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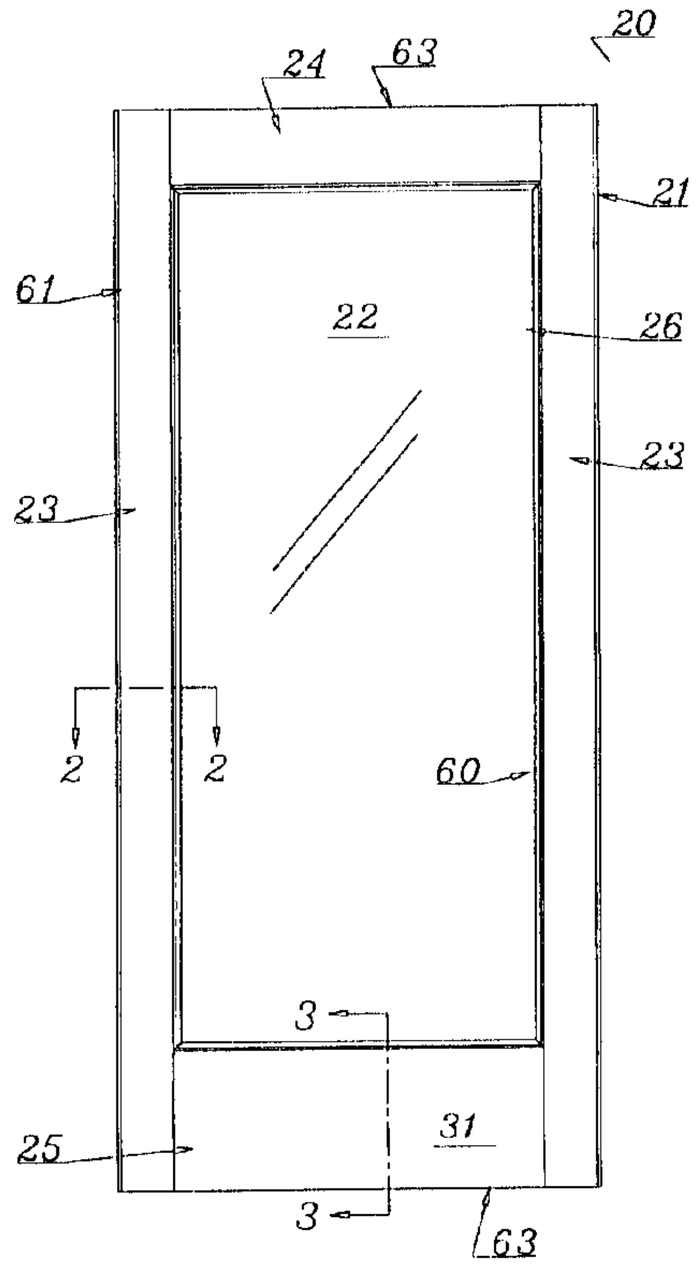
(54) Titre : PORTE PANORAMIQUE COULISSANTE MUNIE D'UN ENCADREMENT DE VITRAGE INTEGRE
(54) Title: PATIO DOOR WITH INTEGRAL GLAZING FRAME



(57) Abrégé/Abstract:
Door frames for supporting large window lights or panes of glass within the frames can be constructed with thin, compression molded skins by integrally forming at the peripheral edges of the aperture in the skins for the light or pane, integral edge strips oriented normal to the skins surfaces with one of said edge strips having an upright flange for holding a light or pane, which edge strips, when joined in an overlapping, interlocking relationship, form both a glazing frame for holding the light or pane in the frame and a closure for the edges of the two skins about the aperture in a water tight, solid joint and a removable glazing strip attachable to the joined edges to retain a light or pane in the glazing frame formed in the resulting aperture with interlocking edge strips of the skins, along with a perimeter frame closing the outer edges of the skins and a "foamed in place" core in the hollow space between the perimeter frame and the joined edge strips.

PATIO DOOR WITH INTEGRAL GLAZING FRAME

Abstract

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PATIO DOOR WITH INTEGRAL GLAZING FRAME

Background

Doors made of synthetic materials have become common place in the construction industry for both residential and commercial buildings. Such products are durable, stable and often include a wood graining on the surfaces to give these doors the appearance of natural wooden doors. Such characteristics are desirable to owners, builders and architects.

Popular synthetic door structures are those constructed of sheet molded resins reinforced with fiber glass, such as disclosed in U. S. Patent 5,644,870 issued to Chen describing the construction of one of these type of doors. In addition there a number of patents assigned to Therma-Tru Corporation which taught this same type of construction, e.g., see U. S. Letters Patent 4,550,540 issued to Thorn. The sheet molding compounds (SMCs) employed are molding resins which include unsaturated polyesters resinous compositions, such as those defined in U. S. Letters Patent Nos. 3,772,241 issued to Kroexel and U. S. Letters Patent No. 3,884,612 issued to Ivor Pratt et al, which are typically reinforced with fiberglass before molding. Such compositions are processed, by the well known sheet molding processes, into thin sheets or skins.

Other patents describing the use of compression molded sheets in door structures, include U.S. Patent No. 4,901,493, U.S. Patent No. 4,860,512, U.S. Patent No. 4,864,789 and U.S. Pat. No. 4,965,030 all issued to Thorn, along with U.S. Patent No. 5,142,835 issued to Mrocca and U.S. Patent No. 5,075,059 issued to Croon.

According to the reference patents, as well as other patents, the sheets or skins employed to construct such doors are made by a sheet molding process wherein uncured resins, reinforced with fiber glass, are compressed between large molds, using pressure and heat, to form thin sheets or skins having a thickness from 0.05 inches to 0.120 inches. While the sheets formed by such process are strong, and can be embossed with wood graining on their outside surfaces, they remain quite flexible in the plane normal to their surfaces. For this reason, and others, to construct a door with these skins, it is often necessary that they be

mounted on a rectangular stick frame by gluing them to the assembled frame and filling the resulting hollow space between the skins and the frame with a plastic foam, such as polyurethane foam which is foamed in place. The frame and foam cooperate with the skins glued to the frame to increase the rigidity of the door structure normal to the plane of the surface of the skins. Moreover the skins provide more than adequate integrity to the plane of the surface of the skins for the lightweight door structures described in the prior art.

While the designs described are satisfactory for doors without large lights (windows) and for doors with small lights, the described construction has been found less that satisfactory for doors with large lights, which are often referred to as patio doors, due to the heavy loadings induced on the frame from the weight of the glass of the tights.

With today's environmental concerns, patio doors often have double glazing (two panes of glass separated by a small space filled with a gas) which requires a frame supporting such double glazing to carry very substantial loadings. In fact some building codes require such double glazing.

It can be appreciated that the thin skins, when required to carry the weight of such glazing, can buckle under such loadings if the door frame constructed of these skins is not properly designed. Further, the glue used to bond the skins to the stick frame is placed under tremendous sheer loadings which can rip the skins from the frame if the design does not distribute the loading properly.

It is an object of the present invention, among others, to design a door structure employing thin compression molded skins as a frame for patio doors, and like, which will accommodate the loadings involved and provide an extended service life for the door frame.

Another object is to provide better weather integrity for patio doors which are constructed in door frames formed with thin skins of compression molded panels by making the area around the window light or pane completely water tight.

Still another object of the invention is to provide a design for such a patio door which better distributes the loadings to the skins forming the exterior components of the

door frame.

