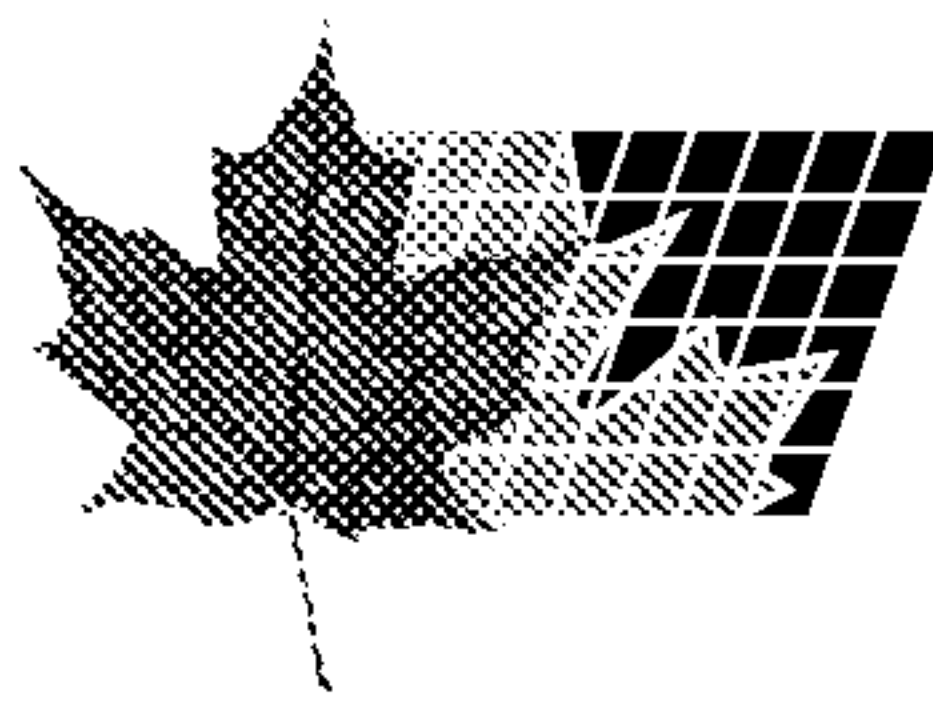




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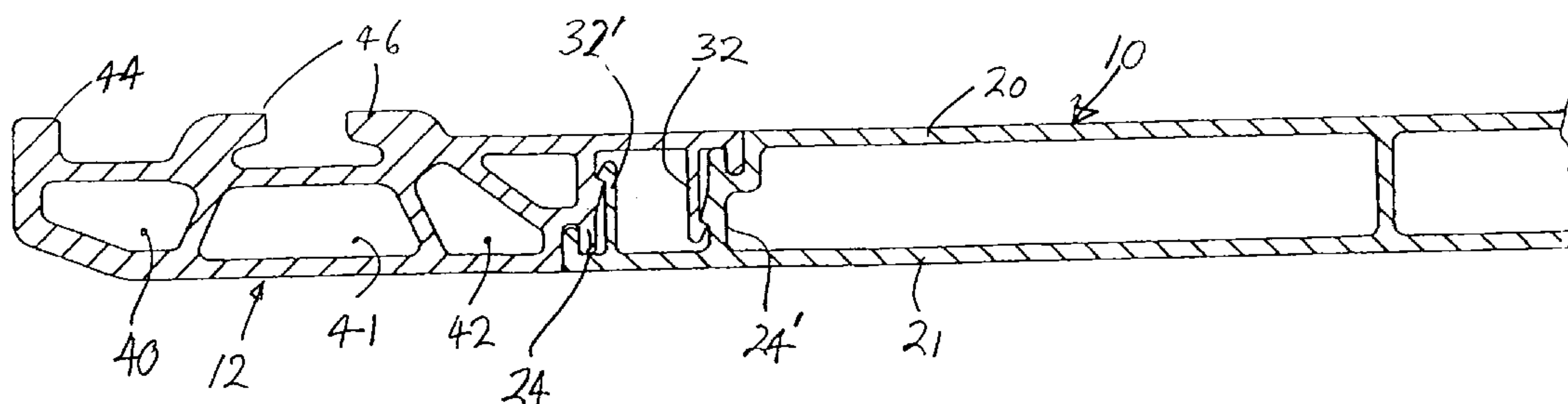
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(54) **PALETTE RENFORCEE, EN PARTICULIER POUR FRET
AERIEN**

(54) **PALLET FOR SUPPORTING A LOAD, PARTICULARLY FOR
AIR CARGO**



(57) A pallet for supporting a load, especially for air cargo, comprises a series of parallel floor panels of extrudable form joined along their longitudinal edges, in which each floor panel is hollow and has spaced upper and lower walls joined by longitudinal spacers. Each floor panel has a first longitudinal edge formation which forms an interlocking joint with a mating second longitudinal edge formation of an adjacent, identical floor panel. Two longitudinal edge members each have an inner edge formation which forms a further interlocking joint with a mating first or a second edge of one of the floor panels, and two lateral edge members each have an inner edge connected to an end of the series of floor panels. Corner pieces are connected between the edge members. The floor panels and edge members are formed as metal extrusions.

Abstract of the Disclosure.

5 A pallet for supporting a load, especially for air cargo, comprises a series of parallel floor panels of extrudable form joined along their longitudinal edges, in which each floor panel is hollow and has spaced upper and lower walls joined by longitudinal spacers. Each floor panel has a first longitudinal edge formation which forms an interlocking joint with a mating second longitudinal edge formation of an adjacent, identical floor panel. Two longitudinal edge members each have an inner edge formation which forms a further interlocking joint with a mating first or a second edge of one of the floor panels, and two lateral edge members each have an inner edge connected to an end of the series of floor panels. Corner pieces are connected between the edge members. The floor panels and edge members are formed as metal extrusions.

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Title: Pallet for supporting a load, particularly for air cargo.

Background of the Invention.

1.Field of the Invention

5 The present invention relates to a pallet for supporting a load, and especially to a lightweight pallet suitable for air cargo. The term "pallet" includes not only a support to which cargo may be attached, but also includes a floor portion of a cargo container.

