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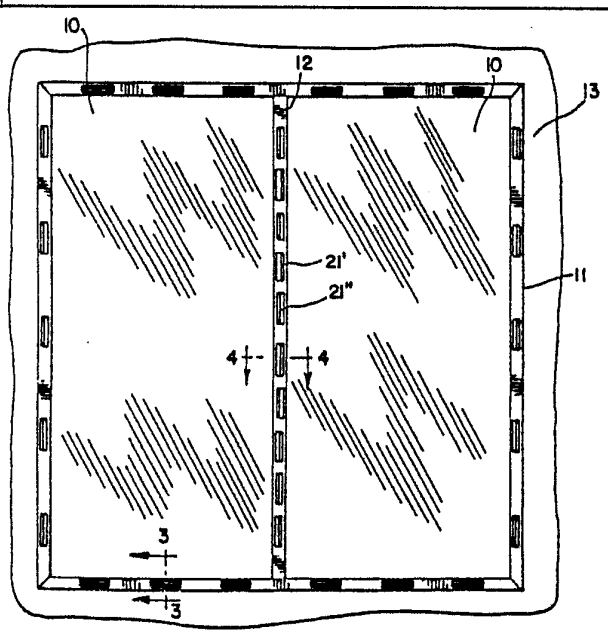
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(54) Title: DOUBLE-PANED WINDOW SECUREMENT



(57) Abstract

A sturdy and reliable mount for a double-paned glass unit (10) that is readily used for standard glass units (10) and frames (11), that is easily installed, that eliminates the need for endcaps or exterior stops, and that uses a flexible connector member (20) as part of the amount. The application of such a securement as a secondary mount to back up a primary mount for a double-paned glass unit, such as a structural silicone adherent, is a particular application of the invention. An embodiment includes a resilient or flexible elastomeric member (20) having a first portion (20) received in a channel formed between the glass plates (10a, 10b) of a double-paned glass unit (10) and a second portion (20b) extending beyond the perimeter of the glass unit (10). The second portion (20b) of the resilient member (20) is fixed to the structure (11) on which the glass unit (10) is to be mounted, such as a building. The means for fixing the resilient member (20) to the building may advantageously take the form of a separate anchor member (21) that can be fixed to the building and which interlocks (21a) with the second portion (20b) of the resilient member (20). A sliding interfit between the complementarily contoured portions of the resilient member (20) and the anchor member (21) in a tongue (26) and groove-type (29) of engagement is shown.

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DOUBLE-PANED WINDOW SECUREMENT

BACKGROUND OF THE INVENTION

This invention generally relates to mounting double-paned window units to buildings, and more particularly to a system providing a secondary or safety mount for securing a sealed double-paned window unit to a building.

Glass units made from two, and sometimes more, panes of glass are well known. They are particularly used as insulating glass units where the two panes, or lights, of glass are sealed together in spaced apart relation. Spacers separate the two lights and are affixed to the respective lights around the entire perimeter of the combined lights. The lights are thus sturdily secured into a unit with an air or other gas layer typically trapped between the two lights, establishing the insulative character of the unit.

Fairly large glass units may be used on office buildings and the like, such as glass units running from floor to ceiling. A number of different techniques have been developed to attach such glass units to a building. One method, for instance, is to attach the glass unit using end caps or exterior stops. The end

caps or stops overlie the outside light of the unit and are anchored or clamped to the building. Such a mounting mechanism is shown in U.S. Patent No. 3,367,077 for example, although a double-paned unit is not described therein.

While the foregoing method provides a very good attachment of the glass unit to the building, many buildings call for mounting the units without the use of exterior stops or caps. One common way to accomplish this is to adhere the interior light of the unit directly to the building. This can either be done in the field, or by adhering the unit to a frame remote from the job and then attaching the frame in place on the building (commonly referred to as unitization). In either case, the structural adherent used would ordinarily be a one or two part silicone sealant, preferably one that cures rapidly. The sealant is applied around the entire periphery of each unit to further weather-seal the unit to the building.