Also it is an object to provide an integral flange in one of the skins making up the frame to support one face of the light or pane, along with a removable interlocking glazing strip, to lock the light or pane in the resulting door frame.

Summary of the Invention

The above objects and many oilier advantages can be obtained with an improved frame for supporting a large window light or pane in door frames constructed of synthetic materials and leaving an integral glazing frame for retaining the light or pane includes a first skin of a compression molded sheet material, the first skin having an aperture with a first integral edge strip oriented generally normal to the plane of the first skin and extending from and around such aperture, a second skin (and opposing skin) of a compression molded sheet material, the second skin having an aperture with a second integral edge strip oriented generally normal to the plane of the second skin and extending from and around such aperture, interlocking means formed on the edge strips operable to fixedly to join said edge strips of the two skins in a permanent overlapping relationship when glue is applied to the surfaces of the interlocking means, a glazing frame means associated with the edge strips having an integral extending flange projecting from one of the edge strips and a glazing strip operable to retain a window light between the flange and the glazing strip when said the edge strips are fixedly joined by the interlocking means, a perimeter frame means closing the space between the skins about their outer perimeter fixedly joined to the respective skins on opposite sides of the frame means and operable to form a hollow space between the .frame means and the interior surfaces of the joined edge strips, and a formed in place foam core in said hollow space.

Description of the Drawing

The defined objects of this invention, along with other advantages can be accomplished by employing the structures illustrated in the following drawings, wherein:

Fig. 1 is a plan view of the novel patio door frame constructed according to the

teachings of this invention;

Fig. 2 is a cross section along lines 2-2 of Fig. 1 illustrating the integral edges of the skins which form a portion of the vertical glazing frame for holding a light or pane in the novel patio door frame structure;

Fig. 3 is a cross section along lines 3-3 of Fig. 1 illustrating the integral edges of the skins which form a portion of the horizontal glazing frame for holding a light or pane in the novel patio door frame structure;

Fig. 4 is a broken away, exploded view of the portion of the vertical glazing frame illustrated in section in Fig. 2;

Fig. 5 is an enlarged cross section of the joint formed between the respective integral edge strips of the skins employed to construct the novel door frame;

Fig. 6 is an enlarged cross section of the glazing strip employed to retain a light or pane in the glazing frame.

Fig. 7 is a plan view of the novel patio door frame structure illustrated in Fig. 1 before the second skin is assembled and the foam is incorporated m the structure, showing the interior components of the novel patio door frame structure;

Fig. 8 is a perspective of an optional weather strip which can be attached to the bottom of the novel door frame, along with the bottom portion of the frame, with parts broken away, also shown in perspective; and

Fig. 9 is a perspective of the bottom of the novel patio door showing optional roller assemblies that can be added to the door frame for sliding door applications for patio doors.

Description of a preferred Embodiment

The novel patio door structure 20, shown in Fig. 1 includes two principal components, the door frame 21 and the window light or pane 22. The light or pane is typically formed of two glass sheets separated by small perimeter divider, with void between them preferably filled with a gas, and their edges sealed together to form a unit. Such units in a typically sized patio door (4' x 8') can weigh in the range of 100 pounds.

As can be seen in Figs. 1, 2 and 3, when the light or pane 22 is inserted into the door frame 21 and the entire weight of the pane is supported by the frame which includes composite vertical stiles 23 and a composite top horizontal rail 24 along with a composite bottom horizontal rail 25. In Fig. 2 the cross-section of the vertical stiles is illustrated with the similar cross section of the bottom horizontal rail illustrated in Fig. 3.

Referring to Figs. 2 and 3, it can be seen that the skins 30 and 31 of compression molded sheet material which form the exterior surfaces of the novel patio door frame are separated by a vertical stile post 32 in Fig 2 and horizontal rail member 38 in Fig. 3 at their outer peripheral edges. The top rail member is identical to the stile posts in cross section and therefore is not shown. The inner peripheral edges of these skins around the central aperture 26 include integral edges. Skin 30 has an integral edge strip 34 incorporating an extending an upstanding flange 35 (with its axis oriented generally parallel to the surface of the associated skin) and skin 31 has an integral edge strip 36 has with extending rim 37. As described in U. S. Letters Patent No 5,644,870 integral edge strips similar to the of the type used in the current invention can be constructed with interlocking elements. A permanent joint between these strips can be effected with glue. Here the edge strips 34 and 36 extend at right angles to the planner surface of their respective skins which form the sides of the door frame 21 about the central aperture, as distinguished from the outer perimeter of the skins as shown in the '870 patent. These edge strips are designed to be interlocking structures as shown in Figs. 4 and 5.

The wall thickness of edge strips 34 and 36 is increased from the thickness of its associated skin (about 0.05 inches to 0.12 inches) to the range of 0.5 inches. Edge strip 34 has a groove 40 formed therein so that a rib 41 at the distal end of edge strip 36 will be received in this groove when the opposed skins are assembled providing an interlocking relationship. Typically these edge strips are joined with glue on their contiguous surfaces when interlocked with one another as shown in Fig. 5.

When the two skins 30 and 31 are joined to form a glazing frame 60, with rib 41 of

strip 36 received in the groove 40 of strip 34 and glue is applied to appropriate surfaces of the edge strips 34 and 36 before joining skins together. Such interlocking edge structures form a closed, hollow space between the skins and at the same time, double the wall thickness of the structure in the glazing frame to increases its strength.

Unique to current door frame 21 is that the flange 35 and the apron 42 of edge strip 34, having surfaces at right angles to one another, form part a the glazing frame 60 designed to receive the light or pane 22. In this regard the extending flange has a light or pane abutment face 43, typically grooved to enhance its sealing capacity against the light or pane. A light or pane inserted into the glazing frame abuts against face 43. When this interface is effected the bottom edge of a light or pane is supported principally by the apron of edge strips of the bottom rail 25. Moreover, since edge strip 36 of skin 31 underlays the apron (see Figs. 2, 3 and 5), increasing the thickness of the structure supporting the light or pane in the glazing frame, increased strength in this area is obtained which is where such strength is desired. A further advantage is achieved in that the skin, flange and apron are integral with one another, a single unit, resulting in a weather tight structure when the edge strips of the several skins are glued together in the described interlocking relationship.

Next since the compression molding process can achieve substantial detail, edge strip 34 of sheet 30 can include a lip 44 at its distal end 45 formed during the compression molding process (see Fig. 5); however this lip, requiring some precession, can also be machined at the distal end of this edge if necessary. When edge strip 36 is joined with edge strip 34 a groove 46 is formed between the distal end 45 of edge strip 34 and the extending run 37 of edge strip 36, as illustrated in Fig. 5, showing the resulting joint in greater detail.

Referring to Figs. 2 and 3 it can be appreciated an extruded glazing strip 47 having a profile as illustrated in Fig. 4 and Fig. 6 can be employed in the groove 46 to retain a light or pane 22 12 previously inserted into the door frame 21. In this regard the glazing strip has an upper section 48 that is generally triangular in cross section, a cross section (best shown in Fig. 5) which is similar in cross section to the cross section to the integral flange 35 of

edge strip 34, and, as can be seen in Figs 2 and 3, when glazing strip is assembled in the groove the exterior appearances of the glazing strip and the flange on opposite sides of the light or pane appear similar. In Fig. 6 it can be seen, the bottom section 49 of the glazing strip is designed to be received in the groove 46 and includes a shoulder 50 which abuts on the top of the extending rim 37 of edge strip 36 to stabilize glazing strip and plug portion 51 which is actually received in the groove 46. This plug portion terminates in an angular tip 52 which, when the plug portion is received in the groove, extends under the lip 44 at the distal end 45 of edge strip 34 to lock the glazing strip in the groove.