10 2.Prior Art

In the past, pallets for air cargo were usually made with a main floor area of wood, foam, or an interlocking core structure laminated between two aluminum sheets, and with a frame surrounding the perimeter of the floor. Such
15 constructions are shown in the following U.S. patents:

No.4,690,360, issued Sep.1,1987 to Looker, and
No.4,964,530, issued Oct.23,1990 to Graff.

20 These laminated type constructions have the drawback that they may become delaminated under stress, to the point where there can be a total failure of the pallet without warning. For this reason, some users prefer a simple, so-called "cookie-sheet" construction, comprising a thin, flat, solid plate of aluminum with a surrounding frame attached to the plate by means of rivets. Such a construction is shown in the
25 U.S.Pat.No.3,698,677 of Looker. However, this type of construction has the drawback that the plate has the tendency to take a permanent deformation due to loading conditions. Also, the single plate is rather flexible and thus prone to

sagging or dishing out; such deformations, especially around the perimeter, mean that the pallets do not easily fit within the aircraft channel restraints. In forcing the pallets into the channels, time is lost and the aircraft structure may be
5 damaged.

Since the floor of the "cookie sheet" type pallet is one large sheet, it must be completely replaced if damaged, or if its deformations become too large. The floor is attached to the perimeter frame by a multitude of rivets that require careful,
10 tedious, drilling and re-riveting. Consequently, these types of pallets are regularly replaced after only six to eighteen months of service, which involves substantial costs when each pallet costs \$600 to \$900 U.S.

Summary of the Invention

15 The present invention provides a pallet formed of a series of parallel, extrudable sections which are fitted together. The sections have a double-walled cross-section, and are more rigid and less subject to permanent deformation than a single layer of material. The sections are joined in ways which allow easy
20 replacement of parts of the main floor portion, as well as edge or frame portions. The joints between the sections have a slight flexibility which allows the pallet to lie on an uneven surface without any permanent deformation.

25 In accordance with the present invention, a pallet for supporting a load comprises:

a series of parallel sided floor panels of extrudable form joined along their longitudinal edges,

each floor panel having spaced upper and lower walls joined by longitudinal spacers, and each having a first

longitudinal edge formation which forms an interlocking joint with a mating second longitudinal edge formation of an adjacent, identical floor panel;

5 two longitudinal edge members each having an inner edge formation which forms a further interlocking joint with a mating first or a second edge of one of said floor panels, and

two lateral edge members each having an inner edge connected to an end of said series of floor panels.

10 The pallet also has four corner pieces, each corner piece having a first spigot which engages within one of the longitudinal edge members, and a second spigot which engages within one of the lateral edge members.

Preferably, the floor panels, and usually also the edge members, are formed as metal extrusions, preferably aluminum.

15 In a preferred form, the interlocking joints are symmetrical in a way which allows the joints to have equal flexing of the floor in both upwards and downwards directions.

20 The interlocking joints each include a claw element integral with one of the edge formations and a rib integral with the mating edge formation, the rib carrying a detent engageable by the claw element, the claw element being flexible to allow the edge formations to be snap fitted together. However, since the panels and members are normally formed by
25 extrusion, they can also be connected by a sliding motion, so a snap fit is not essential.

The preferred interlocking joint is formed by a first longitudinal edge formation having its claw element and rib both downwardly extending, relative to a medial plane of the

floor panels, and the second edge formation has its claw
element and rib both extending upwardly, the edge elements also
having interfitting, upwardly and downwardly projecting flange
elements having surfaces which face inwardly of the floor
5 panels and which fit together to prevent lateral separation of
the edge formations when fully mated with each other.

The longitudinal edge members may include a first edge
member having an inner edge formation forming an interlocking
joint with the first longitudinal edge formation of a floor
10 panel, and a second edge member with an edge formation which
forms an interlocking joint with the second edge formation of
another floor panel. This means that the edge members are
differentiated.

Alternatively, the longitudinal edge members may be
15 identical, and each have an inner edge formation forming an
interlocking joint with a first longitudinal edge formation of
a floor panel, the pallet including a further floor panel which
has its opposite sides identical and of opposite hand, each
opposite side forming an interlocking joint with the second
20 longitudinal edge of an adjacent floor panel or with the inner
edge formation of a longitudinal edge member.

Brief Description of the drawings.

Preferred embodiments of the invention will now be
described by way of example with reference to the accompanying
25 drawings, in which;

Fig.1 is a plan view of a first form of pallet in
accordance with the invention;

Fig.2 is a cross-section through parts of two floor
panels, taken on lines 2-2 of Fig.1;

Figs.2a and 2b are enlarged views of parts shown in Fig.2, and showing respectively the edge formations snap fitted together, and separated;

5 Fig.3 is a cross-section through one longitudinal edge member and an adjacent floor panel, along lines 3-3 of Fig.1;

Fig.4 is a cross-section on lines 4-4 of Fig.1, showing a second longitudinal edge member;

10 Fig.5 is a cross-section on lines 5-5 of Fig.1, showing a lateral or end edge member and an associated end portion of the floor;

Fig.6 is a perspective view of a corner of the pallet;

Fig.7 is an enlarged perspective view of a corner piece;

Fig.8 is a cross-section of a portion of a second embodiment of pallet, showing an alternative joint formation;

15 Fig.9 is a cross-section through another portion of the second embodiment of pallet, showing a special floor panel which can be used to connect two identical, oppositely disposed edge formations; and

20 Fig.10 is a cross-section of an edge member of the second embodiment of pallet, and a connected portion of a panel.

Detailed Description.

25 Fig.1 shows a pallet formed of a series of parallel sided floor panels 10 joined together at their edges, having two longitudinal edge members 12 and 12', and two lateral or end edge members 14, the adjacent ends of the edge members being connected by corner pieces 16.

30 Two typical floor panels 10 are shown in Fig.2. Each is formed of aluminum by extrusion, and each has a hollow, double-walled construction formed by spaced upper and lower parallel walls 20 and 21 joined at the lateral center by longitudinal

spacers or ribs 22, and at their ends by further ribs 24, 24' which are part of edge formations which are shown connected together at the center of Fig.2. The panels have a width many times their height, specifically about 10 to 12 times their height, and a length many times their width, about 12 to 16 times their width. The panels have a central medial plane M, indicated in Fig.2a.

