Office de la Propriété Intellectuelle du Canada
Un organisme d'Industrie Canada

Canadian Intellectual Property Office
An agency of Industry Canada

CA 2294823 C 2008/04/29

(11)(21) 2 294 823

(12) BREVET CANADIEN
CANADIAN PATENT

(13) C

(86) Date de dépôt PCT/PCT Filing Date: 1998/07/03
(87) Date publication PCT/PCT Publication Date: 1999/01/14
(45) Date de délivrance/Issue Date: 2008/04/29
(85) Entrée phase nationale/National Entry: 2000/01/04
(86) N° demande PCT/PCT Application No.: CA 1998/000634
(87) N° publication PCT/PCT Publication No.: 1999/001626
(30) Priorité/Priority: 1997/07/04 (CA2,209,251)

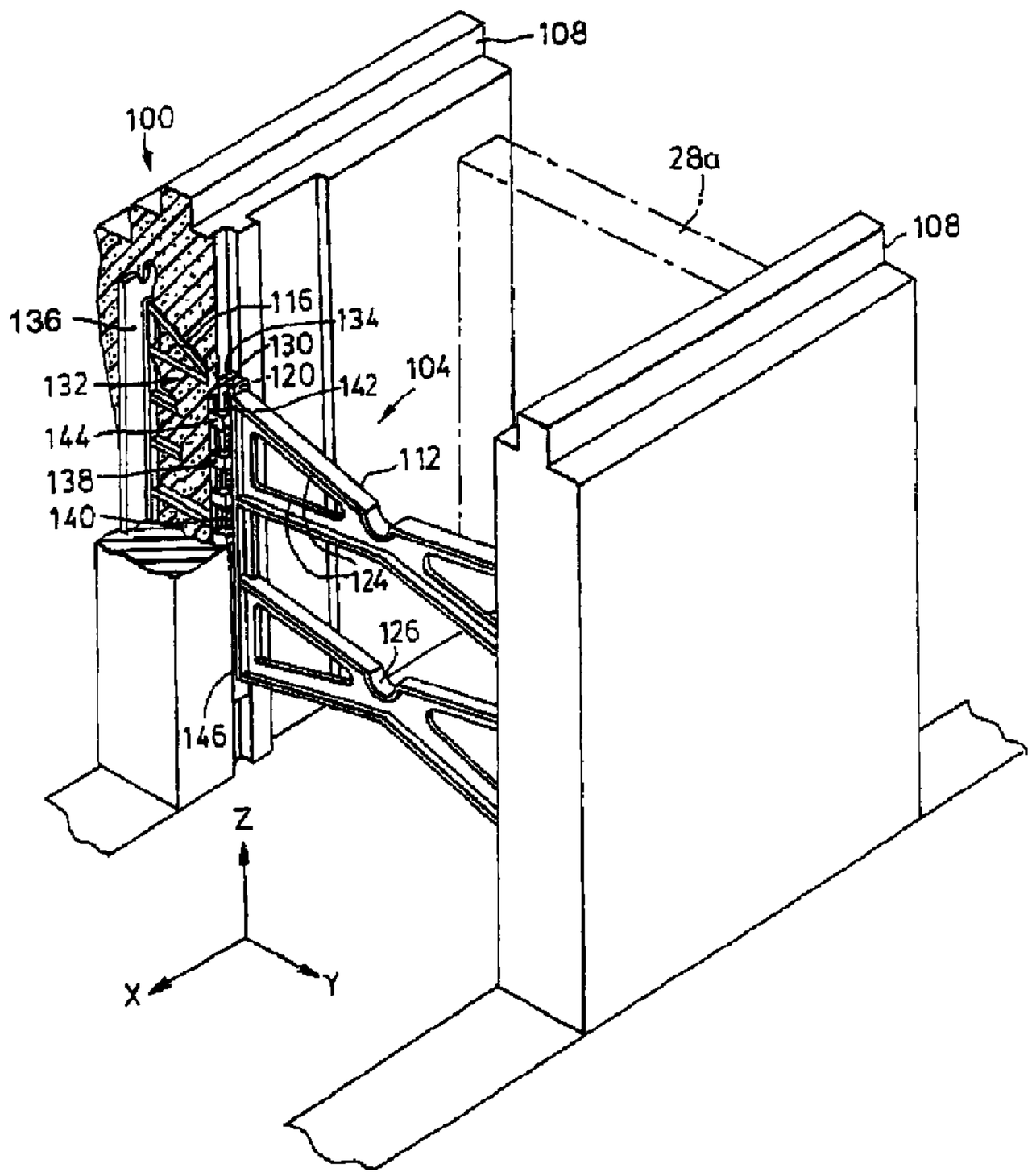
(51) Cl.Int./Int.Cl. *E04B 2/86* (2006.01),
E04G 17/06 (2006.01)