The upper portion 48 of the glazing strip 47 is designed to deflect slightly due to its reduced cross section (see Fig. 6) when its plug portion 51 is pushed into groove 46, forcing the angular tip 52 under lip 44 to lock the strip in place. Further its light or pane engaging face 53 is grooved to form two sealing faces 54 and 55. A vinyl or rubber seal strip 56 is shown associated with the pane engaging face of the strip in Fig. 6 and is employed to improve the seal against the light or pane 22 when it is retained by the glazing strip 47. If desired additional seal strips can be employed on this face, as illustrated in Figs. 2 and 3. This arrangement allows the glazing strip to be popped out of groove 46 to replace the light or pane, if necessary.

It can be appreciated from the forgoing description that glazing frame 60 (a frame for receiving a window light or pane) is formed by the described edge strips which is completely water tight and strong enough to support the heavy dual glass panes now in use. Further since the edge strips 34 and 36 are formed integrally with skins 30 and 31 respectively, the loading from the light or pane 22 on the apron 42 on the bottom glazing frame is distributed uniformly to the skins forming the exterior surfaces of door frame 21.

Once the skins 30 and 31 have their respective edge strips 34 and 36 join as described to form the glazing frame, or in the alternative, while such jointer is occurring, the outer vertical peripheral edges 61 of the skins are joined at their perimeter to the stile posts 32 by gluing the skins to these posts with the top peripheral edges 62 of the skins joined to

the top rail member 33, also with glue. Likewise the bottom peripheral edges 63 of the skins are joined with the bottom rail member 38 in the same manner (see Fig. 7). When this procedure is completed stile posts and rail members form a perimeter frame closing the outer edges of the door frame 21 leaving a hollow space 64 between the interior of the glazing frame 60 and the interior surfaces of these members.

In Fig. 7 the interior structure of the door frame 21 can be seen before skin 31 is assembled with skin 30, illustrating the positions of the stile posts 32 and rails 33 and 38. If desired, filler members 65 can be glued to the central portion of the stile posts (as illustrated in Fig. 7) and to the skins to provide support for door hardware or accessories, such as latching mechanisms and locks (not shown).

Again referring to Fig. 7, once skin 31 is assembled with the structure illustrated therein, the door frame is not yet complete. The final step is to introduce a plastic foam, such as polyurethane foam, into the resulting hollow space 64. This can be accomplished by drilling a small hole in the top rail 33 member and injecting foaming agents into this hollow space to create a foam core 66. Polyurethane compositions have the advantage that they can be foamed by CFC-free materials and produce gases which do not harm the Ozone layer. Moreover, halogen-free materials are also better flame retardant, making polyurethane foams the foam of choice for the current door frame 21. Also polyurethane foams have better insulating qualities and better acoustical absorption characteristics, plus a history a satisfactory performance in such structures. When the foam agents are introduced into the hollow space in the frame, the resulting foam core 66 fills the entire space, bonding to the skins, the stile posts and the rails, marrying these parts together as a composite unit.

While it is preferred that the skins 30 and 31 and their respective integral edge strips 34 and 36 be formed as one single unit, it is possible to join smaller panels having the defined integral edge strips, with miter joints to form the full skins described for the preferred embodiment without a serious loss of integrity of a door frame 21 constructed with such composite skins. When such composite skins are employed, it may be desirable, in

larger frames, to employ an inner rectangular frame or additional stiles of wood or steel which abut 16 against interior surfaces of the glazing frame 60 to increase its strength. Of course, it is an option to use such additional reinforcement adjacent to the interior of the glazing frame, even when single panel skins are employed.

The stile posts 32 and the rail members 33 and 38 may have additional features to enhance the strength of the door frame 21 or the utility of the resulting door frame. In the regard the stile posts 32 and the top rail member 33, they can be constructed of wood, metal and plastic extrusions. Normally the sides of these members which engage the inner surfaces of the skins have grooves 69 which allow any excess glue to flow into the grooves, forming a glue ridge in the groove that increases the shear strength between the skin and the stile posts and the top rail member. In addition stile posts can include vertical stops 70 which the peripheral edges 61 of the skins 30 and 31 can abut against, as shown in Fig. 2. Likewise the top edges 62 of the skins can abut against the stops of the top rail member 33 (not shown because it has the same cross sectional configuration as the stile posts). Both the stile posts and the top rail member may include extensions 71 which extend beyond the stops 70 allowing a carpenter to trim top and side edges of the door frame 21 to fit into a door opening.

The bottom rail member 38, while constructed of the same materials as the stile posts 32, is somewhat different in that it is often required to perform additional functions and is subject to extensive trimming to accommodate differences in the opening in which the door frame is installed. In this regard, as shown in Fig. 3, this rail member is usually equipped with two large, spaced apart grooves 72 which are quite deep. As a result even after extensive trimming, the grooves are still available to receive a bottom weather strip 73 shown in Fig. 8. Typically the weather strips has ribs that can be pushed into the grooves to retain it in place across the bottom of the door frame.

In addition the bottom rail member 38 can be routed from the bottom to remove, in part, the portion 74 of tins this member between the grooves 72 so that recessed roller

assemblies 75 can be inserted in the bottom of the door frame, as shown in Fig. 9.

In most cases the exterior surfaces of the skins 30 and 31 will include wood graining which can be effected by incorporating a mirror image of the gaining pattern in the faces of the molds used for compression molding the skins. This process is well known in the art relating to doors made of these sheet molded products. Having described my invention by way of illustration, and not by way of limitation, it should be appreciated that variations can be adopted without departing from the spirit of this invention(s).

What I claim is:

1. An improved door frame for supporting a large window light or pane in doors constructed of synthetic materials and having an integral glazing frame comprising:

a first skin of a compression molded sheet material, said first skin having an aperture with a first integral edge strip oriented generally normal to the surface plane of said first skin and extending from and around its aperture;

a second skin of a compression molded sheet material, said second skin having an aperture with a second integral edge strip oriented generally normal to the surface plane of said second skin and extending from and around its aperture;

interlocking means associated with said first edge strip and said second edge strip operable to fixedly to join said edge strips together in an overlapping relationship when glue is applied to the contiguous surfaces of said interlocking means;

glazing frame means associated with said first and second edge strips having an integral flange extending from one of said edge strips and a retaining strip attachable to said joined strips and operable to retain a window light between said flange and said retaining strip;

a perimeter frame means operable to close the space between said skins about their perimeter and fixedly joined to said respective skins thereby forming a hollow space between said frame means and the interior surface of said joined edge strips; and

a formed-in-place foam core in said hollow space.

2. The improved door frame as defined in Claim 1 including a window light.

3. The improved door frame as defined in Claim 1, wherein the formed-in-place foam core is a polyurethane foam.

4. The improved door frame as defined in Claim 1,wherein the frame means closing

the space between the skins about their perimeter is a rectangular frame composed of two vertical stiles, a top horizontal rail member and a bottom horizontal rail member.

5. The improved door frame as defined in Claim 1, wherein the frame means includes a weather strip at the bottom of the frame which is mounted in grooves formed in the bottom rail member.

6. The improved door frame as defined in Claim 1, wherein the frame means includes rollers mounted on the bottom of the door frame.