Figs.2a and 2b show details of a first edge formation 25 at one edge of a panel 10, and a second edge formation 26 at the opposite side of an identical panel, the two formations being capable of forming an interlocked joint as shown at 27 in Fig.2 and 2a. The edge formations are rotationally symmetrical about the medial plane M; i.e. edge formation 26 is the same as formation 25 when rotated 180° about a longitudinal axis coincident with this plane. Edge formation 25 may be considered as "downwardly open" in having a downwardly open recess, and edge formation 26 may likewise be considered as "upwardly open".

Each edge formation includes an integral extension 28, 28' of the upper or lower wall 20, 21, which ends in a vertical flange element 30 projecting inwardly towards the medial plane. An intermediate portion of the extension 28, 28' carries a claw element 32, 32' extending perpendicularly to the medial plane and having an outwardly facing detent or claw 33, 33' along its outer edge. Claw element 32 of edge formation 25 extends downwardly while claw element 32' of edge formation 26 extends upwardly. The outer face of end spacer or rib 24, 24' carries a detent 24a, 24a' positioned to engage a claw 33, 33' of the opposing formation. At the junction of the ribs 24, 24' to the upper or lower wall remote from the extension 28, 28', there is provided a narrow channel 35 defined in part by a vertical

surface 35a facing inwardly towards the center of the panel.

As will appear from Figs.2 and 2a, the edge formations are snap fitted together by inserting claw elements 32, 32' against the outer side of ribs 24, 24' and allowing flange elements 30 to enter the channels 35 of the opposing formation. The completion of the insertion causes the claws 33, 33' to snap past the detents 24a, 24a' so that the parts are snap-fitted and effectively locked together. The parts can also be connected by a sliding motion. The contact between the inside surfaces of the two flange elements 30 and the inside surfaces 35a of the channels 35 resist tension applied to the joint. The joint has a slight flexibility so that the pallet can accommodate a slightly uneven surface without deformation of the panels or edge formations. Due to its symmetrical nature, the flexibility is the same with both upwards and downwards deflections.

Fig.3 shows a similar joint between a first longitudinal edge member 12 and an outer panel 10. The edge member has a downwardly open edge formation with a downwardly extending claw element 32 engaging the detent on the outer rib 24' of the panel, while the panel has an upwardly open edge formation with an upwardly extending claw element 32' which engages the rib 24 at the inner side of the edge member, and which corresponds to the similar rib 24 of a panel edge. The parts can be connected by snap action or sliding. The edge member 12 is a hollow extrusion having upper and lower walls separated by three cavities 40, 41 and 42, of which 41 and 42 are outer and inner cavities respectively. The extrusion also has an outer, upwardly projecting lip 44, and two ribs 46 having recesses on their inner surfaces which between them provide an undercut track for retaining a tie-down element (not shown).

Fig.4 shows similar details of a second longitudinal edge member 12', which is similar to member 12 except that it has an upwardly open joint formation which includes an upwardly projecting claw element 32' cooperating with the detent of end rib 24 of the floor panel edge formation, while the claw element 32 of the panel edge formation engages the detent on the side of rib 24' of the edge member. The remainder of the edge member is the same as for the member 12.

Fig.5 shows a lateral or end edge member 14 attached to an end of a panel. The end edge member has the same form of hollow, extruded section as the longitudinal edge members, including the cavities 40, 41 and 42, and including the lip 44 and the ribs 46. The connection to the panels is by a tongue 50 which fits between the top and bottom walls 20 and 21 of the floor panels. In order to accommodate the ribs or spacers 22, 24, 24' of the panels, the tongue is formed with slots coordinated to fit these ribs. Vertical bores are drilled through the walls 20 and 21 and through the tongue, and rivets 52 are inserted through these bores to secure the tongue.

As an alternative to the slotting of the tongue 50, the internal ribs 22, 24 and 24' could be cut away to accommodate the tongue.

Fig.6 shows a perspective view of a corner of the pallet, including the corner piece 16, and two of the rivets 52 used to secure the end edge member to the panels. The corner piece is shown in more detail in Fig.7. It will be seen to comprise a metal casting having a rounded outer surface 60, and two side surfaces 61 at 90° to each other. Each side surface has two spigots 62, 63 which are shaped to be inserted into the outer and inner cavities 40 and 42 of the edge members 12, 12' and

14.

Fig.8 shows an alternative form for the joints at the edges of a panel 110, where it is connected to adjacent panels. A first edge formation 125 at the left side of panel 110 has an
5 outer pair of upper and lower claws 130, 130' which embrace and engage two inner claws 132, 132' which are part of a second edge formation 126 of an identical panel. The claws are again suitable for being snap fitted together, but may also be
10 slidably attached. The joint is symmetrical about the medial plane of the panels, and again has slight flexibility.

In the arrangement shown in Fig.8, each panel has a first edge formation 125 on one edge, and a second edge formation 126 at its other edge. These may be used, as before, with two longitudinal edge formations, one having the first edge
15 formation and one the second; i.e. the edge formations would be differentiated as in the first embodiment. However, it is alternatively possible to use the special reversing edge panel 118 which is shown in Fig.9, and which has second edge formations 126, characterized by inside claw elements, on both
20 of its edges. Use of this panel allows the panels on opposite sides of the panel to be reversed, and thus allows identical longitudinal edge members to be used on the opposite sides of the pallet.

Fig.10 shows one form of longitudinal edge member 112 to
25 be used with the panels 110 or 118. It has a hollow, double walled body with a recess 143, and an upper lip 44 and ribs 146 similar to those of the previous embodiment.

We Claim:

1. A pallet for supporting a load, comprising:

a series of parallel floor panels of extrudable form joined along their longitudinal edges,

5 each floor panel having spaced upper and lower walls joined by longitudinal spacers, and each having a first longitudinal edge formation which forms an interlocking joint with a mating second longitudinal edge formation of an adjacent, identical floor panel;

10 two longitudinal edge members each having an inner edge formation which forms a further interlocking joint with a mating first or a second edge of one of said floor panels,

and two lateral edge members each having an inner edge connected to an end of said series of floor panels.