(72) Inventeur/Inventor:
BENTLEY, FRANK B., CA

(73) Propriétaire/Owner:
FORMTECH INTERNATIONAL CORPORATION, CA

(74) Agent: GOWLING LAFLEUR HENDERSON LLP

(54) Titre : ENSEMBLE D'ATTACHES POUR UN SYSTEME DE COFFRAGE DE MURS
(54) Title: TIE ASSEMBLY FOR A WALL FORM SYSTEM



(57) Abrégé/Abstract:
A form system comprises several form units (100), each having a pair of panels (108) positioned in spaced relation to each other. A plurality of tie members (104) connects the panels, the tie member comprising a spacer member (112) disposed transversely

CA 2294823 C 2008/04/29

(11)(21) 2 294 823

(13) C

(57) Abrégé(suite)/Abstract(continued):
between the panels. Each tie member further comprises a pair unit connecting members (116), one positioned on each of an outside surface of a panel. The spacer members are each connected to a first unit and a second unit connecting member through the first opening in the panels. The first and second unit connecting members have first and second connections respectively, to permit the first and second unit connecting members of a first form unit to be connected with corresponding first and second connecting members of a second form unit.

PCT WORLD INTELLECTUAL PROPERTY ORGANIZATION
International Bureau

INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 6 : **E04B 2/86** | **A1**

(11) International Publication Number: **WO 99/01626**

(43) International Publication Date: 14 January 1999 (14.01.99)

(21) International Application Number: PCT/CA98/00634

(22) International Filing Date: 3 July 1998 (03.07.98)

(30) Priority Data:
2,209,251 4 July 1997 (04.07.97) CA

(71) Applicant *(for all designated States except US)*: 1251005 ONTARIO LTD. [CA/CA]; 15455 Bathurst Street, Aurora, Ontario L4G 7A7 (CA).

(72) Inventor; and
(75) Inventor/Applicant *(for US only)*: BENTLEY, Frank, B. [CA/CA]; 15455 Bathurst Street, Aurora, Ontario L4G 7A7 (CA).

(74) Agents: STRATTON, Robert, P. et al.; Gowling, Strathy & Henderson, Suite 4900, Commerce Court West, Toronto, Ontario M5L 1J3 (CA).