7. The improved frame as defined in Claim 1, wherein the skins are constructed of panels having integral edge strips oriented generally normal to the plane of the panels that are joined to from each skin having an aperture with said edge strips extending from and around such aperture.

8. The improved door frame as defined in Claim 1, wherein at least an additional vertical stile is incorporated in a space adjacent to the glazing frame means to increase the rigidity of the door frame.

9. The improved door frame as defined in Claim 1, wherein the thickness of the skins is between 0.05 inches and 0.125 inches in thickness.

10. The improved door frame as defined in Claim 1, wherein the thickness of the integral edge strips on the skin have a thickness of approximately 0.5 inches.

11. An improved door frame for supporting a large window light or pane in patio doors constructed of synthetic materials and having an integral glazing frame comprising:

a first skin of a compression molded sheet material, said first skin having an aperture with a first integral edge strip oriented generally normal to the surface plane of said first skin and extending from and around its aperture, said first skin also having a flange extending normal to the edge strip;

a second skin of a compression molded sheet material, said second skin having an aperture with a second integral edge strip oriented generally normal to the surface plane of said second skin and extending from and around its aperture;

interlocking means associated with said first edge strip and said second edge strip operable to fixedly to join said edge strips together in an overlapping relationship when glue is applied to the contiguous surfaces of said interlocking means;

a glazing strip attachable to said edge strips and operable to hold a window light in the frame by forcing it against said flange of said first integral edge strip;

a perimeter frame means operable to close the space between said skins about their perimeter and fixedly joined to said respective skins thereby forming a hollow space between said frame means and the interior surface of said joined edge strips; and

a formed-in-place foam core in said hollow space.

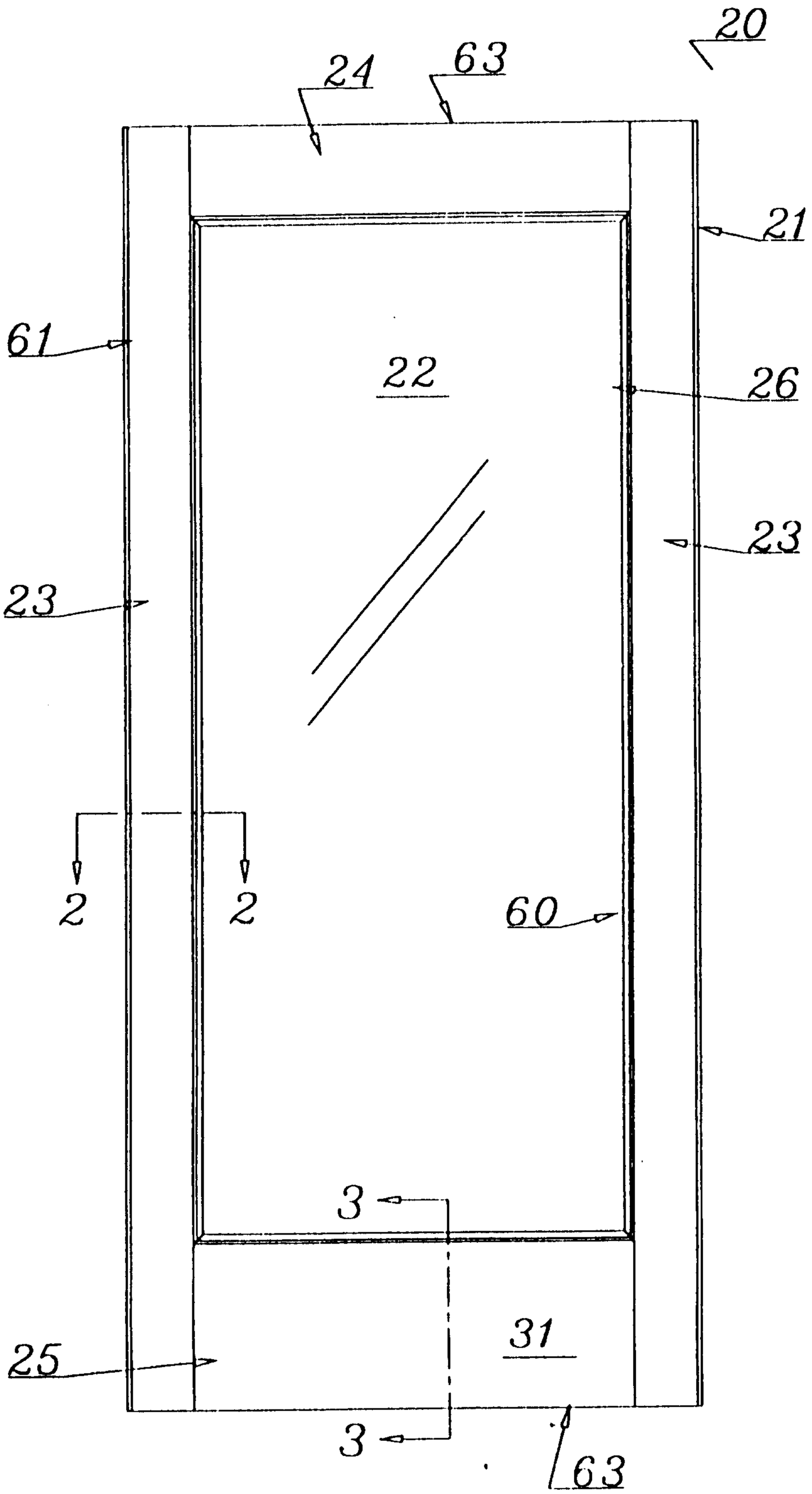

FIG. 1

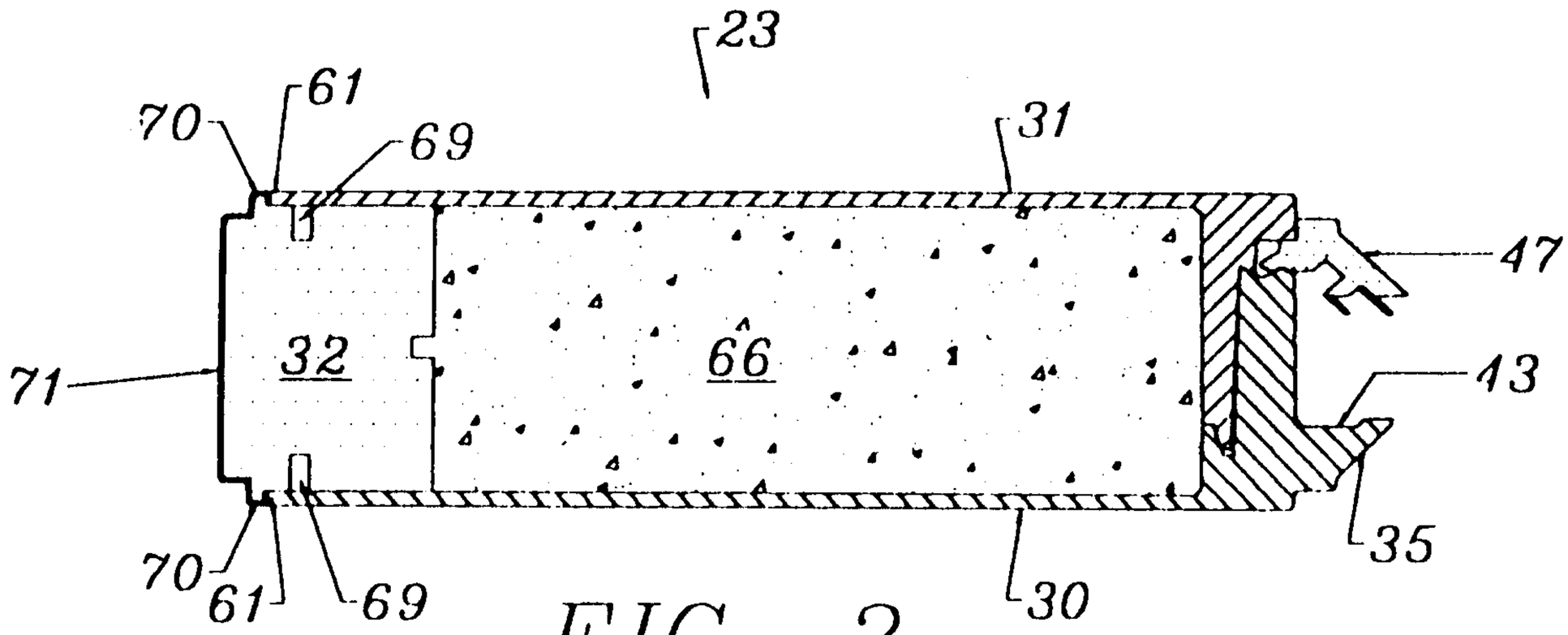
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FIG. 2