15 2. A pallet according to claim 1, further comprising four corner pieces, each corner piece having a first spigot which engages within one of the longitudinal edge members, and each having a second spigot which engages within one of the lateral edge members.

20 3. A pallet according to claim 1, wherein said floor panels are formed as metal extrusions.

4. A pallet according to claim 1, wherein said floor panels and said edge members are formed as metal extrusions.

25 5. A pallet according to claim 1, wherein said interlocking joints provided limited flexing between said panels.

6. A pallet according to claim 5, wherein said interlocking joints are symmetrical about a medial plane of the floor

panels, whereby said joints provide equal flexing of one floor panel relative to another in both upwards and downwards directions.

5 7. A pallet according to claim 1, wherein said interlocking joints each include a claw element integral with one of said edge formations and a rib integral with the mating edge formation, said rib carrying a detent engageable with said claw element, said claw element being flexible to allow the edge
10 formations to be snap fitted together.

8. A pallet according to claim 7, wherein said edge formations are of extrudable form and are such as to allow them to be connected by sliding as well as by snap fitting.

15 9. A pallet according to claim 7, wherein said interlocking joints each have two of said claw elements and two of said ribs with detents.

20 10. A pallet according to claim 7, wherein said first longitudinal edge formation has its claw element downwardly extending, relative to a medial plane of the floor panels, and said second edge formation has its claw element upwardly extending, said edge formations also having interfitting, upwardly and downwardly projecting elements having surfaces which face inwardly of the floor panels and which fit together to prevent lateral separation of the edge formations when fully
25 mated with each other.

11. A pallet according to claim 1, wherein said longitudinal edge members include a first edge member having an inner edge formation forming an interlocking joint with the said first longitudinal edge formation of a floor panel, and a second edge

member which forms an interlocking joint with the said second edge formation of another identical floor panel.

5 12. A pallet according to claim 1, wherein said longitudinal edge members are identical, and each have an inner edge formation forming an interlocking joint with a first longitudinal edge formation of a floor panel, said pallet including a further floor panel which has its opposite sides identical and of opposite hand, each said opposite side forming an interlocking joint with the second longitudinal edge of an adjacent floor panel or with said inner edge formation of a longitudinal side member.