It will of course be readily appreciated that the entire weight of the unit is borne by the sealant. Wind forces are also directly borne by the sealant, as are stretching forces imposed by the expansion and contraction of the interior light. If the sealant fails, which unfortunately does occur, the entire unit will fall out of the building. Such potentially catastrophic failure of the sealant is typically hard to detect, unless the elements are observed leaking around the glass unit. Moreover, the seeds for sealant failure can be initially sown if the building is not properly surfaced for good adhesion, which can be difficult to accomplish and inspect in the field. Four sided captured silicone systems, while attractive to the industry, have nevertheless found disfavor for these reasons.

SUMMARY OF THE INVENTION

It is a principal objective of this invention to provide a sturdy and reliable mount for a double-paned glass unit that is readily used with standard glass units and frames, that is easily installed, that eliminates the need for endcaps or exterior stops, and that uses a flexible connector member as part of the mount. The application of such a mount as a secondary mount to back up a primary mount for a double-paned glass unit, such as a structural silicone adherent, is a more particular aspect of this principal objective.

The objective is met by the present invention which comprises a resilient or flexible member having a first portion received in a channel formed between the glass plates of a double-paned glass unit and a second portion extending beyond the perimeter of the glass unit. The second portion of the resilient member is fixed to the structure on which the glass unit is to be mounted, such as a building.

The means for fixing the resilient member to the building may advantageously take the form of a separate anchor member that can be fixed to the building and which interlocks with the second portion of the resilient member. The interlock of this embodiment uses a sliding interfit between complimentarily contoured portions of the resilient member and the anchor member in a tongue and groove-type of engagement.

In a present embodiment, the resilient member is an elongated block of a rubber or elastomeric material, such as EPDM. The block has a first portion that is sized to fit between the panes or lights of the double-paned glass unit in the recessed channel typically formed about the unit's perimeter. A second portion of the block extends beyond the perimeter of the glass unit.

The second portion is formed with a contoured surface presenting one and preferably more laterally extending (i.e. perpendicular to the general plane of the glass unit) flanges or ridges. These ridges run along the longitudinal length of the block.

The anchor member used with this present embodiment is an L-shaped metal bracket. The base of the L is fixed to the building, as by welding it to the mullion. The other part of the L has a surface formed thereon that is complimentary to that of the block's second portion so that the block and anchor interfit and interlock. For example, the surface of the L of this embodiment has a recessed channel defined therein within which one of the block flanges is received in a tongue and groove interengagement.

The foregoing mount has found particular application in a system for mounting such double-paned glass units to a building. A plurality of the connectors are located about the perimeter of the glass unit in spaced apart relation. In this regard, while the invention could readily be applied as a primary mount for a glass unit, it is presently considered to be most useful as a secondary or safety mount to a primary mounting using a silicone adherent. That is, the glass unit is adhesively secured to the building in a conventional fashion and the connector of the present invention is employed as a back-up in the event of the failure of the adherent. So applied, the glass unit would be field glazed or attached to the building in a unitized arrangement using standard techniques.

The anchor L's are positioned about the perimeter of the unit and fixed in place, as by welding to the mullion. The mounting blocks are then interlocked with respective L's by inserting the first portion of a block into the channel between the glass lights and longitudinally

sliding the second portion into the complimentary recess of the L.

Some of the advantages realized by this mount and mounting system used as a secondary mount can thus be readily seen. First, and perhaps foremost, the system precludes the catastrophic effects that formally resulted from failure of the primary adherent. If the primary mount fails, the system of the present invention prevents the glass unit from falling out, and enables repair or reattachment of the unit.

The connector and system are also readily used with standard glass units and building materials. No modification of either the glass unit, building or frame is thus required. Standard field glazing techniques are employed with the present invention, and the ability to unitize is unaffected.

The connector also allows normal expansion and contraction of the glass lights. All of the advantages of a four sided captured silicone system are retained, including less restriction on movement of the lights during expansion and contraction and a seal with the building against air and water infiltration. Furthermore, point contact with the interior light and undesirable pressure points are not associated with the present invention.

The foregoing objectives, features and advantages of the invention will be further understood upon consideration of the following detailed description of an embodiment of the invention taken in conjunction with the accompanying drawings, in which:

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a diagrammatic elevational view showing an arrangement of anchor members for mounting of a pair of adjacent glass units;

Fig. 2 is a perspective view of an embodiment of a resilient block used in a mount made in accordance with this invention;

Fig. 3 is a sectional view taken along line 3-3 of Fig. 1; and

Fig. 4 is a sectional view along line 4-4 of Fig. 1.