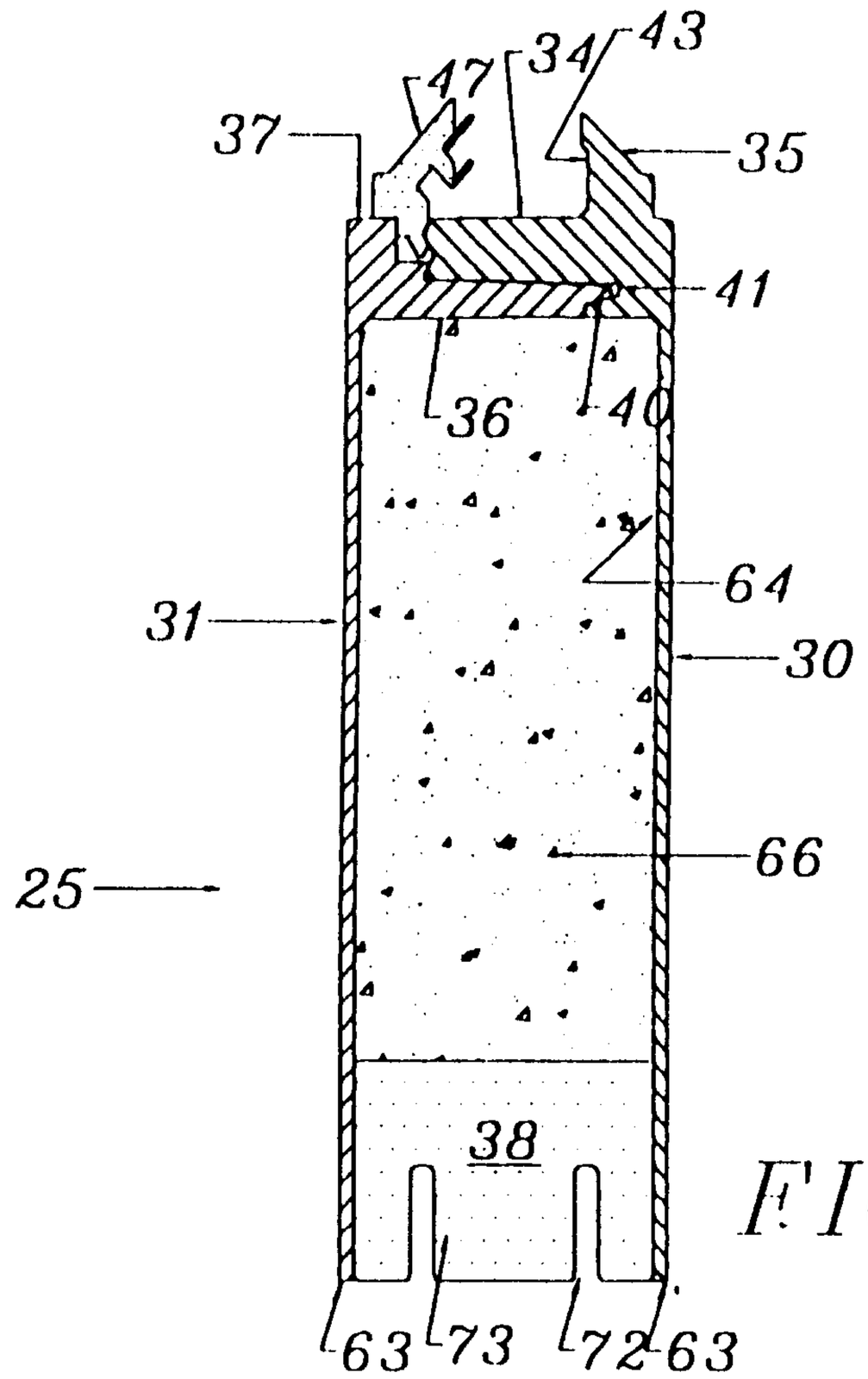
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FIG. 3

