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Pease, Jr. et al.

[11] **3,903,669**

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[54] **MOUNTING ASSEMBLY**

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[52] **U.S. Cl.** **52/455**; 52/585; 52/628

[51] **Int. Cl.**[2] **E06B 3/58**

[58] **Field of Search** ..... 52/455, 456, 457, 458, 52/476, 397, 585, 753 E, 627, 628; 85/14

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Attorney, Agent, or Firm—Biebel, French & Bugg

[57] **ABSTRACT**

A mounting unit providing for snap-together assembly of complementary molding members for use in mounting door lights or the like. The molding members have female studs integrally formed therein. A male connector member having a first portion smaller in diameter than the diameter of the bore in the stud and a locking portion larger in diameter than the bore is used to join the complementary molding members positively yet releasably together. The male connector member also has a centrally located collar for lengthwise self-centering.

16 Claims, 10 Drawing Figures

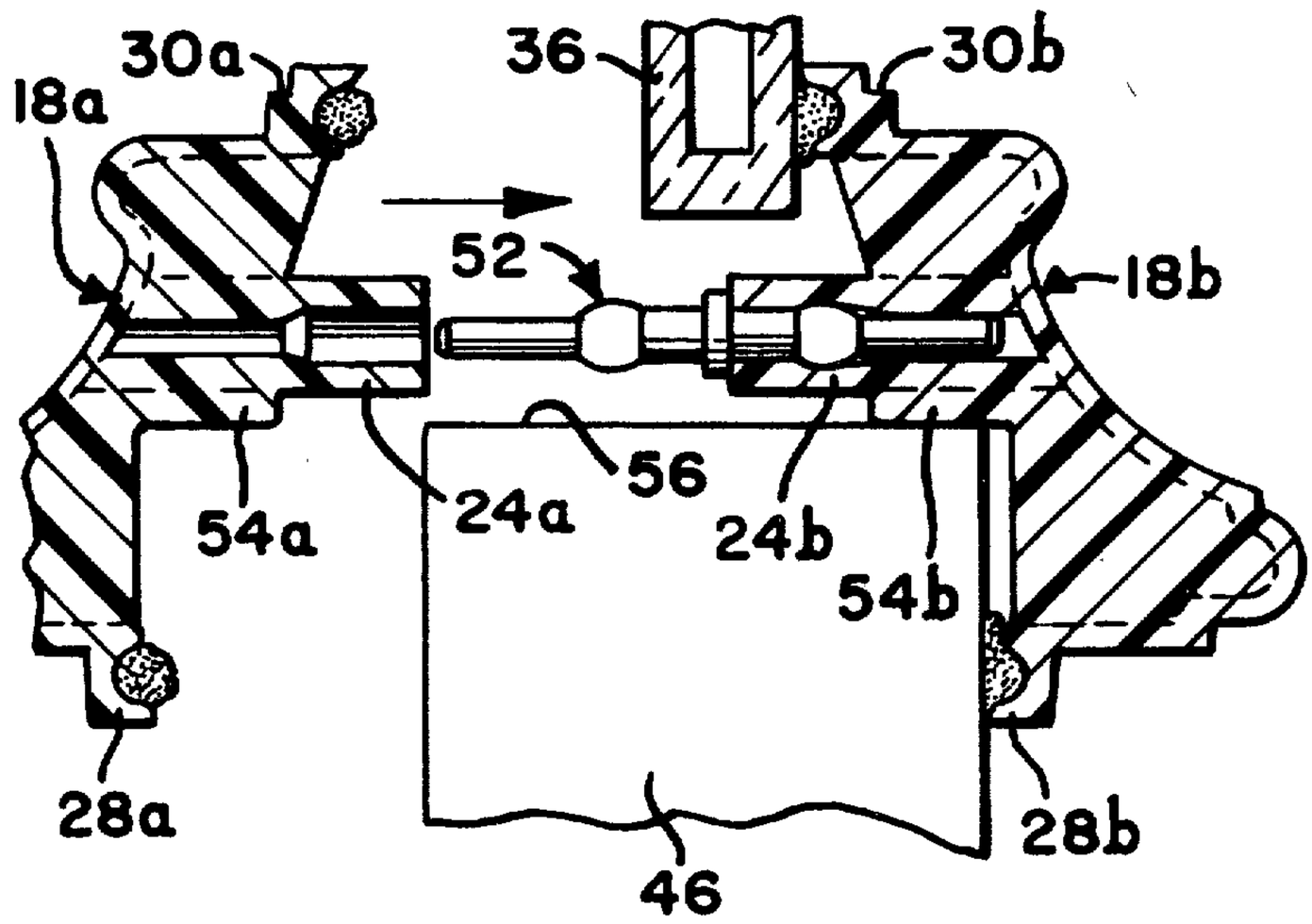


FIG-1

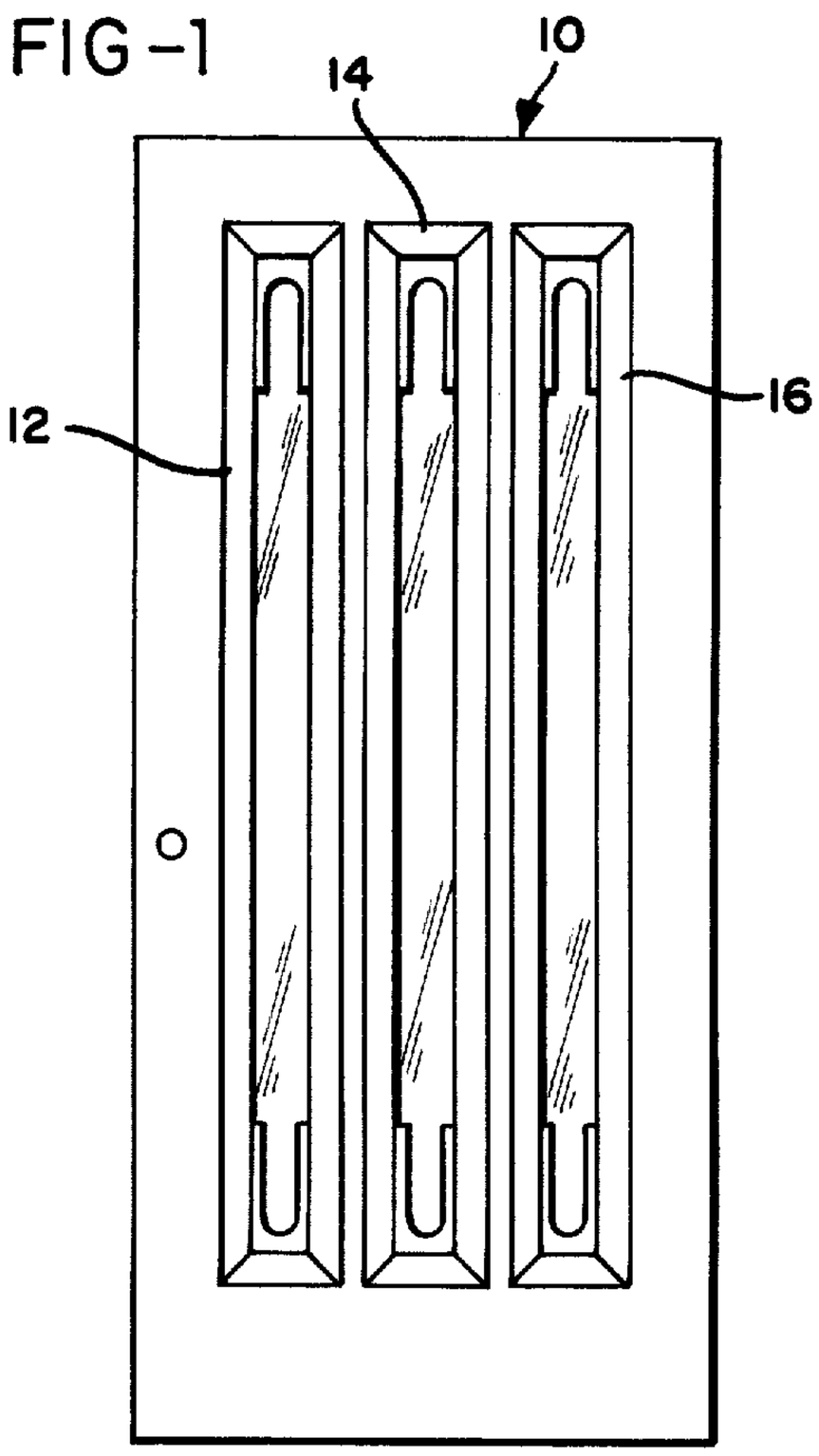


FIG-4

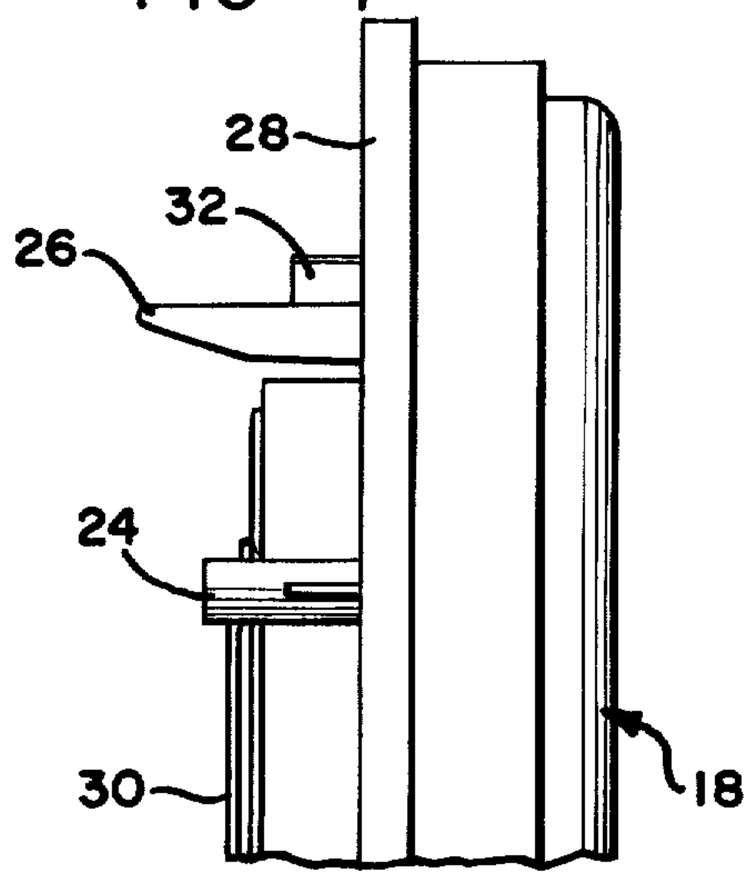