DETAILED DESCRIPTION OF AN EMBODIMENT OF THE INVENTION

The invention has presently found particular application as a secondary mounting system for a double-paned glass unit that is secured to a building using a silicone adhesive as a primary mount. While the following embodiment will be described in the context of this application, it will be understood that the invention may have other employments beyond what is specifically described.

Referring first to Fig. 1, a pair of glass units 10 are shown as they would be approximately positioned on a frame 11 including a mullion 12 on a building 13. The frame 11 is fixed to the building 13 in a conventional fashion well known in the building industry.

The glass units 10 are standard double-paned insulative glass units having two panes or lights of glass 10a, 10b (Figs. 3 and 4); light 10a is the interior light. The lights 10a, 10b are separated by a spacer assembly 14 that is slightly inset from the edge of the unit 10 and extends around the entire perimeter of the unit. The spacer assembly 14 is adhered to both lights in a conventional manner, such as through the use of a one or two part silicone compound. Each unit 10 is thus sealed with an insulative layer of air or other gas sandwiched between the lights.

Each of the units 10 is supported on the frame 11 by a structural seal of a silicone compound. This technique is conventional, and amounts to adhering the unit to the frame 10 with a bead of the silicone compound, such as a bead of silicone (not shown) around the inboard side of the interior light 10a applied in the gap 15. It will be noted that the gap 15 is provided by spacers 16, such as Norton tape, between the interior light 10a and the frame 11.

As already noted, the double-paned glass units 10 are standard, and are mounted to a typical frame 11 in a conventional manner using a structural sealant. The structural sealant forms the primary means for mounting the units 10. This method of supporting the glass units 10 provides the desired mounting without exterior stops or endcaps. The problem is that each unit 10 is entirely supported by the adhesive bond with the frame 11. If the bond fails, the unit 10 falls out.

A back-up or secondary mount is therefore provided by the present invention in this embodiment. If the sealant fails in the primary mount, the inventive securement holds the unit in place and prevents catastrophic failure of the entire unit mounting.

The illustrated mount made in accordance with the invention has two parts. One part is a resilient block 20 (Fig. 2) made of a rubber or rubber-like material, such as a shore A type EPDM having a durometer of about 70. This elastomer is compatible with the structural silicone sealant used as the primary mount. The block 20 has a first portion 20a that fits in the recess or channel formed around the edge of a glass unit 10 between the lights 10a, 10b, and a second portion 20b that extends beyond the perimeter of the unit 10. The other part of the mount is an anchor member in the form of an L-shaped metal bracket 21 (Figs. 3 and 4) that has a base 21a fixed to the frame 11 and flange 21b to which the block second portion 20b is attached.

The block 20 and anchor bracket 21 are engaged or interlocked through a sliding fit. To this end, the second portion 20b of the block has a contoured surface that is received and seats within a complimentarily contoured surface of the bracket flange 21b.

The second block portion 20b when viewed in cross-section (Figs. 3 and 4) has a stem 23 from which outboard and inboard lateral flanges 24 and 25 extend. A third lateral flange 26 extends inboard from the end of the stem 23, and is spaced a slight distance away from the other inboard flange 24. These flanges 24-26 extend along the entire longitudinal length of the block 20.

The flange 21b of the bracket 21 is configured to interlock with the block second portion 20b. It has a recess 28 formed therein with an inboard extending channel or groove 29 defined within the recess. A lip 30 overlies this channel 28. A ridge 31 extends perpendicularly from the flange 21b. All of these surface features of flange 21b extend along the entire longitudinal length of the flange 21b. The recess 28 and channel 29 are open at each end of the flange 21b.

The contour of the bracket flange 21b exactly matches that of the block 20 so that they interlock when engaged. The flange 26 of the block 20 is first inserted into one end of the channel 29, and then the block 20 is longitudinally slid along the bracket flange 21b. Once positioned, the block flanges 24 and 25 are flush with the bracket flange 21b, with bracket ridge 31 received in a complimentary recess 32 formed between stem 23 and flange 25. Block flange 26 is received in channel 29 in a tongue and groove-type connection.