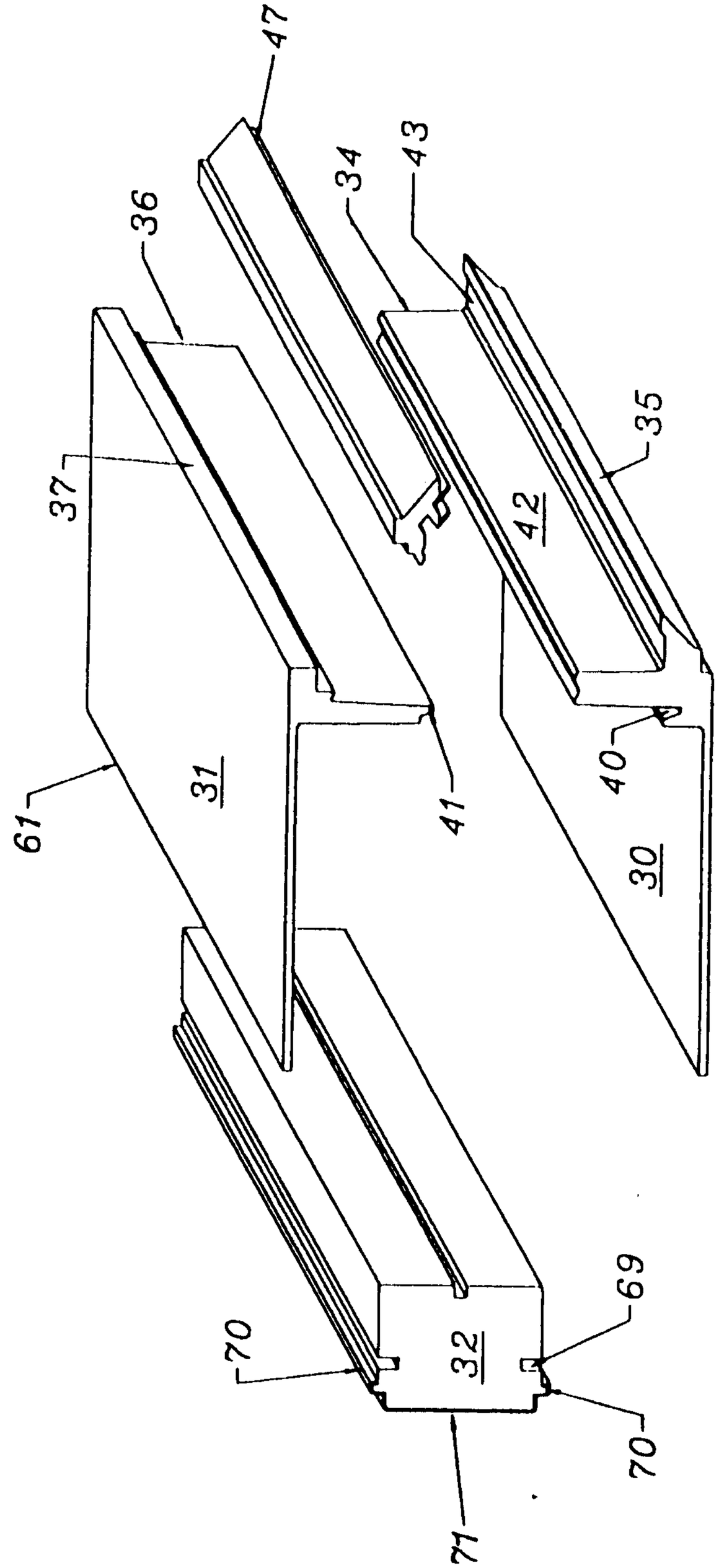


FIG. 4

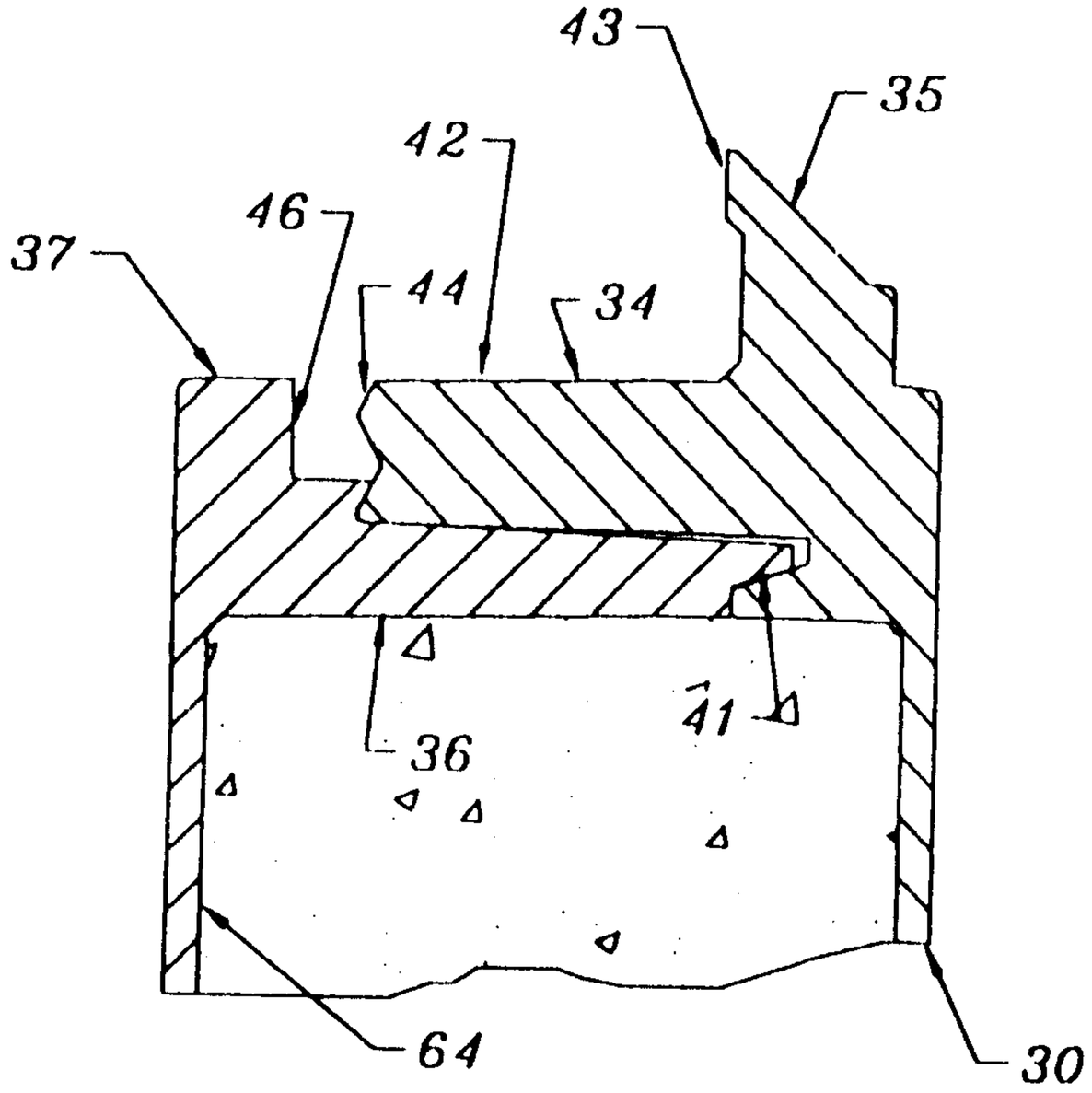
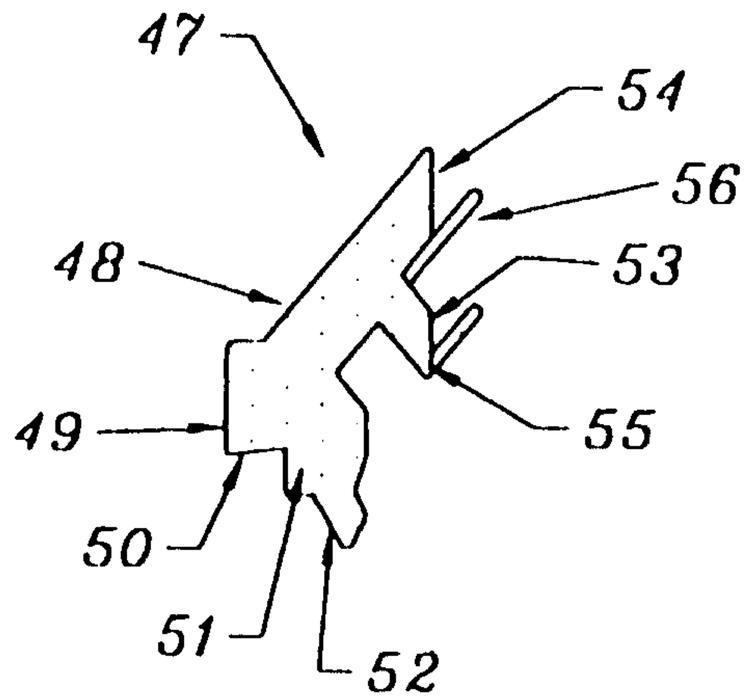