FIG-5

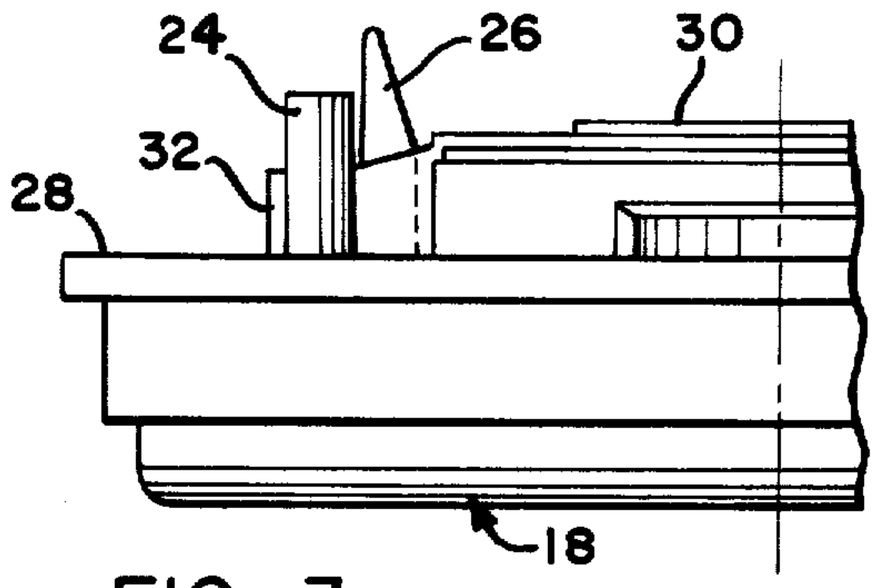


FIG-2

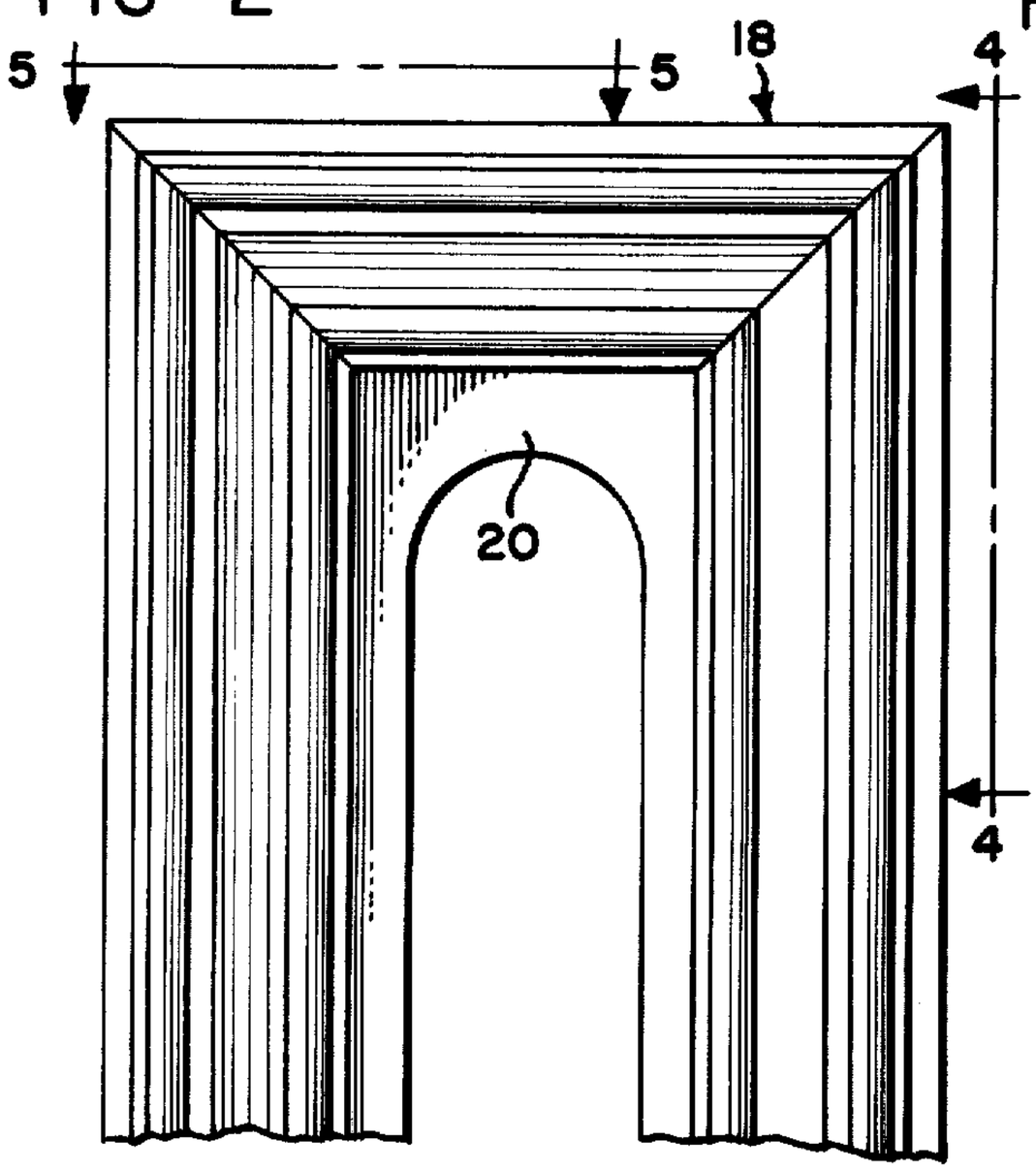


FIG-3

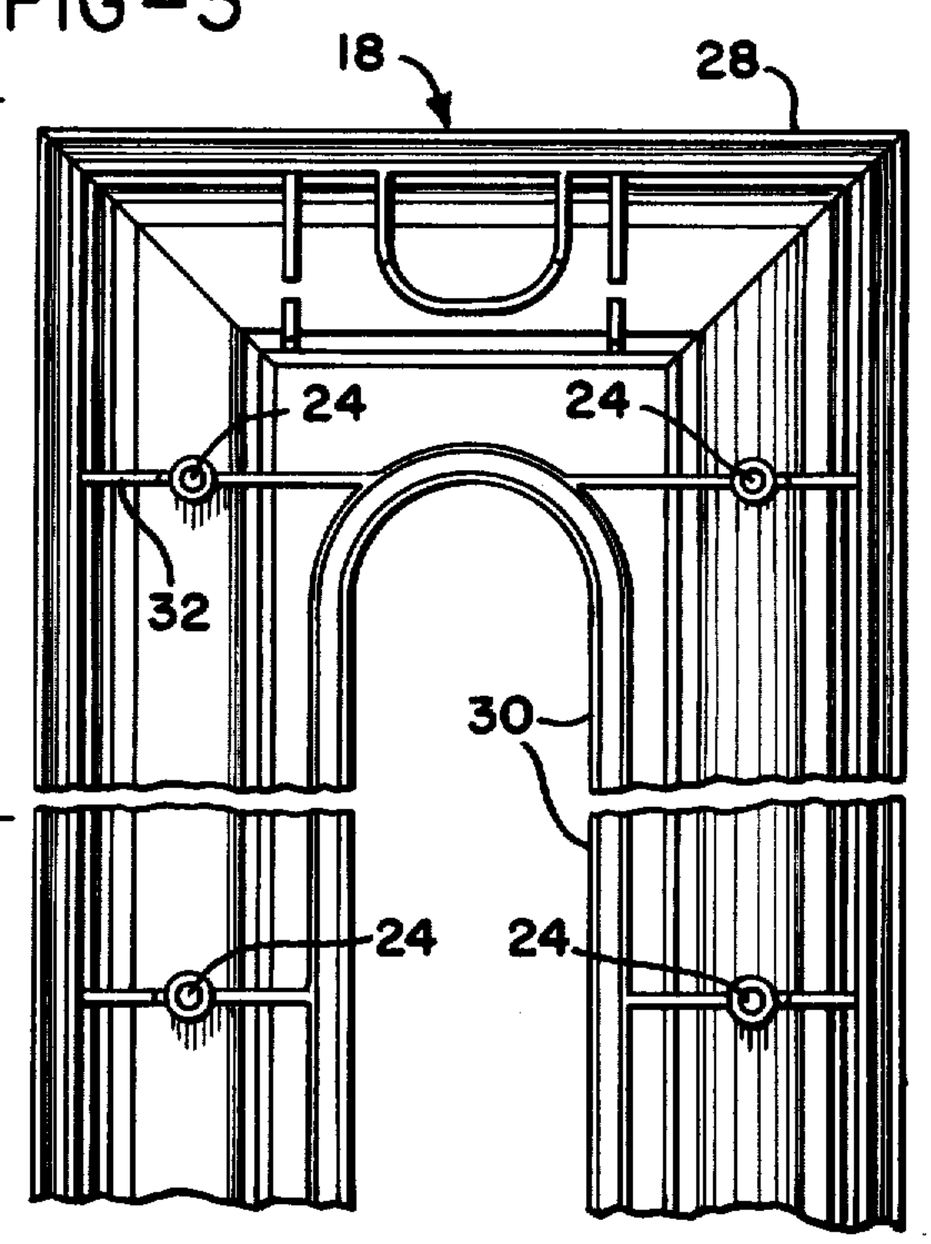


FIG-6

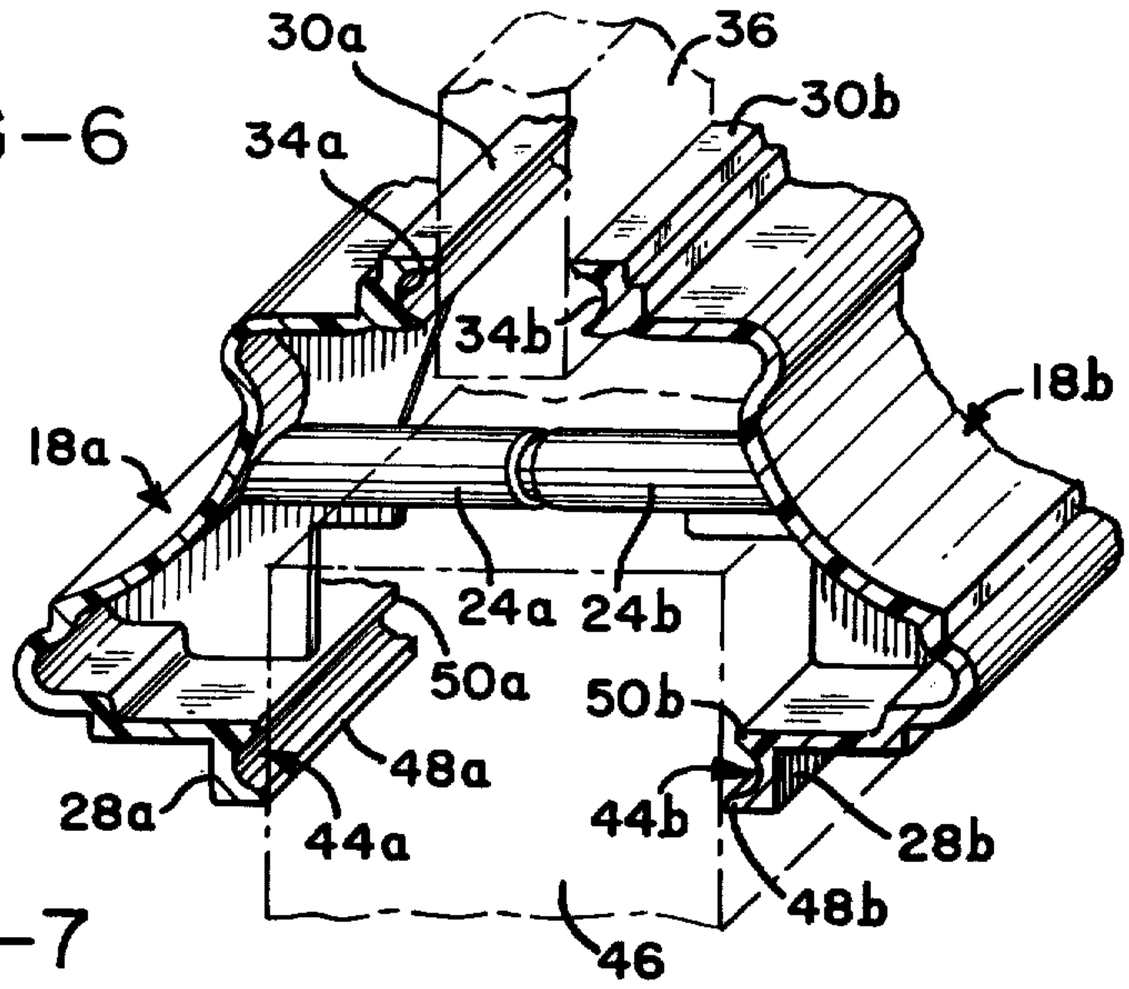


FIG-9

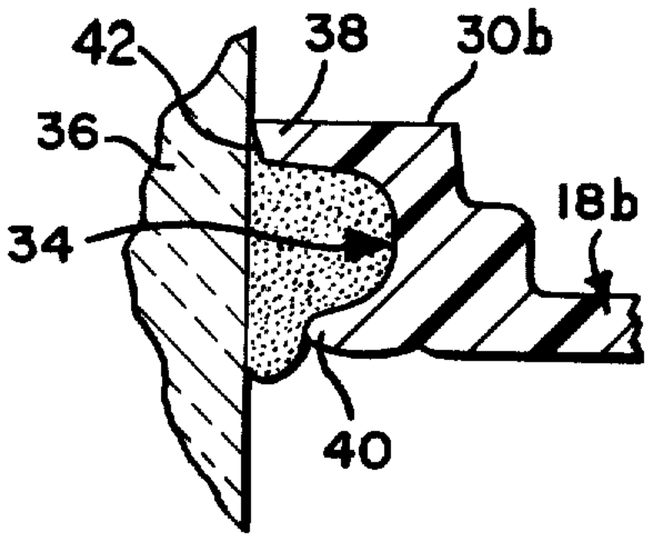


FIG-7

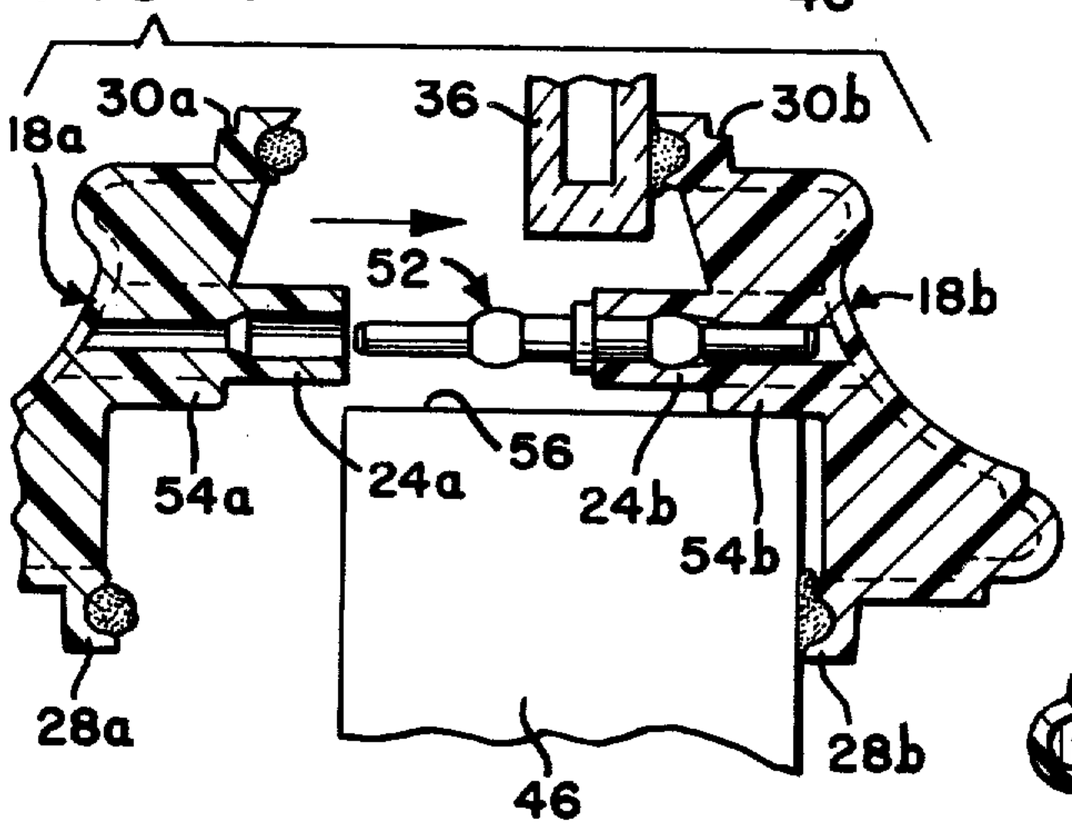


FIG-8

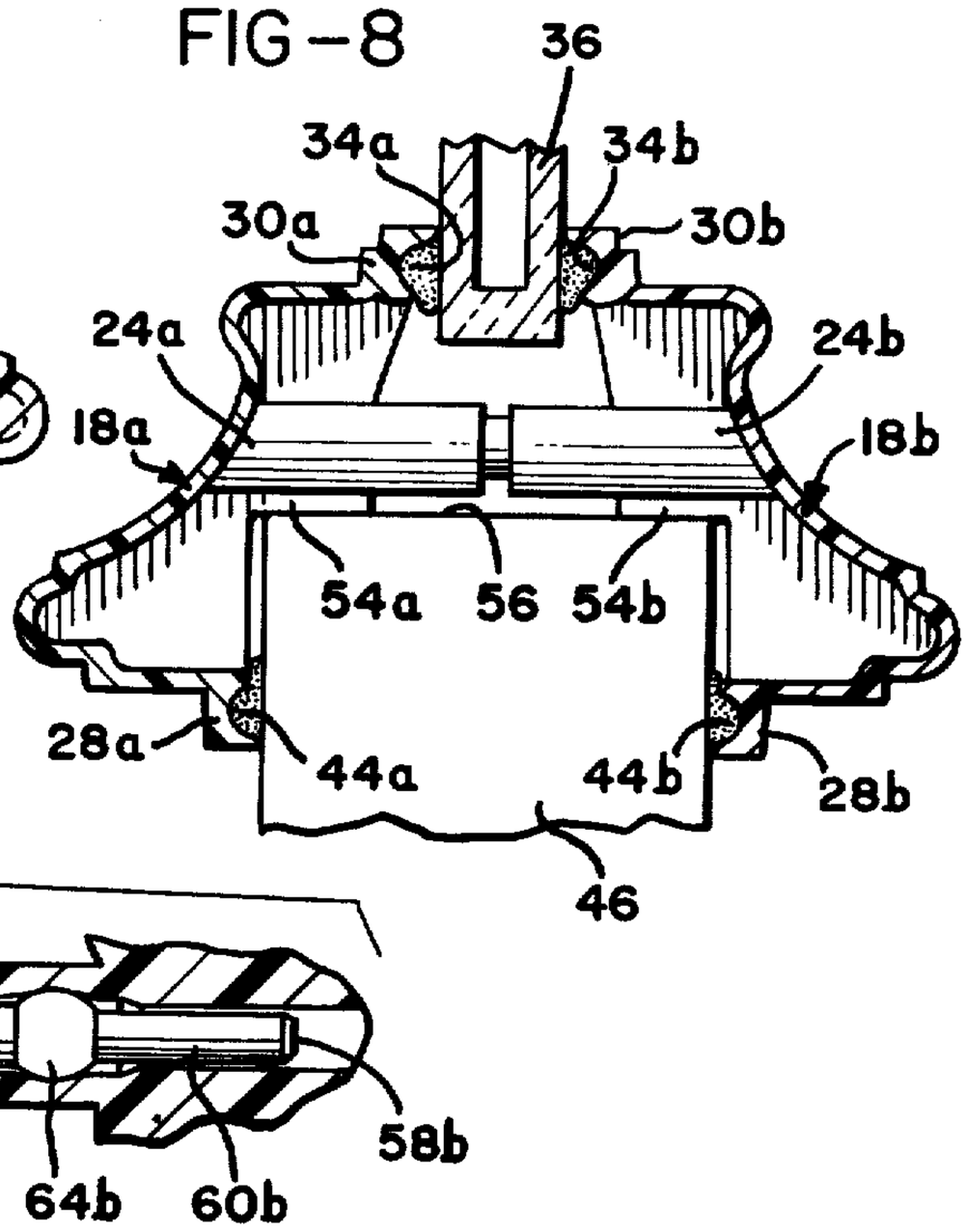
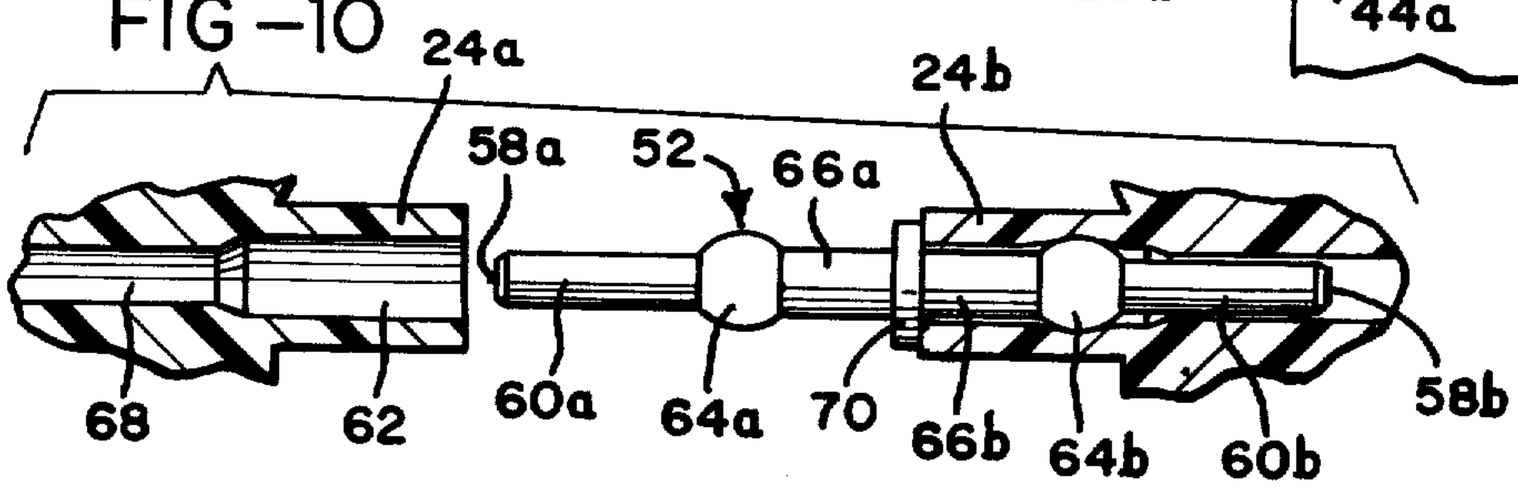


FIG-10



MOUNTING ASSEMBLY

BACKGROUND OF THE INVENTION

This invention relates to the mounting of panes of glass or the like in complementary receiving openings in a frame such as a door — a major field for the use of the invention being in the mounting of glass panes known as door lights in entry doors and the mounting of similar panes as side lights or top lights in a fixed frame beside or above a door opening.