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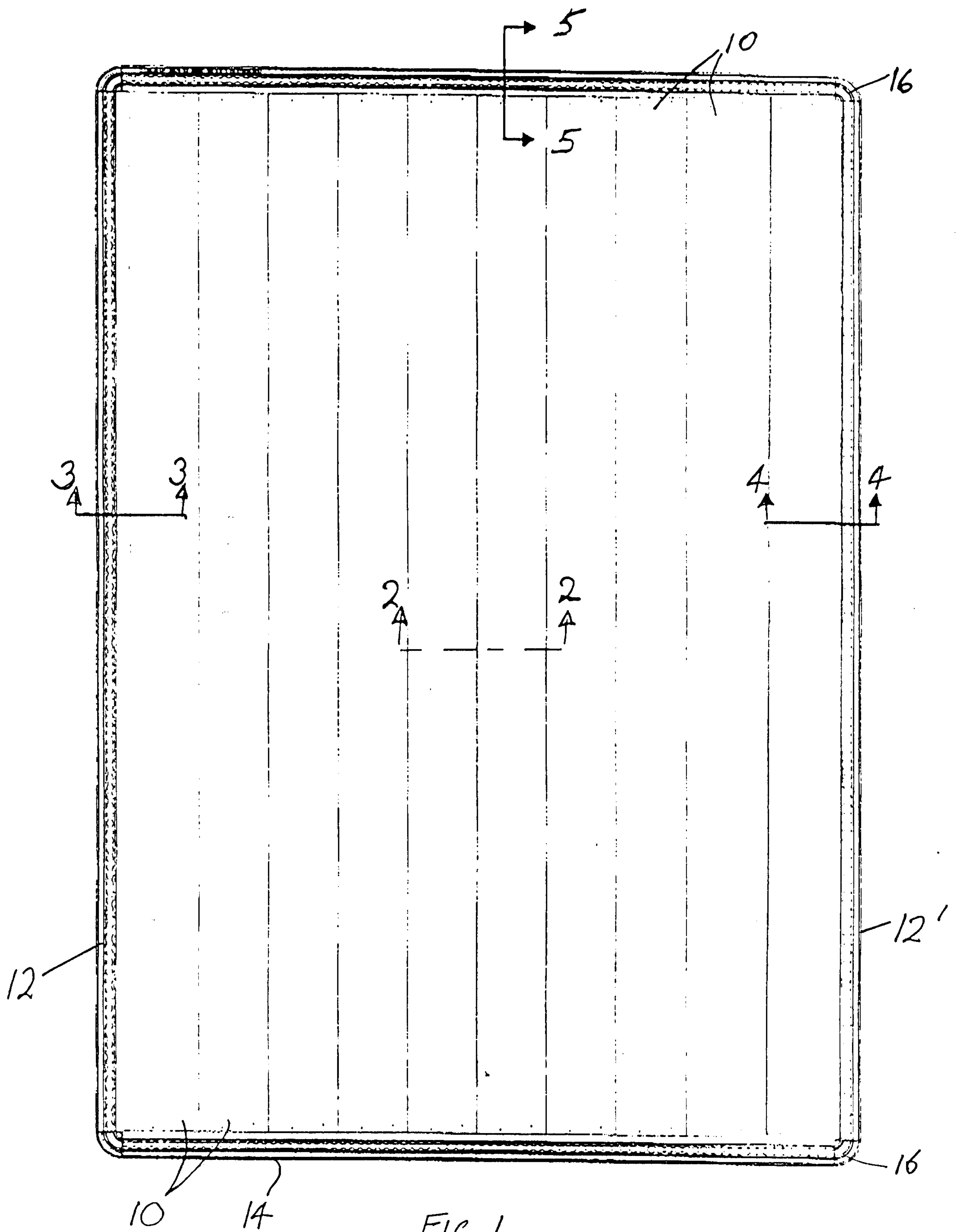
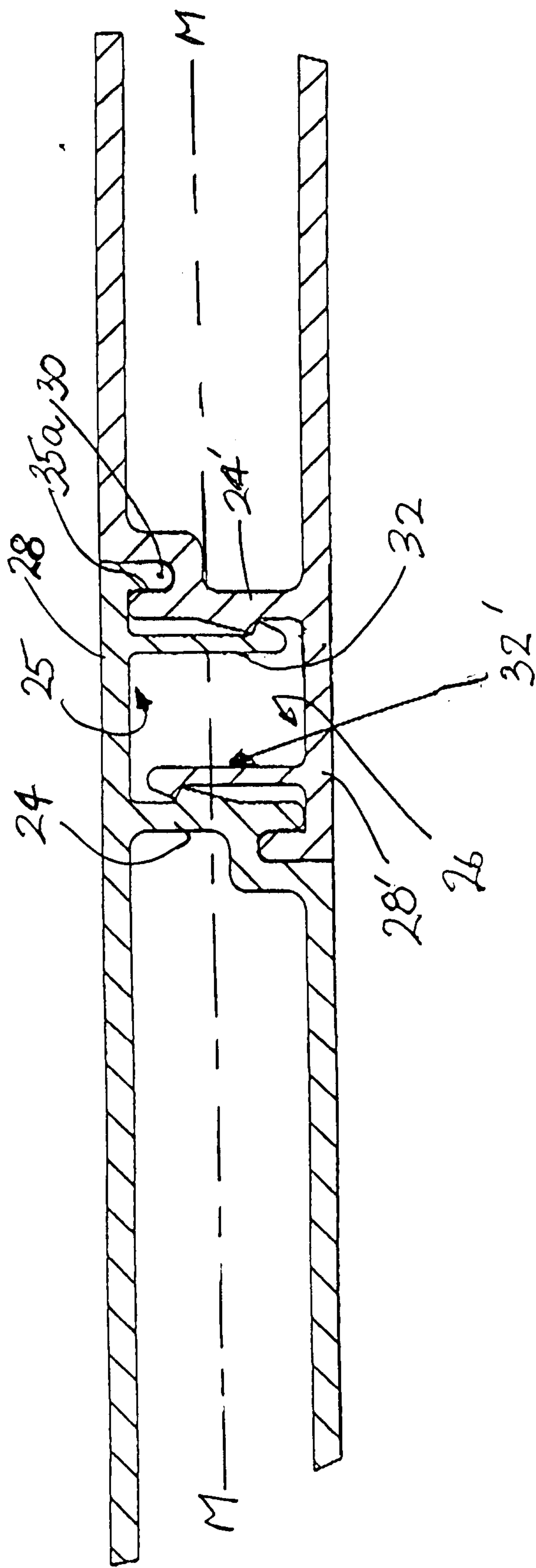
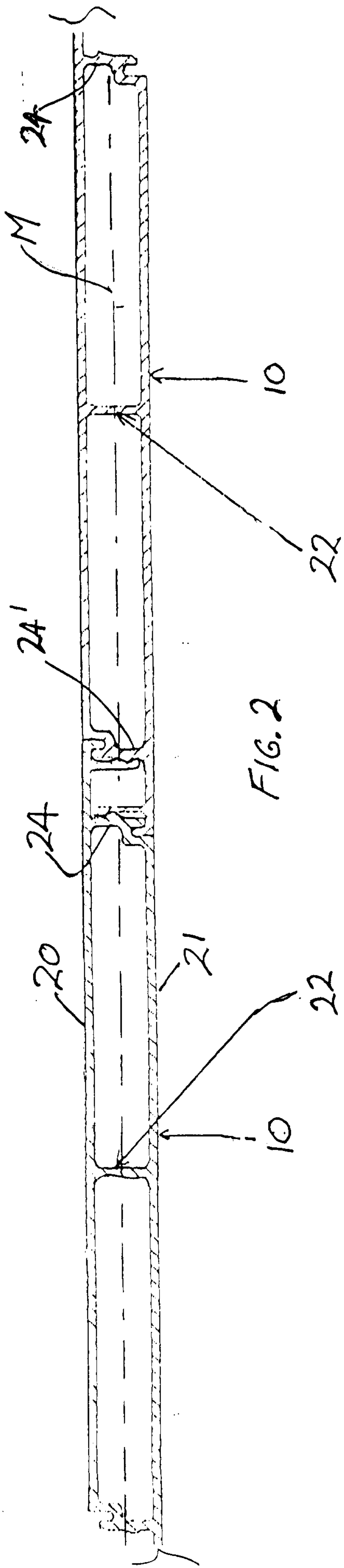