FIG. 5



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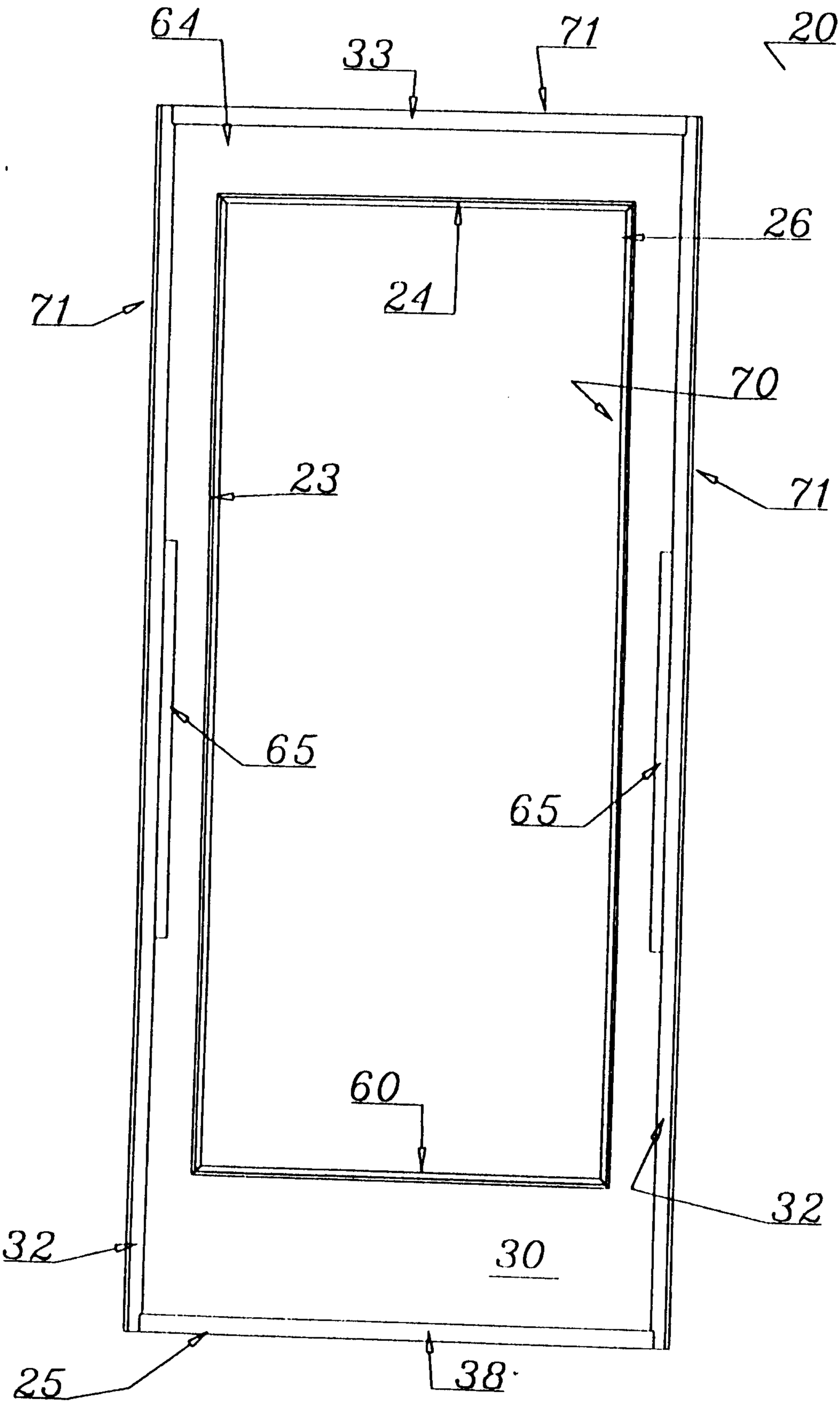

FIG. 7

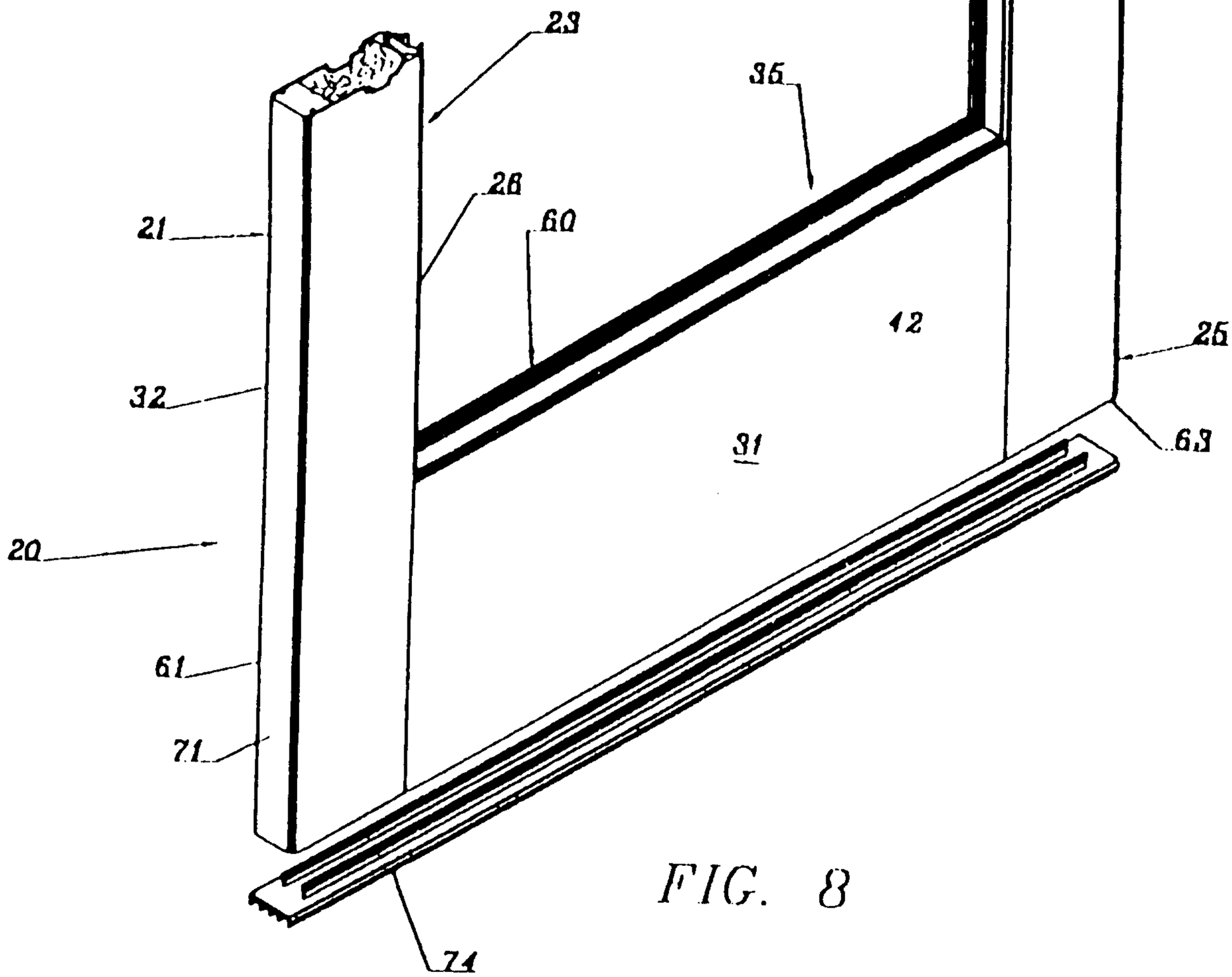
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FIG. 8