The invention is especially concerned with improvement of the construction and use of decorative moldings for the mounting purposes outlined in the preceding paragraph. The conventional practice in this respect has been to utilize moldings of wood, or more recently of strong foamed plastic, which are secured in place in pairs by screws. That is, both moldings can be secured to the face of the door or other frame, but the preferred practice has been to secure paired moldings directly together by screws which extend through one molding into the other and thereby clamp them to surface portions of the frame surrounding the opening for the pane and to peripheral surface areas of the pane.

Mounting a pane by use of this type of conventional molding is in itself a time-consuming procedure at best, particularly if a wooden molding must be assembled from separate pieces as a part of the installation procedure. It also results in leaving exposed the heads of the mounting screws, which are therefore ordinarily located on the inner side of an exterior entry door. Further, such moldings allow relatively little tolerance for variation in their own dimensions or in the dimensions of the frame opening or of the pane to be mounted therein.

While these conventional wooden moldings have been used on metal doors, it has been suggested that metal doors may have an integral door light which includes metal moldings for mounting the panes of glass. Thus, U.S. Pat. Nos. **964,676; 1,118,265;** and **1,689,823** disclose metal door assemblies having metal molding units. These units do not provide for convenient replacement of the glass, should it become broken, since they are integral with the door assembly, nor is there the capability of using interchangeable moldings which may be installed separately.

Of course, it is always possible to mount such a pane by a glazing procedure essentially the same as used for generations in conventional practice with windows. That is, the frame can be rabbited to provide a fixed shoulder against which the pane seats from one side, and the frame opening is filled in along its periphery from the other side of the pane by means of glazing compound and/or filler strips of wood. This old procedure, however, provides minimal opportunity for decoration surrounding the glass.

More recently, glazing units have been developed which will snap together providing a quick and easy installation. For example, U.S. Pat. Nos. **3,081,851; 3,123,869** and **3,242,627** disclose molded or extruded metal moldings, and U.S. Pat. No. **3,455,080** discloses a rigid plastic extrusion molding for use in such a glazing unit. However, the snap-together feature of these assemblies has resulted in rather complex clip or connector arrangements which will not allow for releasable yet positive assembly. Thus they do not permit reglazing or adjustment of the alignment of the pieces during

assembly. Nor do the prior known structures have a feature for automatic centering of the moldings. In addition, they are not flexible assemblies which adapt to changes in humidity and temperature without a loss in the seal between the molding and the glass or the molding and the door. The disclosed door light units also do not have a provision for glazing both the seal between the molding and glass and the seal between the molding and door.

Accordingly, there is a need in the art for a snap-together rigid plastic door light molding which has the many desirable characteristics of prior moldings of this type, but which overcomes the disadvantages of the prior art moldings created by the previously used connector assemblies.

SUMMARY OF THE INVENTION

The present invention has as the primary object the provision of a mounting system for door lights and like panes in the form of complementary molding members which have the following features:

a. They are formed from relatively hard and resilient material in a configuration which provides substantial tolerance for dimensional variation of the frame and pane, togehter with increased stability in place.

b. They are produced by molding from plastic material of desired hardness and resilience for purposes of economy and uniformity, as well as variety of design configurations.

c. They incorporate special provisions for effective application of caulking material against both the frame and the pane while also giving assurance that the caulking material will be confined to the locations where it is needed and cannot extrude on to the exposed surface of either the frame or the pane.

d. They are designed to provide sufficient sealing pressure against both the door frame and the windowpane.

e. They incorporate novel means for connecting the paired molding members together by simple pressure and without the use of tools, but if the pane requires replacement, the assembly can be disassembled and then reassembled without replacement of any parts other than the caulking material.

f. The interconnection of the molding members is effected by means of double ended male connector means which include provision for effective lengthwise self-centering.

g. The connector is designed to deform the plastic of the bore into which it is inserted in order to lock in place without adhesive or binder. However, it is also readily removable and reusable whenever the assembly requires replacement.

h. The connector has a guide section or pilot portion at its ends to keep the connector aligned until the second half of the molding pin is attached.

i. The connector is designed to allow flexing of the formed moldings under stress or of the moldings during assembly and allows for rolling misalignment during assembly of the moldings.

j. While the female connector studs on the moldings can serve as the means for supporting and centering the pane, additional projections may be used which are located on each of the moldings intermediate the rims and extending perpendicular to and beyond the plane of said inner rim.

With all of these advantageous features, the instant invention offers those in the building trades an improved snap-together door light unit of a kind previously not available. A key to the advantageous features of the present invention is the use of a male connector member or pin symmetrically designed around a central collar so that each end has a pilot portion of lesser diameter than the bore in the complementary female stud followed by a locking portion or ball of greater diameter than the bore for positive yet releasable force fitting engagement therein.

The dimensional shape of the female stud is also important in facilitating ease of assembly and maintaining the desired characteristics of the assembled molding unit. That is, the bore has a first or outer portion of a size larger than the pilot portion of the connector pin but smaller in diameter than the locking portion of the pin. A second portion of the bore is only slightly larger in diameter than the pilot portion of the connector member.

The interrelationship between the bores in the complementary molding members and connector members of this invention provides for a molding assembly which is securely sealed together, applying stress against both the glass and the frame, and yet may be separated for easy replacement of the glass planes if necessary. Likewise, the described structural features of the connector pins and bores means that when assembled, they will be interfitted in a manner resulting in a stable yet flexible unit which can withstand jolting, changes in temperature and humidity, and other physical and dimensional stresses.

Accordingly, it is an object of the present invention to provide an improved, snap-together mounting unit for easy assembly of a molding unit which has good stability, tolerance, resiliency, etc.

It is a further object of the present invention to provide a snap-together molding unit which may be positively yet releasably assembled together.

Another object of the present invention is to provide a molding unit which when assembled will provide a good seal between the frame and the molding and the glass pane and the molding.

Still another object of the present invention is to provide a mounting assembly which utilizes a unique self-centering connector pin to provide for positive but releasable connection and easy assembly of the complementary molding members.

Other objects and advantages of the present invention will be apparent from the following description, the accompanying drawings and the appended claims.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is an elevational view of a door structure showing typical door light units of the present invention;

FIG. **2** is a front elevation of one of the molding members of the door light unit shown in FIG. **1**;

FIG. **3** is a back elevation of the molding member of FIG. **2**;

FIGS. **4** and **5** are enlarged fragmentary elevations looking as indicated by the lines **4—4** and **5—5** of FIG. **2**;

FIG. **6** is a fragmentary perspective view of a section of a molding assembly of the present invention in a mounted position;

FIG. **7** is an exploded section of the mounting unit during assembly;

FIG. **8** is a cross-section of the mounting unit of FIG. **7** after assembly;

FIG. **9** is an enlarged section of a fragment of the mounting unit at the point where one of the complementary molding member is caulked to the glass pane; and

FIG. **10** is an enlarged cross-section of the stud and pin of FIG. **7** during assembly.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

FIG. **1** shows a door **10** having light units **12, 14** and **16** therein which are illustrated in FIG. **1** as of the type which provide for narrow vertical rectangular panes in the door itself. However, any number of other shapes and designs for door light units may be formed including square, rectangular, octagonal, curved-corner shapes. In addition to being used as assemblies for light units in doors, the mounting units of the present invention may be used for side lights, top lights, or other door or wall units.