FIG. 1



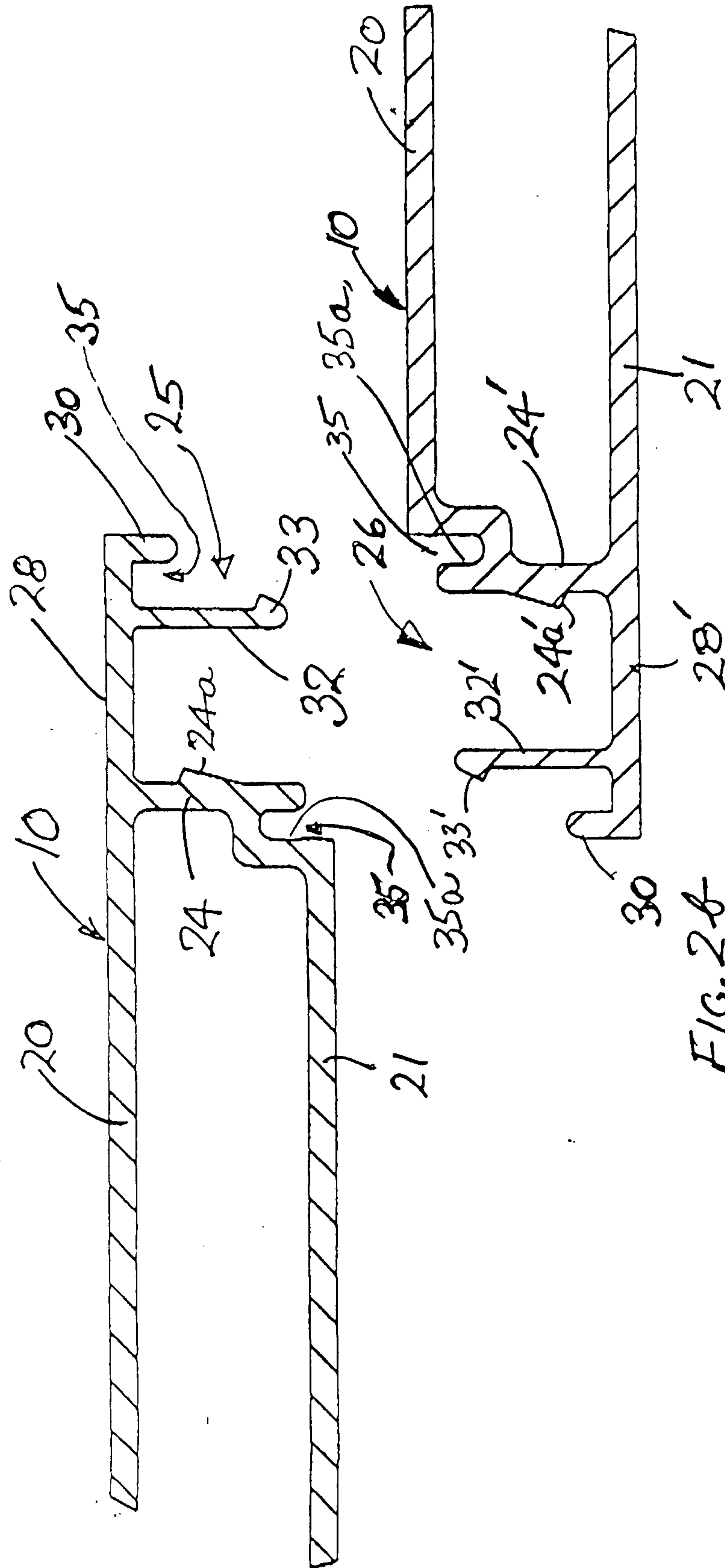
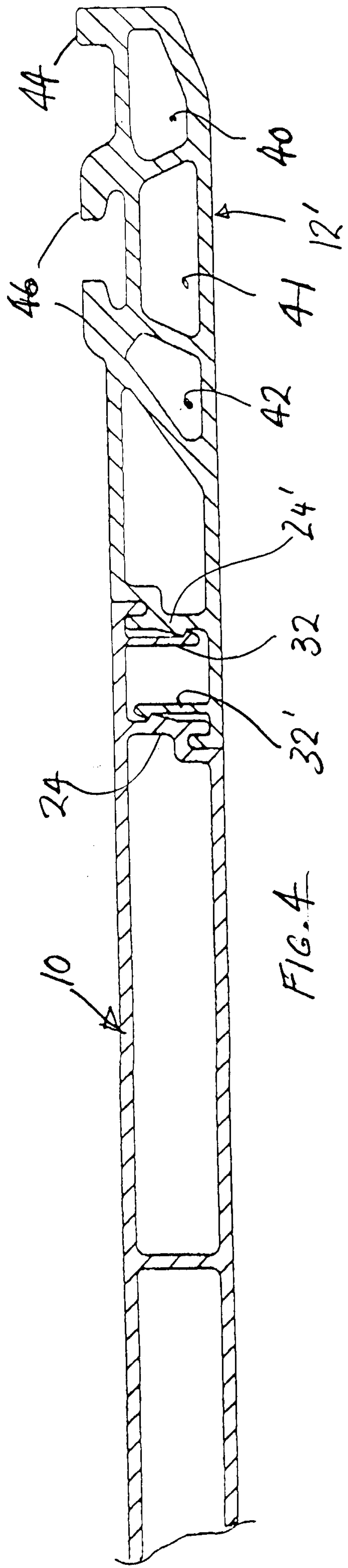