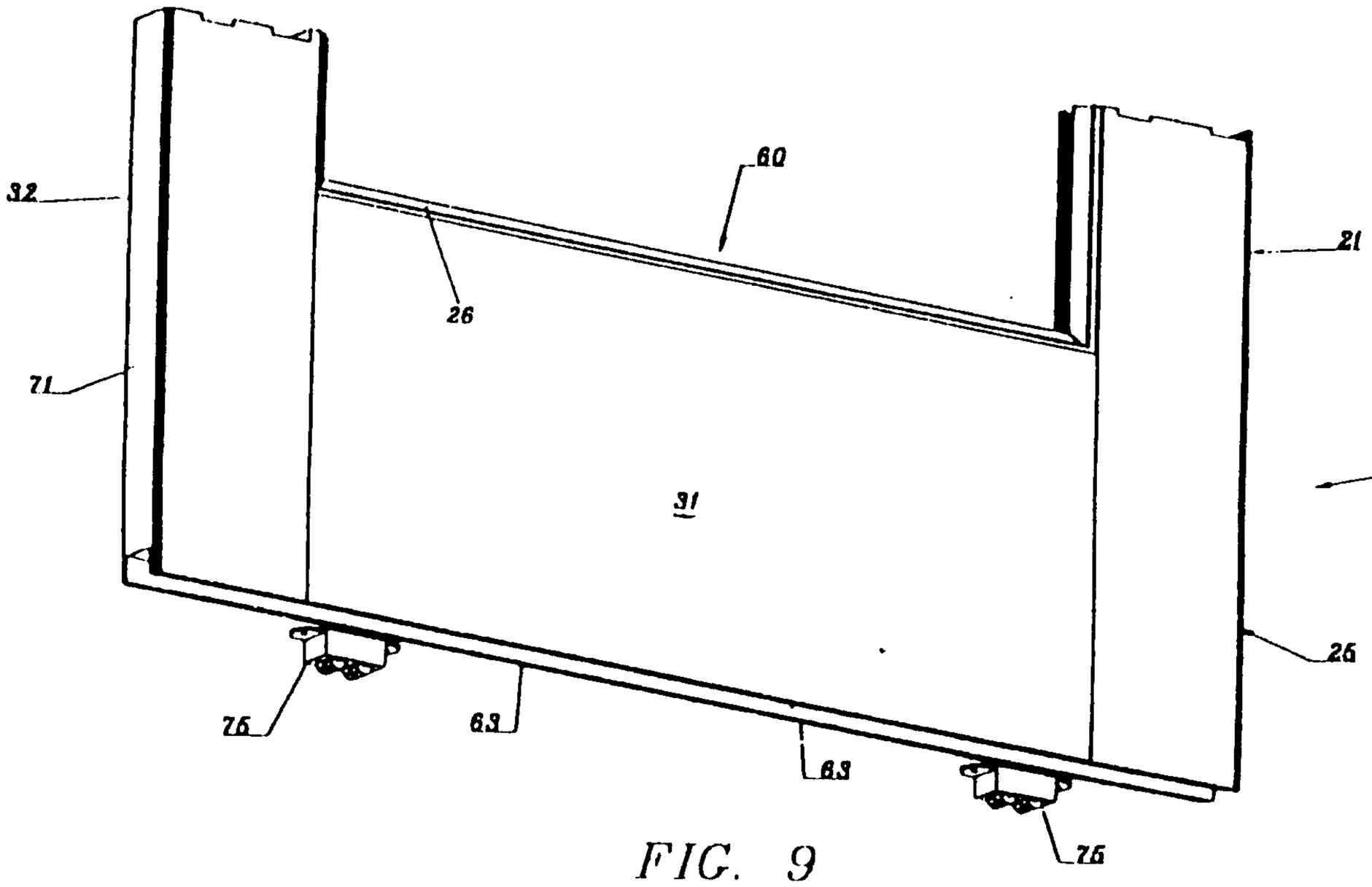
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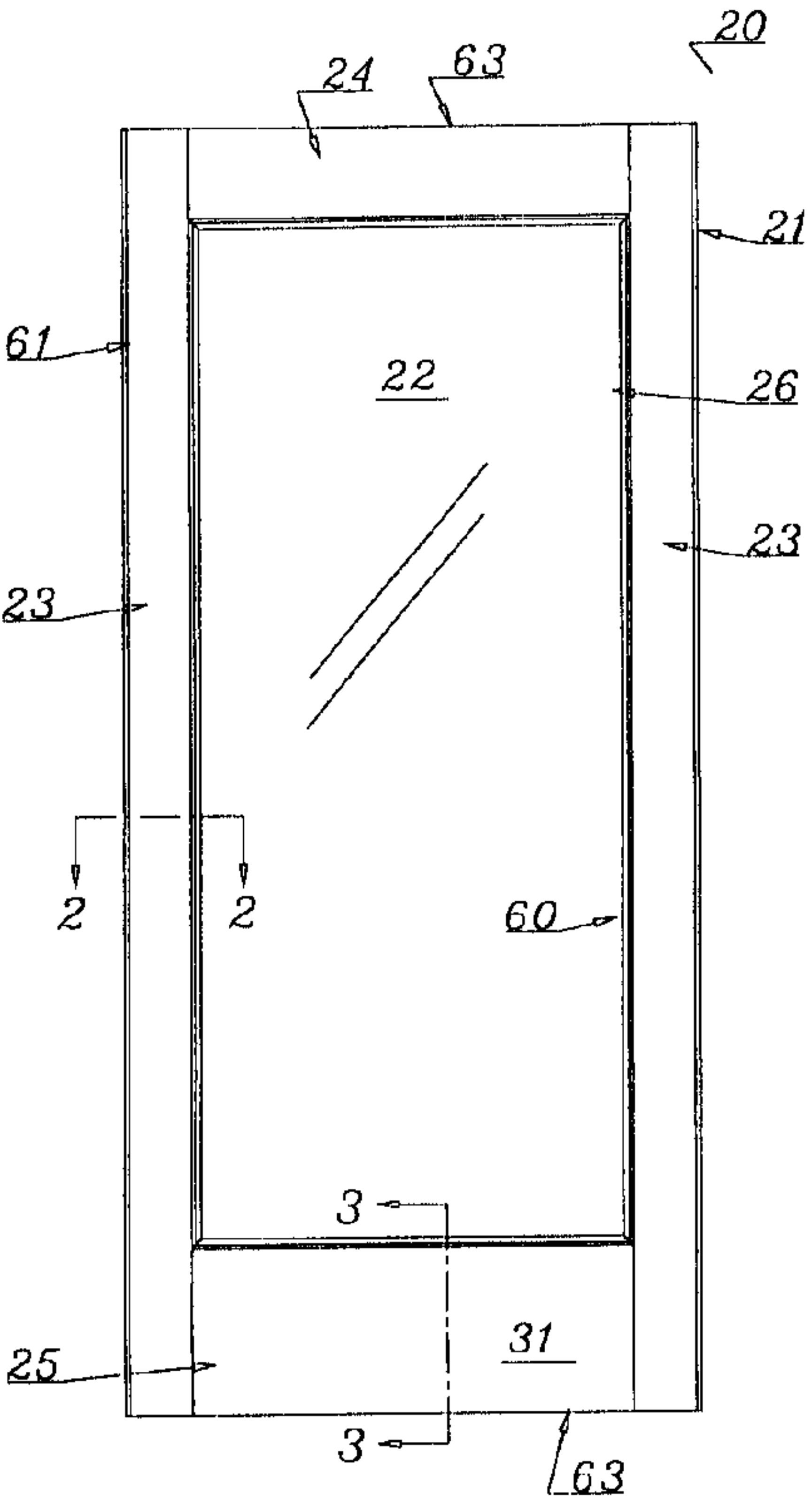
FIG. 9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