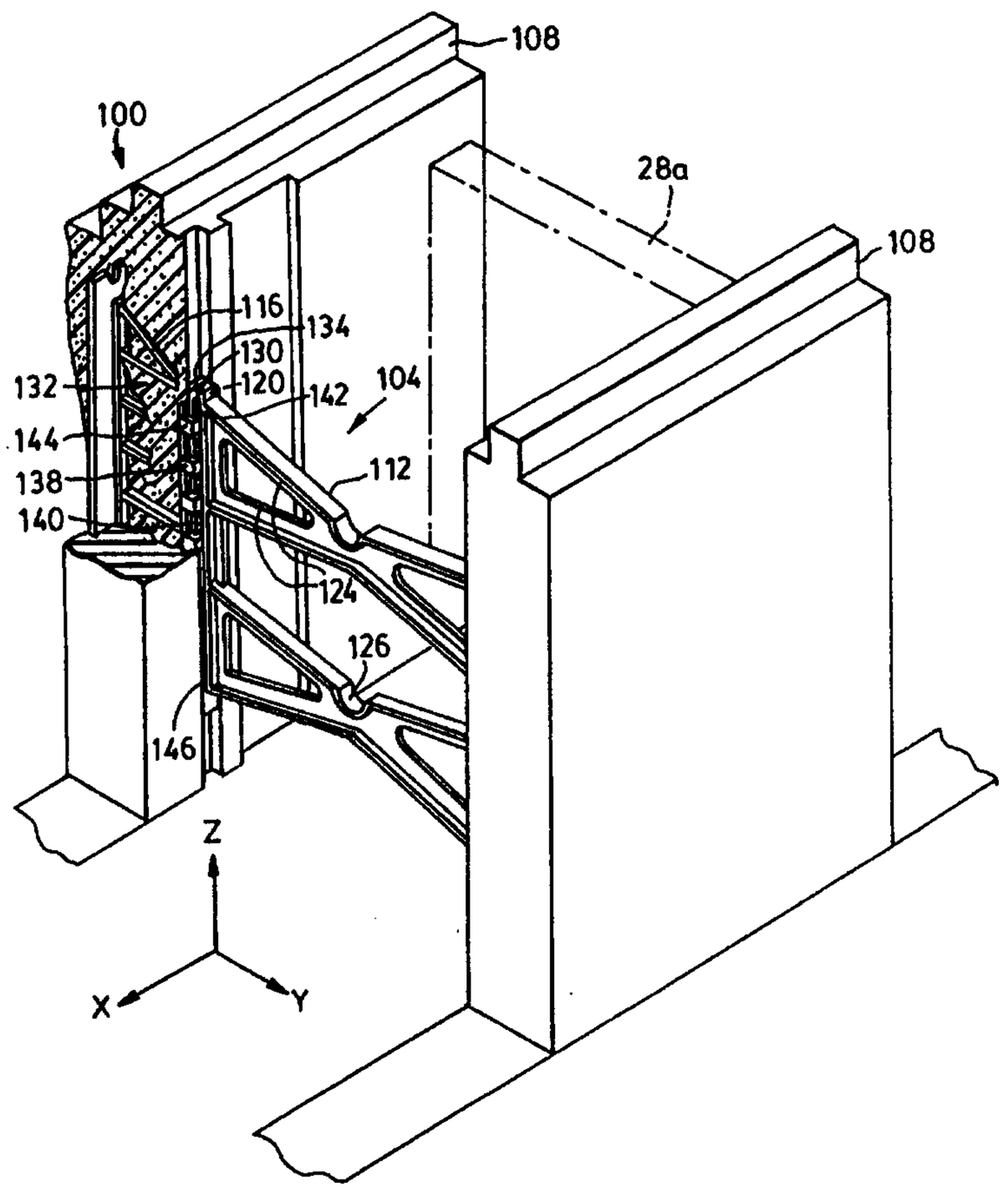
(81) Designated States: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE, GH, GM, GW, HU, ID, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG).

Published
With international search report.
Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.

(54) Title: TIE ASSEMBLY FOR A WALL FORM SYSTEM

(57) Abstract

A form system comprises several form units (100), each having a pair of panels (108) positioned in spaced relation to each other. A plurality of tie members (104) connects the panels, the tie member comprising a spacer member (112) disposed transversely between the panels. Each tie member further comprises a pair unit connecting members (116), one positioned on each of an outside surface of a panel. The spacer members are each connected to a first unit and a second unit connecting member through the first opening in the panels. The first and second unit connecting members have first and second connections respectively, to permit the first and second unit connecting members of a first form unit to be connected with corresponding first and second connecting members of a second form unit.



TIE ASSEMBLY FOR A WALL FORM SYSTEM

Field of the Invention

This invention relates to tie assemblies and wall form units and systems used to construct structural components such as walls. More particularly, the present invention relates to such tie assemblies, wall form units and form systems for walls formed of a pourable, curable construction material where the form system remains in situ.