It will be noted that two types of blocks 20 are depicted. The block 20 of Fig. 3 has flanges 24 and 25 which are slightly thicker than those of block 20 illustrated in Fig. 4. This is primarily because

the flanges 24, 25 of the Fig. 3 block, which is used along the bottom or base of the unit 10, would bear some of the weight of the glass unit 10 in the event of failure of the primary sealant mount. The blocks along the sides of the unit 10 (Fig. 4) would not be weight bearing. Blocks of the type shown in Fig. 4 are also used along the top of the unit 10.

Figs. 1 and 4 illustrate the mounting arrangement used along a mullion 12 which is intermediate two adjacent glass units 10. The anchor brackets 21 are alternated along the length of the mullion 12 so that brackets 21' form part of the mount for one glass unit 10 while every other bracket 21'' forms part of the mount for the other glass unit 10. A backer rod 32 made of Denver foam (polyurethane) is used in a conventional fashion to provide a seal along the edge of the unit 10 to prevent the structural silicone from seeping into the channel between the lights 10a, 10b. The backer rod 32 would be broken up into pieces designed to span the distance between blocks 20.

In the use of the illustrated embodiment, a unit 10 is attached to the frame 11 using structural silicone sealant in a conventional manner. Anchor brackets 21 are then fixed to the frame 11 such as by welding. The blocks 20 are thereafter slid into place in the channels along the perimeter of the unit 10 and into engagement with respective anchor brackets 21. A weather seal 34 is provided around the edges of the exterior light 10b between the light 10b and the frame (Fig. 3) and adjacent lights 10b (Fig. 4).

Although the illustrated embodiment utilizes anchor brackets 21 that are welded to a frame 11 in a unitized arrangement, it is contemplated that a snap-type anchor member could be employed in a ratchet attachment to a frame. Moreover, the invention can be used in field glazing as well as in a unitized arrangement.

An embodiment made in accordance with this invention was tested to determine its supportive capability exclusive of the use of structural sealant, i.e. as if the structural sealant had completely failed and the unit was supported exclusively by the mounting assembly of this invention. Two standard insulative glass units 10 measuring 4' by 8' in a 7' by 11'' two light wide system were arranged in a manner similar to that depicted in Fig. 1. Anchor brackets 21 were welded to the aluminum extrusion frame 11 so that blocks 20 were located at quarter points along the top and bottom of each unit 10 (the retaining mount illustrated along the major axis of each unit being omitted). Mounts were located along the outer sides of the units 10 spaced 6'' from the ends (top and bottom) and along the minor axis (3 retaining mounts being used instead of the illustrated 5). The mullion 12 had mounts located 6'' from either end in alternating pairs, with a pair of alternating mounts at about the midpoint of the mullion 12 (the other intermediate mounts likewise being omitted). The blocks were 6'' in longitudinal length and manufactured by Tremco of Columbus, Ohio, under the designations TR 2140E and TR 2140E.

The foregoing supportive assembly tested to a pressure of 93 lbs./sq. ft, or an equivalent wind velocity of 193 m.p.h., at which point the mullion 12 rotated and unsealed the unit. That is, the frame 11 failed before the mounting assembly, showing the high reliability of this inventive system.

Thus, while the invention has been described in connection with a present embodiment, those skilled in this art will recognize modifications of structure, elements, arrangement, portions, materials and the like that can be used in the practice of the invention without departing from the principles of this invention.

WE CLAIM:

1. A mount for a double-paned glass unit having two plates of glass joined together in spaced apart relation with an outboard opening channel formed between the glass plates along the perimeter of the glass unit, comprising:

a resilient member having a first portion received in the channel formed between the glass plates and a second portion extending beyond the perimeter of the glass unit, and

means for fixing said second portion to the building.

2. The mount for a double-paned glass unit of claim 1 wherein said means for fixing said second portion to the building comprises means for interlocking engagement between said second portion and an anchor member fixed to the building.

3. The mount for a double-paned glass unit of claim 1 wherein said interlocking engagement means comprises a contoured surface formed on one of said second portion and said anchor member presenting at least one tongue, which contoured area is received in a complimentarily contoured area of the other of said anchor member and second portion which complimentarily contoured area presents at least one groove within which said tongue is received.

4. The mount for a double-paned glass unit of claim 2 wherein said interlocking means comprises a stem formed on said second portion extending outboard from said glass unit and in the same general plane of said glass unit and a tongue extending perpendicularly

from said stem, said tongue being seated in a groove formed in said anchor member to fix said resilient member to said anchor member.