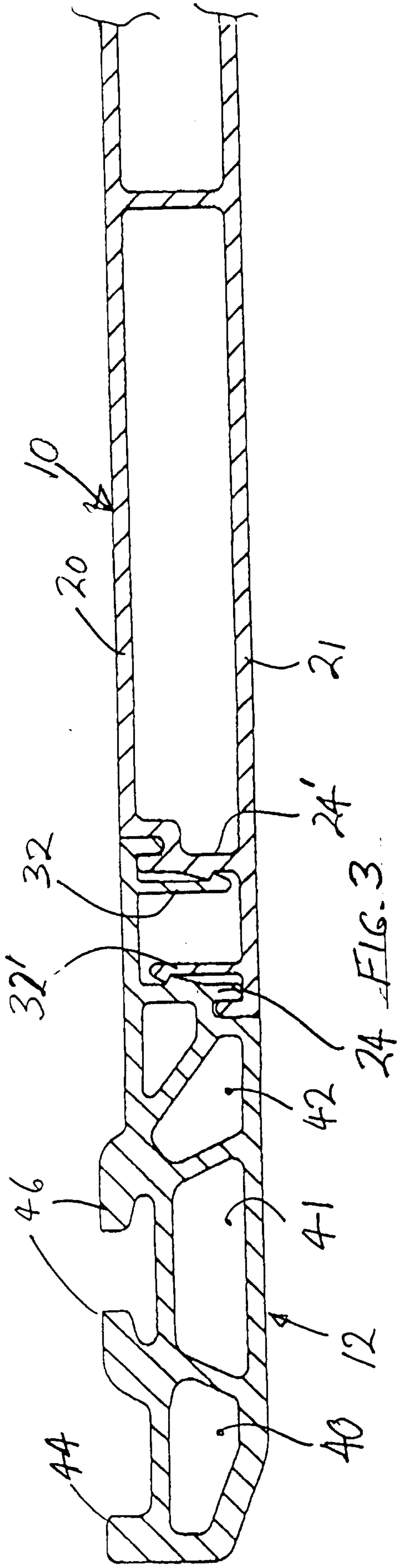
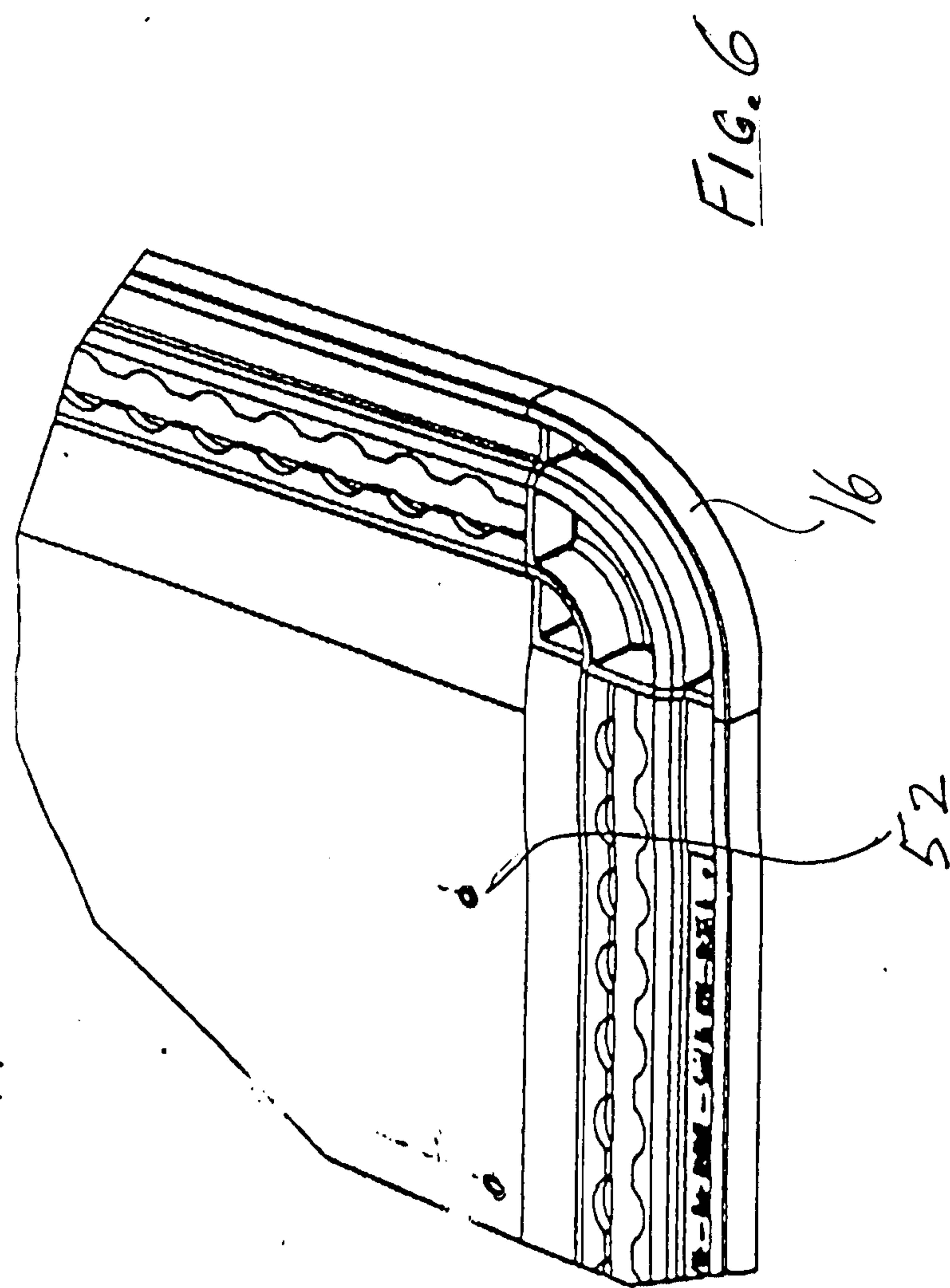
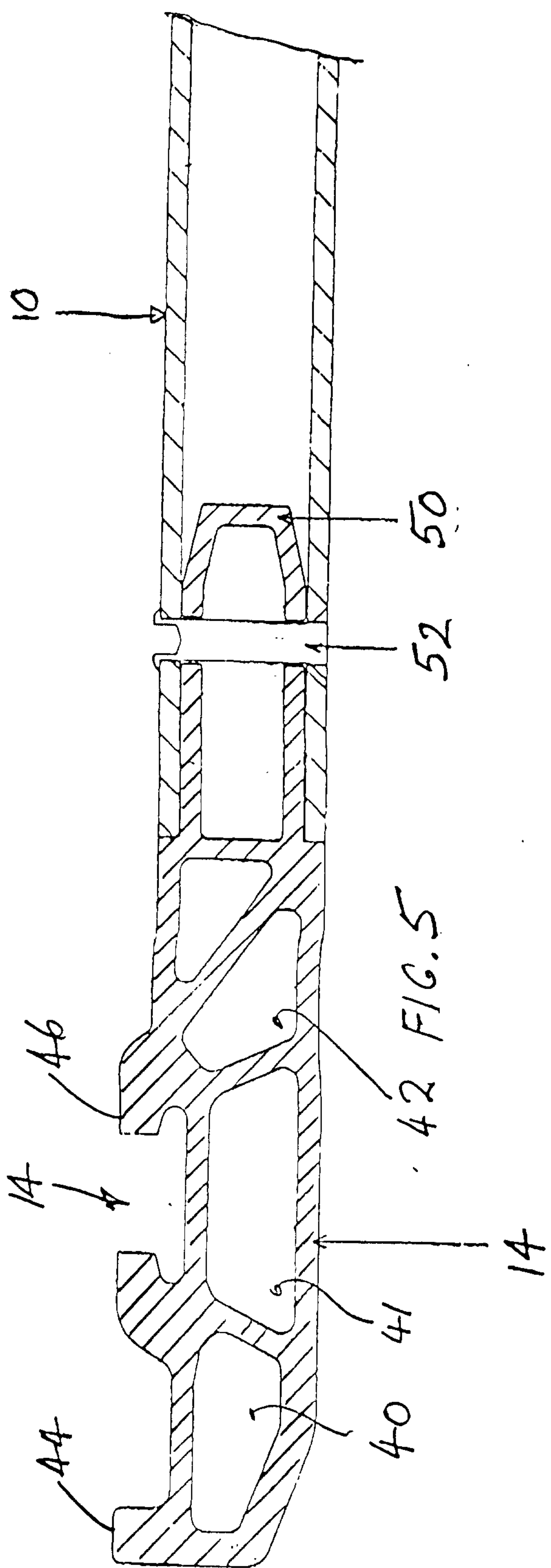


