portions, also causes the triangular shape ribs 27 to invade the side walls of the sockets. In this regard, the ribs 27 effectively assist in preventing rotation or working of the hinge elements in and relative to their mounting sockets.

From the foregoing description, it is submitted that those familiar with the art will readily understand and appreciate the novel advancement of the present invention. In particular, the feature of controlling the expansion for the mounting plug portion to a single direction paralleling the hinge axis, effectively avoids the splitting problem as occurs when uncontrolled radial expansion of the mounting plug portions takes place to provide lateral force on the relatively thin section of wood located between the mounting plug sockets and the adjacent door edges 37 and 38. Further, it is to be recognized that while the features of the present invention have been described in association with the particular preferred embodiment illustrated in the drawings, the same is nevertheless subject to change, modification and substitution of equivalents without avoiding the invention as hereinafter set forth in the claims.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. A face mounted hinge assembly for use in pivotally interconnecting folding doors and the like, comprising: a pair of identical, unitary molded plastic hinge leaf elements, each leaf element comprising a body portion having a planar guide surface engageable with a planar door face on which it is mounted, a substantially cylindrical mounting plug portion, integral with said body portion and extending perpendicularly from said guide surface for insertion into a cylindrical walled mounting socket formed inwardly of said door face; and a pair of coaxially aligned cylindrical hub portions formed integrally with said body portion at spaced positions along one linear edge thereof and lying non-interferingly out of the plane of said guide surface; said hub portions having coaxial openings therethrough; the said linear edges of a said pair of leaf elements being aligned in opposed adjacency in assembly, with said hub portions thereat coaxially interleaved in registering alignment; a hinge pin, definitive of the hinge axis for said assembly, mounted in said axial openings and thereby pivotally interconnecting the leaf elements; guide means aligned with said hinge axis and comprising coplanar surfaces for engaging opposing lateral edges of a pair of doors

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interjoined by the hinge assembly whereby to uniformly space such door edges and align the assembly on said doors; each said plug portion having a central smooth walled opening extending through its said body portion and communicating with a single, lengthwise extending slot medially dividing said body portion into semi-cylindrical portions; and elongated anchor pin means insertable into the central opening of each said plug portion to effect controlled separation of its said semi-cylindrical portions transversely of said slot and directionally parallel to said hinge axis whereby to frictionally anchor the same against the walls of its associated said mounting socket.

2. The invention of claim 1, wherein said guide means comprises a plurality of planar leaf members, one projecting integrally from each of said hub portions at right angles to said guide surface, each such leaf

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member having opposing parallel planar faces aligned with the opposed, linear edges of an assembled said pair of leaf elements to simultaneously engage opposing lateral edges of the pair of doors in assembly therewith.

3. The invention of claim 1, and lengthwise extending wedge shaped rib portions and additional coplanar wedge shaped anchor lip portion on the exterior of said semi-cylindrical portions, said lip portions lying transversely of the longitudinal axis of said rib portions, and said rib and lip portions operatively responding to separation of said semi-cylindrical portions to penetrate the sidewalls of a mounting socket thereby to anchor said plug portion against rotational and axial movements therein.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

PATENT NO. : 3,916,480
DATED : November 4, 1975
INVENTOR(S) : Lester L. Smith

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Title page [21] Appl. No. "11,382" should be --501,138--.

Signed and Sealed this

tenth Day of February 1976

[SEAL]

Attest:

RUTH C. MASON
Attesting Officer

C. MARSHALL DANN
Commissioner of Patents and Trademarks