Background of the Invention

Construction components, such as walls and columns, are often made from castable materials such as concrete. As is well known, to make a specifically shaped component rom such materials, a form is built or erected which functions as a mould for the castable material. In the past, forms were typically made from inexpensive materials such as wood. To make the component, the form is erected to create a cavity capable of holding the castable material (eg. concrete) in a liquid form. The concrete is then poured or otherwise fed into the cavity created by the form and then allowed to set. Once the material has hardened into a structural component, the form is removed. After use as a form, quite often, much of the form material can not be reused and must be discarded. Furthermore, the removal of the form requires a significant amount of labour.

Another way a form can be built is to make a form from several form units, each form unit having a pair of spaced panels. The form units are placed adjacent each other, both horizontally and vertically, to build a complete form. So long as the individual form units are not too small, enhanced efficiency in the construction of a form may be achieved in such a system. This is particularly the case if the form units are designed to remain permanently in the situ, once placed, and do not have to be removed once the concrete has been poured and set. One such system has side panels for each form unit made of an insulative material. These side panels perform the dual purpose of functioning as the side walls for the cavity and then after the concrete has set, as an insulative layer on each side of the concrete.

It will be appreciated that it is often necessary to construct a wall many metres in length and several metres in height. This will require many form units that must be held together. Particularly in forms which are high, the vertical interconnections between adjacent form units are important as they resist vertical lift forces that tend to lift and separate adjacent form units.

However, providing interconnections between form units which are effective, but which can quickly be engaged, is problematic. Another difficulty in such systems is the lack of space efficiency in the transportation of pre-built form units to a construction site.

A form unit that can be assembled at a work site is taught in NL-A-8600566. This form unit includes panels provided with a tie assembly consisting of embedded connecting members that can receive tie members in a sliding fit. However, the connecting members described therein are expensive to manufacture since they are formed with a solid connecting channel.

Accordingly, it is desirable to have a form system that employs form units having both efficient and effective form unit interconnections, and the form unit must be capable of being efficiently transported to the construction site.

Summary of the Invention

According to a preferred embodiment of the present invention, there is provided a tie assembly for a wall form unit. The tie assembly connects a first panel and a second panel which define a space to contain a pourable, curable construction material, such as concrete, for forming a wall section. The tie assembly, first and second panels, and the cured construction material combine to form the final wall structure. A spacer member maintains the first and second panels in a predetermined relation. The spacer member has spaced apart, opposing edges, and each edge is provided with connecting means. A first and a second connecting member are each provided with a support for respective attachment to the first and second panels, and a coupling projecting from the support. The coupling defines a channel for sliding engagement with the connecting means. An abutment means permits the coupling and the connecting means to cooperate to detachably retain the connecting means.

In a further a embodiment of the present invention, there is provided a wall form unit for containing a pourable, curable construction material for forming a wall section integrating the wall form unit and the construction material. The wall form unit comprises a first panel and a second panel in predetermined relation for defining the wall section. A tie assembly includes a spacer member for maintaining the first and second panel in the predetermined relation, opposing first and second connecting members attached to the spacer member, and abutment means for retaining the spacer member in engagement with the connecting member. The spacer member has spaced apart, opposing edges, each the edge provided with connecting means. The first and second connecting

members are each provided with a support for attachment, in opposed relation, to the respective first and second panels, and a coupling projecting from the support. The coupling defines a channel for sliding engagement with the connecting means. The abutment means permits the coupling and the connecting means to cooperate to detachably retain the connecting means.

In a third embodiment of the present invention, there is provided a wall form system for forming a wall section having a core of pourable, curable construction material sheathed by a plurality of panels. The wall form section is constructed from at least two wall form units, each wall form unit having means for interlocking the wall form units to define the wall section. Each wall unit comprises a first panel and a second panel in predetermined relation for receiving the construction material, and at least one tie assembly. The tie assembly comprises a spacer member for maintaining the first panel and the second panel in the predetermined relation, opposing first and second connecting members attached to the spacer member, and abutment means for retaining the spacer member in engagement with the connecting members. The spacer member has spaced apart, opposing edges, each the edge provided with connecting means. The first and second connecting members are each provided with a support for attachment, in opposed relation, to the respective first and second panels, and a coupling projecting from the support. The coupling defines a channel for sliding engagement with the connecting means. The abutment means permits the coupling and the connecting means to cooperate to detachably retain the connecting means.