5. The mount for a double-paned glass unit of claim 4 wherein said anchor member is a bracket having a base which is secured to the building, and a portion extending from the base and intersecting the general plane of said glass unit, said bracket portion having a contoured surface formed thereon including a recessed area with a groove within which contoured surface said second portion of said resilient member is received and seats.

6. The mount of claim 2 wherein said resilient member is an elastomeric block.

7. A system for securely mounting to a building a double-paned glass unit having two plates of glass joined together in spaced apart relation with an outboard opening channel formed between the glass plates along the perimeter of the glass unit, comprising:

a plurality of resilient member having a first portion received in the channel formed between the glass plates and a second portion extending beyond the perimeter of the glass unit, said resilient members being located in spaced relation about the perimeter of the glass unit, and

means for fixing each of said second portions to the building.

8. The system of claim 7 wherein said resilient members are elastomeric blocks, said second portion being shaped to interlock with an anchor member on the building.

9. The system of claim 8 wherein said anchor member is a bracket having a base that is fixed to the building and a portion extending from said base having a recess formed therein defining a channel that is perpendicular to the general plane of said glass unit, said block second portion having a flange formed thereon that is received in said channel to interlock said second portion with said anchor.

10. A mount for a double-paned glass unit having two plates of glass joined together in spaced apart relation with an outboard opening channel formed between the glass plates along the perimeter of the glass unit, comprising:

a primary adhesive securement for the glass unit including an adhesive bond between the unit and the building, and

a secondary securement for the glass unit comprised of retaining mounts each having a resilient member with a first portion received in the channel formed between the glass plates and a second portion extending beyond the perimeter of the glass unit, and means for fixing said second portion to the building.

11. The mount for a double-paned glass unit of claim 10 wherein said means for fixing said second portion to the building comprises means for interlocking engagement between said second portion and an anchor member fixed to the building.

12. The mount for a double-paned glass unit of claim 11 wherein said interlocking engagement means comprises a contoured surface formed on one of said second portion and said anchor member presenting at least one tongue, which contoured area is received in a

complimentarily contoured area of the other of said anchor member and second portion which complimentarily contoured area presents at least one groove within which said tongue is received.

13. The mount for a double-paned glass unit of claim 12 wherein said interlocking means comprises a stem formed on said second portion extending outboard from said glass unit and in the same general plane of said glass unit and a tongue extending perpendicularly from said stem, said tongue being seated in a groove formed in said anchor member to fix said resilient member to said anchor member.

14. The mount for a double-paned glass unit of claim 13 wherein said anchor member is a bracket having a base which is secured to the building, and a portion extending from the base and intersecting the general plane of said glass unit, said bracket portion having a contoured surface formed thereon including a recessed area with a groove within which contoured surface said second portion of said resilient member is received and seats.

15. The mount of claim 11 wherein said resilient member is an elastomeric block.

16. A system for securely mounting to a building a double-paned glass unit having two plates of glass joined together in spaced apart relation with an outboard opening channel formed between the glass plates along the perimeter of the glass unit, comprising:

a primary adhesive securement for the glass unit including an adhesive bond between the unit and the building, and

a secondary securement for the glass unit comprised of a plurality of retaining mounts each comprised of a resilient member having a first portion received in the channel formed between the glass plates and a second portion extending beyond the perimeter of the glass unit, said resilient members being located in spaced relation about the perimeter of the glass unit, and means for fixing each of said second portions to the building.

17. The system of claim 16 wherein said resilient members are elastomeric blocks, said second portion being shaped to interlock with an anchor member on the building.

18. The system of claim 17 wherein said anchor member is a bracket having a base that is fixed to the building and a portion extending from said base having a recess formed therein defining a channel that is perpendicular to the general plane of said glass unit, said block second portion having a flange formed thereon that is received in said channel to interlock said second portion with said anchor.

19. A method for securely mounting to a building a double-paned glass unit having two plates of glass joined together in spaced apart relation with an outboard opening channel formed between the glass plates along the perimeter of the glass unit, comprising the steps of:

attaching the glass unit to the building using an adhesive bond between the unit and the building as a primary securement, and

further attaching the glass unit to the building using a secondary securement comprised of a plurality of retaining mounts each including a resilient member having a first portion received in the channel formed between the glass plates and a second portion, said resilient members being located in spaced relation about the perimeter of the glass unit, and means for fixing each of said second portions to the building.