As shown in FIG. **2**, the door light unit has a molding member **18** having a front portion **20** molded or shaped to the desired configuration and design. The molding member can be prepared from rigid plastic materials in a number of known ways such as injection molding of rigid polyvinyl chloride compounds, acrylonitrile-butadiene-styrene (ABS) compounds and similar materials. These materials can be tinted a color during molding or can be adapted for painting later.

FIG. **3** illustrates the reverse side **22** of the molding member **18.** Studs **24** are shown at spaced intervals around the molding, and may also be seen in FIGS. **4** and **5.** The female studs **24** provide for snap-together assembly of two complementary door light units when joined by a male connector member. While the studs **24** may themselves be used to seat the glass pane in place in the assembled unit, FIGS. **3–5** show additional projections **26** for that purpose. In that case the projections **26** on the two complementary moldings to be joined together will be designed to pass each other on assembly and thus to overlap to support the pane in the assembled unit. In addition, projections **26** may be beveled (as shown) on the ends to provide a cam action to aid in centering the panes which projections **26** will support. The outer rim **28** and inner rim **30,** containing caulking grooves, are also illustrated in these figures, as are bosses **32** against which the door frame seats.

A better view of the bosses and rims **28** and **30** is shown in FIGS. **6–9.** Thus in FIG. **6,** there are inner rims **30***a* and **30***b* on the complementary moldings **18***a* and **18***b* having grooves **34***a* and **34***b* therein. These grooves **34***a* and **34***b* provide for applying a caulking compound around the seal between the molding members **18** and the glass pane **36.** As illustrated in FIG. **9,** the groove **34** is shaped so that any caulking compound applied to it will be forced inwardly and downwardly giving a good seal with little excess to be wiped away. This is done by having the upper lip portion of the rim or outer wall **38** of the groove extend beyond lower portion or inner wall **40** of the grooves to provide a gap along the inner periphery of groove **34** so that excess caulking can flow away from upper edge **38.** In addition, to aid in the forcing of the caulking into groove **34,** there is an inwardly slanting land surface **42** on the

lip **38.** The angle of slant on surface **42** in relation to the plane of the surface of the glass **33** may typically be around **10°.**

The same type of arrangement is used in caulking grooves **44***a* and **44***b* which provide for a seal between outer rims **28***a* and **28***b* of moldings **18***a* and **18***b* and the door frame **46.** Here, lower lip portions **48***a* and **48***b* extend beyond inner walls **50***a* and **50***b* to give the effect described previously with regard to the caulking around the glass plane. Similarly, lip **48** has a slanted land surface of the type previously described for lip **38** on rim **30.**

While the door light unit of FIG. **6** is shown in the assembled position, FIG. **7** illustrates the manner of assembly. There, one of the complementary molding members **18***b* having a stud **24***b* is shown with connector pin **52** inserted completely in that stud. Complementary member **18***a* is shown in a position for ready assembly by aligning stud **24***a* with the remaining portion of pin **52.** Also as shown in FIG. **7,** there are on each of the molding members **18***a* and **18***b* boss portions **54***a* and **54***b* which on assembly rest on the adjacent surface **56** of frame **46.**

FIG. **8,** then, shows molding units **18***a* and **18***b* in the assembled form. When assembled, the molding unit is securely seated on frame **46** and sealed around the periphery by the caulking in grooves **44***a* and **44***b*. Likewise, the glass pane **36** is securely seated within the unit and sealed by the caulking grooves **34***a* and **34***b*. Because of the structural and dimensional relationship between the female studs **24***a* and **24***b* and the connector member **52,** there is also provided a uniform sealing pressure of rims **28***a* and **28***b* and rims **30***a* and **30***b* against both the frame **46** and the glass **36.**

The dimensional features of the pin, resulting in this sealing pressure as well as other unique advantages, are shown best in FIG. **10.** That is, pin **52** has end portions **58***a* and **58***b* to promote easy introduction into studs **24***a* and **24***b*. In the form shown, there is approximately a **0.050** inch area at each end **58***a* and **58***b* with a **15°** taper. Next there is a pilot portion **60***a* and **60***b* which is smaller than the diameter of the female bore at any point and considerably smaller than the outermost portion **62** of the female bore.

The pilot portions **60***a* and **60***b* are followed by locking portions **64***a* and **64***b* which are dimensioned to be slightly larger in diameter than the diameter of portions **64** of the bore. For instance, portions **60***a* and **60***b* of pin **52** may have a typical diameter of **0.140** inches +.000, −.010, while the locking portions **64***a* and **64***b* have a diameter of **0.195** inches +.002, −.000. Middle portions **66***a* and **66***b* of the pin **52** may have a diameter of **0.175** inches. This corresponds to bore diameters of **0.187** ±.001 inch for portion **62** and **0.150** inches for the inner end portion **68** of the bore in female stud **24.** The interior diameter of the bore portion **68** may be slightly tapered, e.g., approximately **1°** on each side.

In FIG. **10,** connector end **58***a* is positioned for insertion into stud **24***a*. Pilot portion **60***a* will enter first, followed by the locking portion **64***a*, which will serve as a temporary stop since it is larger in diameter than the bore portion **62.** This is useful in aligning all of the studs and connectors prior to forcible insertion of locking portion **64***a*. Since the locking portion or ball **64***a* has a spherical surface (for example on a **0.250** radius) it allows for rolling alignment of the bores. In addition, since the inserted portions **58***a* and **60***a* are at this stage contained in bore portion **62** which is larger in diameter than these parts of the male connector **52,** this also allows for movement of the parts in aligning them. After alignment, locking portion **64***a* is forcibly inserted into bore portion **62.**

Since a plastic material approximately **0.0635** inches thick (i.e., the opening diameter is approximately **0.187** inches and the bore itself may be **0.314** inches in diameter) is used to form the stud **24,** the plastic deforms during insertion of the pin **52.** This is shown in FIG. **10,** where locking portion **64***b* has deformed stud **24***b* and is in tight frictional and tensional engagement therewith. No adhesive is needed, and the frictional engagement allows for removal of the molding unit by prying it loose from the pin **52.** Further, the thickness of the walls of stud **24** may be tapered about **1°** or so to provide a thinner and more yielding bore at the point of pin entry.

Collar **70** is located in the middle of the pin **52** and has a diameter thicker than the bore entry (i.e., typically **0.250** inches) so that it can seat against the ends of the studs on assembly. Thus collar **70** assures that during assembly, no more than one-half the pin **52** will be driven into stud **24.** This is important since it is necessary to retain the symmetrical relationship of the ball portions **64***a* and **64***b* on each side of the pin **52** for effective connection with the studs **24***a* and **24***b*.