FIG. 28





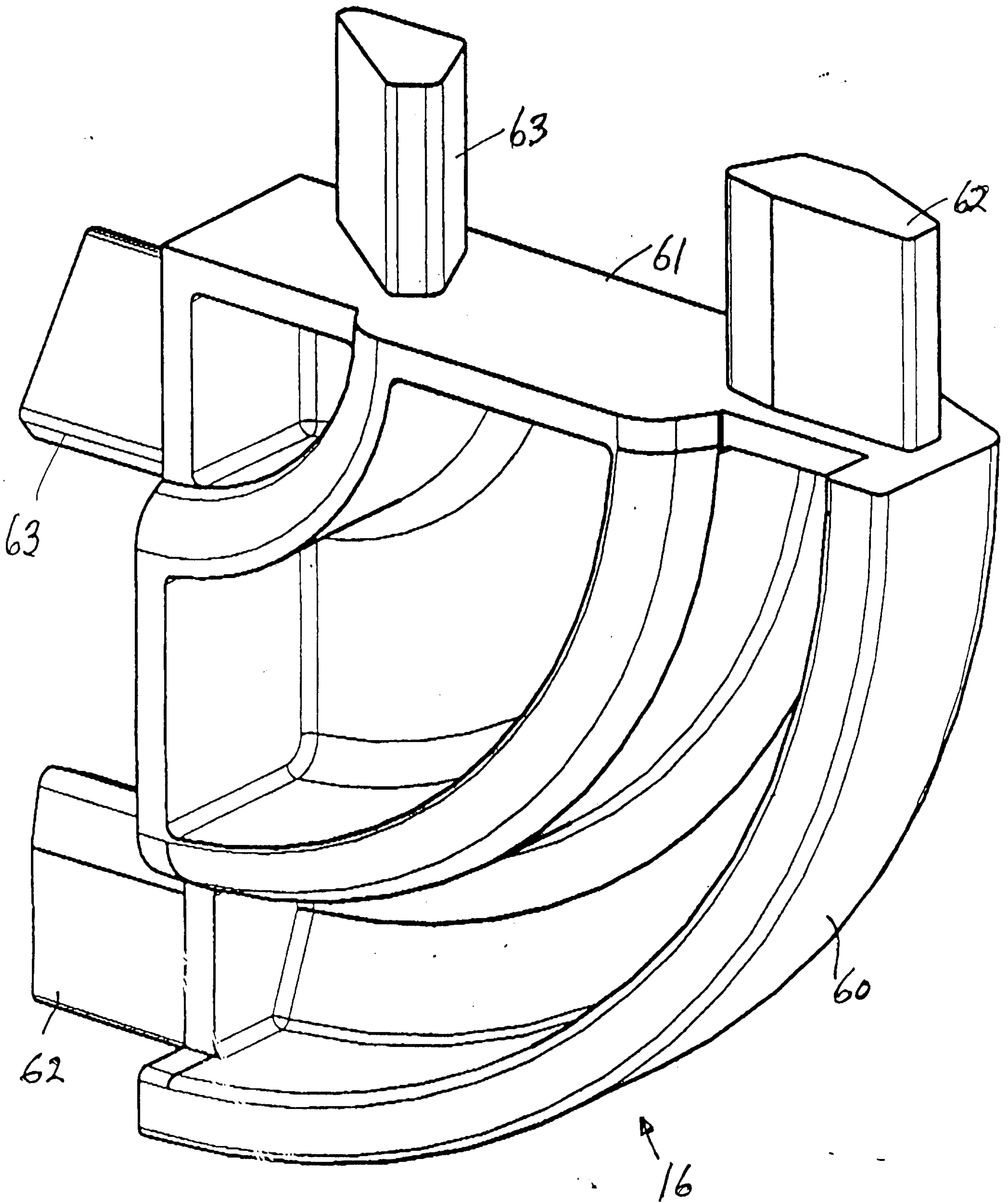


FIG. 7

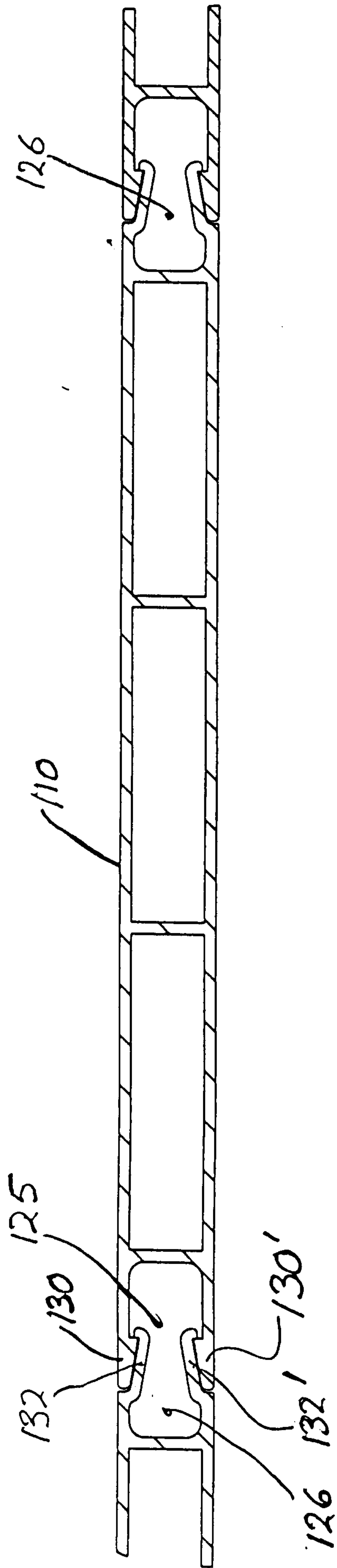


FIG. 8