20. The method of claim 19 wherein said resilient members are elastomeric blocks, said second portion extending beyond the perimeter of the unit and being shaped to interlock with an anchor member on the building.

21. The method of claim 20 wherein said anchor member is a bracket having a base that is fixed to the building and a portion extending from said base having a recess formed therein defining a channel that is perpendicular to the general plane of said glass unit, said block second portion having a flange formed thereon that is received in said channel to interlock said second portion with said anchor.

FIG-2

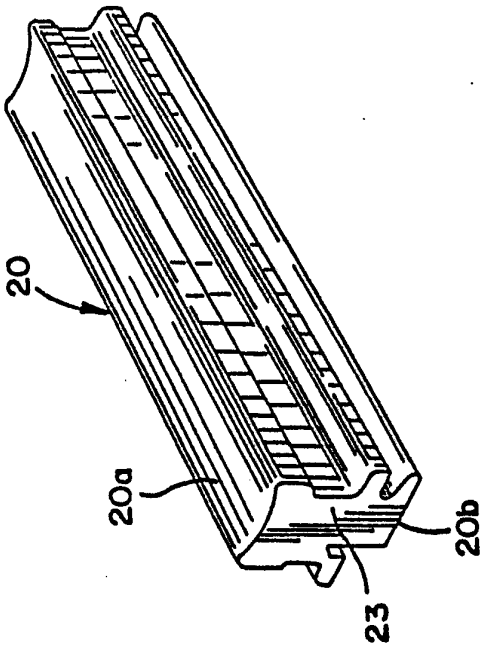


FIG-1

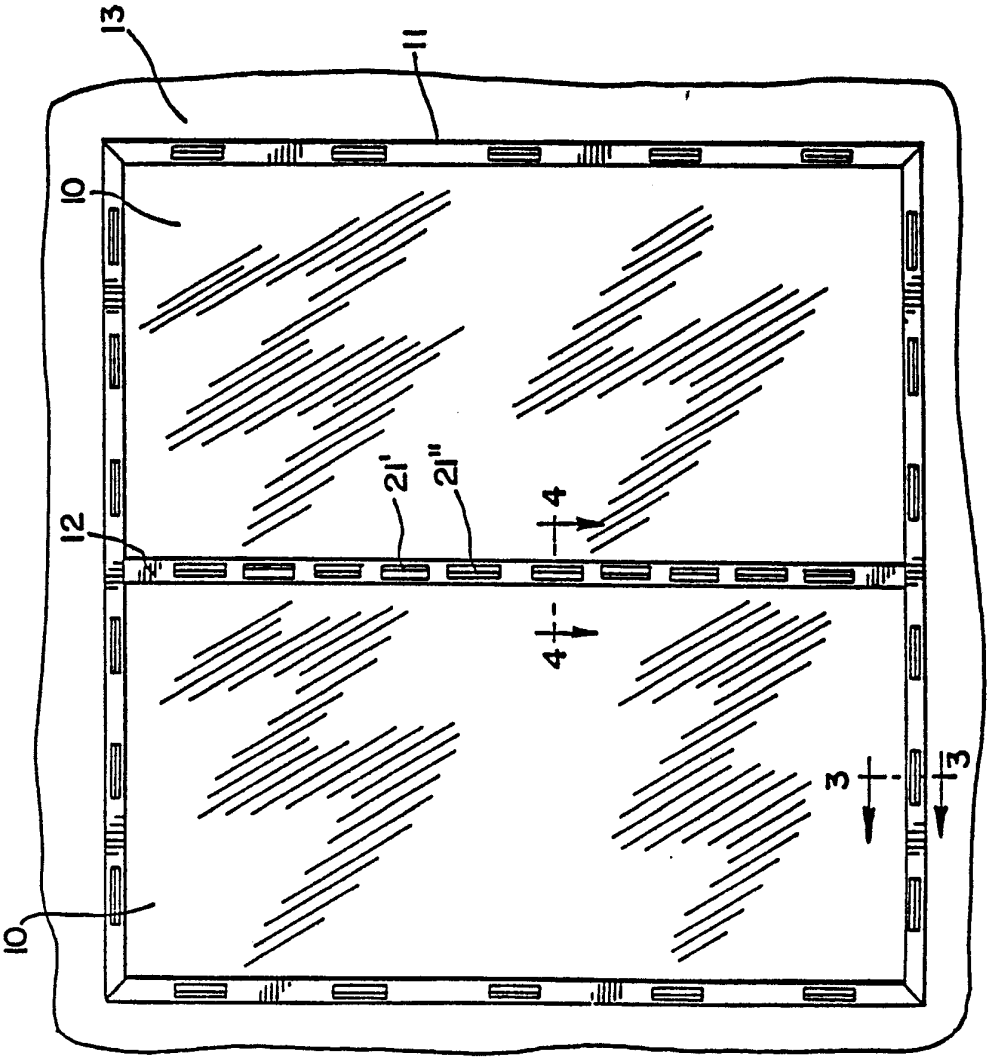


FIG-4

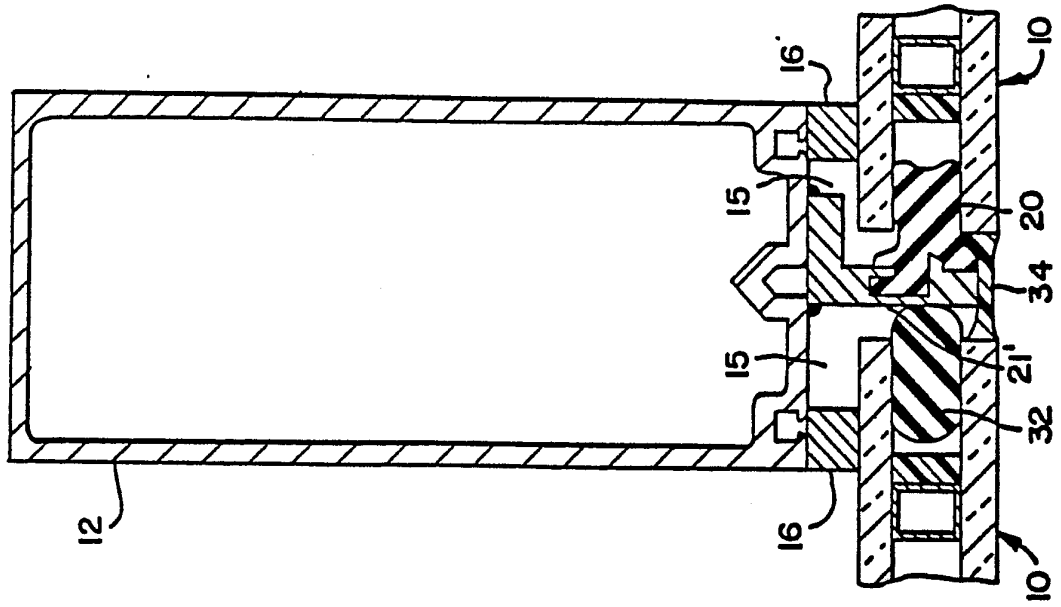
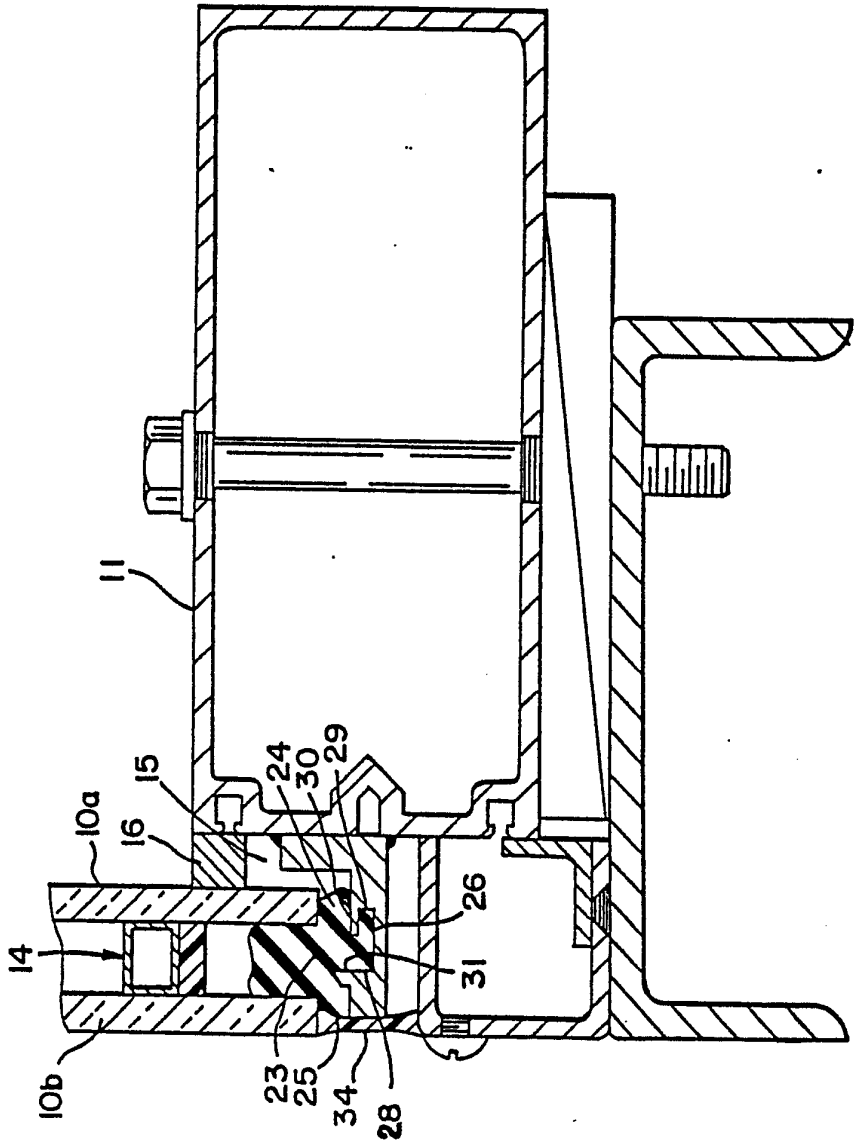