As assembled, the molding unit has good stability due to the type of connection between connector pin **52** and the studs **24***a* and **24***b*. Because the engagement is primarily in the area of locking portions **64***a* and **64***b*, and since the locking portions are spherical in shape, this permits some rotational movement of the assembly around the balls **64***a* and **64***b*. Similarly since locking portions **64***a* and **64***b* are larger in diameter than the rest of the pin **52,** they form fulcrums permitting some tilting movement of the assembly if stressed in that manner.

Thus, if the surfaces of the frame **46** and/or glass **36** are uneven, the connector mechanism allows enough internal adjustment to maintain rims **28***a*, 28*b*, 30*a* and **30***b* under stress against the frame **46** and glass **36,** respectively. In a like manner, the described connection takes up normal stresses and strains from temperature change, humidity change, jarring, etc. As shown in FIG. **8,** this flexibility is also facilitated by the fact that bosses **54***a* and **54***b* seat on the frame **46** and there is a gap **72** elsewhere around the frame between bosses **54***a* and **54***b* and rims **28***a* and **28***b*. Such a gap also allows for the adjustment mentioned.

The moldings **18***a* and **18***b* as shown in FIGS. **6–9** are designed for insulating glass having a thickness in the range of **0.484** to **0.512** inches and a door frame of approximately **1.70** inches. In that case the molding members of the type shown in the drawing may be **1.54** inches wide from the open end of stud **24** to the outermost part of the middle portion. It would then be **0.182** inches from the open end of bore **24** to the edge of rim **30** and **0.790** inches from the open end of bore **24** to the edge of rim **28.** The height of such a typical molding number may be in the area of **1.50** inches to **1.875** inches depending on the configuration of the outer wall. The outer wall of plastic may be of an average thickness of around **0.090** inches.

When a single pane assembly is desired, the dimension of the distance between the open end of stud **24** and the edge of rim **30** will have to be adjusted accord-

ingly. Thus with a ⅛ inch pane, the edge of rim **30** will extend approximately **0.005** inches out from the edge of the open end of stud **24.** It should be apparent that the dimensions of the assemblies may be adjusted in this manner to provide for attachment to different thickness frames, different thickness glass panes, etc.

In FIGS. **6–9** the molding members **18***a* and **18***b* have also been shown of the same outer configuration and design. However, it is noted that the molding members **18***a* and **18***b* may be of different designs as long as the mating parts are complementary to each other.

While the articles herein described constitute preferred embodiments of the invention, it is to be understood that the invention is not limited to these precise articles, and that changes may be made therein without departing from the scope of the invention which is defined in the appended claims.

What is claimed is:

1. A mounting assembly for supporting a flat pane of glass or the like in a receiving opening in a frame, comprising:

a. a pair of complementary molding members of plastic material each including

i. an intermediate portion sized to be received within said opening,

ii. an outer rim sized to seat on an annular surface area of said frame surrounding said opening, and

iii. an inner rim sized to seat on an annular surface area of said pane adjacent the periphery thereof,

b. said intermediate portion of each of said molding members including spaced female connector studs each having a bore therein and located for alignment with opposed studs on the other complementary molding member, and

c. complementary male connector members having a pilot portion of lesser diameter than the diameter of said bore in the associated said stud and having a spherically curved locking portion of greater diameter than said diameter of said bore in said associated stud for force-fitting engagement therein whereby said molding members are releasably yet positively held together with said rims in clamping relation with said annular surface areas of said frame and said annular surface areas of said pane.

2. A mounting assembly as defined in claim **1** wherein each of said rims includes groove means for receiving and retaining caulking material in sealing engagement with said frame and said pane respectively.

3. A mounting assembly as defined in claim **2** wherein said groove means comprise means defining a groove extending along each of said rims in spaced relation with the periphery of said rim, and means defining a lip extending along the periphery of each of said rims outwardly of the adjacent said groove for direct engagement with said frame or said pane to seal against outward flow of caulking material from said adjacent groove.

4. A mounting assembly as defined in claim **3** further comprising means defining a land surface extending from the periphery of each said rim to the adjacent said groove in diverging relation with the plane of the surface of said frame or said pane.

5. A mounting assembly as defined in claim **3** wherein each of said groove defining means comprises inner and outer walls, each of said inner walls being of lesser height than the associated said outer wall to provide a gap along the inner periphery of said groove through which excess caulking material can flow away from said rim.

6. A mounting assembly as defined in claim **1** further comprising means limiting penetration of said bores by each of said male connector members to less than one-half the length of said connector member.

7. A mounting assembly as defined in claim **6** wherein said limiting means comprises a collar located at the middle of each said male connector and of sufficiently greater diameter than said bores to seat on the ends of said bore.

8. A mounting assembly as defined in claim **7** wherein said locking portion of each said male connector member is a spherical curved portion spaced between said pilot portion and said collar of said member.

9. A mounting assembly as defined in claim **1** further comprising a plurality of projections located on each of said molding members intermediate said rims and extending perpendicularly to and beyond the plane of said inner rim for supporting and centering said pane with respect to said inner rim.

10. A mounting assembly as defined in claim **9** wherein said projections overlap each other in the assembled position and are located on each said molding member to avoid contact with each other in the assembled position of said assembly.

11. A molding member for a mounting assembly of complementary molding members, said assembly supporting a flat pane of glass or the like in a receiving opening in a frame, comprising

a. a rigid plastic shaped member having

i. an intermediate portion sized to be received within said opening,

ii. and outer rim sized to seat on an annular surface area of said frame surrounding said opening, and

iii. an inner rim sized to seat on an annular surface area of said pane adjacent the periphery thereof,

b. said intermediate portion of said molding member including spaced female connector studs each having a bore therein for receiving male connector members having a pilot portion and a spherically curved locking portion,

c. each of said bores having an outer portion wherein the diameter is larger than said pilot portion of said male connector member but smaller than said locking portion and a tapered second portion only slightly larger than said pilot portion of said male connector member.

12. A molding member as defined in claim **11** wherein each of said rims includes groove means for receiving and retaining caulking material in sealing engagement with said frame and said pane respectively.

13. A molding member as defined in claim **12** wherein said groove means comprise means defining a groove extending along each of said rims in spaced relation with the periphery of said rim, and means defining a lip extending along the periphery of each of said rims outwardly of the adjacent said groove for direct engagement with said frame or said pane to seal against outward flow of caulking material from said adjacent groove.

14. A molding member as defined in claim **13** further comprising means defining a land surface extending from the periphery of each said rim to the adjacent said groove in diverging relation with the plane of the surface of said frame or said pane.

15. A molding member as defined in claim 13 wherein each of said groove defining means comprises inner and outer walls, each of said inner walls being of lesser height than the associated said outer wall to provide a gap along the inner periphery of said groove through which excess caulking material can flow away from said rim.

16. A molding member as defined in claim 11 further comprising a plurality of projections located around the periphery of said molding member intermediate said rims and extending perpendicularly to and beyond the plane of said inner rim for supporting and centering said pane with respect to said inner rim.

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