16
10
15
20
34
15
21'
32
12
16
10

FIG-3


11
15
24
30
29
10a
16
26
14
31
10b
23
25
34
28

INTERNATIONAL SEARCH REPORT

International Application No PCT/US 87/00937

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) [3]

According to International Patent Classification (IPC) or to both National Classification and IPC

IPC (4) : E0 6B 3/26

U. S. Cl. 52/202, 308,400

II. FIELDS SEARCHED

Minimum Documentation Searched [4]

Classification System	Classification Symbols
U. S.	52/202,203,208,397,398,399,400,402,403,772,788,790,308

Documentation Searched other than Minimum Documentation to the Extent that such Documents are included in the Fields Searched [5]

III. DOCUMENTS CONSIDERED TO BE RELEVANT [14]

Category [6]	Citation of Document, [16] with indication, where appropriate, of the relevant passages [17]	Relevant to Claim No. [18]
X	US,A, 3,343,317 (Cripe) 26 September 1967	1 thru 21
X	US,A, 2,430,873 (Haas) 18 November 1947	1 thru 18
Y	US,A, 4,134,238 (Auger) 16 January 1979	1 thru 18
Y	DE,A, 1,086,875 (Schoninger) 11 August 1960	1 thru 18
X	FR,A, 1,203,877 (Compagnie de Chimiques) 3 August 1959	1 thru 18
X	US,A, 4.669,241 (Kelly) 2 June 1987	1 thru 18
X	US,A, 2,748,431 (Eriksson) 5 June 1956	1 thru 21
X	US,A, 4,348,435 (Mistrick et al) 7 September 1982	1 thru 21
X	US,A, 4,500,572 (Francis) 19 February 1985	1 thru 21
X	US,A, 4,552,790 (Francis) 12 November 1985	1 thru 21

[6] Special categories of cited documents: [15]

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"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

IV. CERTIFICATION

Date of the Actual Completion of the International Search [2]	Date of Mailing of this International Search Report [2]
2 July 1987	06 AUG 1987
International Searching Authority [1]	**Signature of Authorized Officer [20]**
ISA/US	James Lee Ridgill, Jr.
	JAMES LEE RIDGILL, JR.