According to a further aspect of the invention there is provided a form system having first and second form units, said first and second panels positioned in spaced relation to each other, each of said first and second panels having an inwardly facing surface and an outwardly facing surface and a first opening therethrough; at least one tie member, said tie member comprising a spacer member having first and second ends, said spacer member being disposed transversely between said panels, said tie member further comprising first and second unit connecting members being positioned away from said inward facing surface and proximate said outward facing surface of said first panel and said second unit connecting member being positioned away from said inward facing surface of said second panel and proximate said outward facing-surface of said second panel, said tie member having a first attachment means providing an attachment of said spacer member to said first unit connecting member through said first opening in said second panel; said first and second unit connecting members of said tie member having a first and second connection means respectively, to permit said first unit connecting member of a first form unit to be connected with one of said first and second connecting members of a second form unit, when said panels of said first

form unit is placed above and is in transverse alignment and abutment with respective panels of said second form unit.

According to another aspect of the invention there is provided a kit for building a form unit having first and second spaced apart panels each having an opening therethrough, said kit comprising, in combination, a plurality of elongated spacer members, each said spacer members, having first and second ends, first and second elongated unit connecting members, each said spacer member having a first connecting device located proximate said first end adapted to co-operate with a first connecting device on said first unit connecting member to establish a first connection, therebetween, through said opening in said first panel; and said spacer member having a second connecting member located proximate said second end adapted to co-operated with a second connecting member to establish a second connection, therebetween, though said second opening in said second panel; said first and second unit connecting members of said spacer members also having a third and fourth connection means respectively, to permit said first unit connecting member of a first form unit to be connected with one of said first and second connecting members of a second form unit, and said second unit connecting member of said first form unit to be connected with the other said first and second connecting members of said second form unit, when said panels of said first form unit are placed above in transverse alignment and abutment with respective panels of said second form unit.

According to a further aspect of the invention, there is provided a form unit for a form system, said form unit comprising: first and second panels positioned in spaced, generally parallel relation to each other, each of said first and second panels having an inwardly facing surface and an outwardly facing surface and a first opening therethrough; first and second tie members, each of said first and second tie members comprising an elongated spacer member having first and second ends, said spacer member being disposed transversely between said panels and said first and second tie members being spaced longitudinally from one another, said tie member further comprising first and second elongated unit connecting members, said first unit connecting member being oriented generally vertically and positioned on the outward side of said first panel and said second unit connecting member being oriented generally vertically and positioned on the outward side of said second panel, said tie member having a first attachment means for attaching said spacer member to said first connecting member through said first opening in said first panel, and a second attachment means for permanently attaching said tie member to said second connecting member through said first opening in said second panel; said first unit connecting member having a first unit connection

means adapted to cooperate with a second unit connecting means of a second form unit to provide to a first connection between said first form unit and said second form unit when said panels of said first form unit are placed above and in transverse alignment and abutment with respective panels of said second form unit; said second unit connecting member having a third unit connection means adapted to cooperate with a fourth unit connecting means of a second form unit to provide for a second connection between said first form unit and said second form unit when said panels of first form unit are placed above and in transverse alignment and abutment with panels of said second form unit.

Brief Description of the Drawings

In drawings which illustrate example embodiments of the invention:

Figure 1 is a perspective view of a form unit made in accordance with one embodiment of the invention;

Figure 2 is a front, elevation view of part of the form unit of Figure 1;

Figure 3 is a plan view of part of the form unit of Figure 1;

Figure 4 is a plan view of the connection between the tie member and connecting member shown in Figure 1;

Figure 5 is a perspective view showing the connection between the tie member and connecting member shown in Figure 1;

Figure 6 is a detailed view showing a connection made between two vertically adjacent connected wall-forming units;

Figure 7 is a plan view from above along the line 7-7 in Figure 6;

Figure 8 is plan view of the detail in Figure 6 along the line 8-8 in Figure 6;

Figure 9 is a similar view to Figure 6 showing a connection made between two vertically adjacent connected wall-forming units;

Figure 10 is a schematic side elevational view of part of a complete form constructed in accordance with an embodiment of the invention;

Figure 11 is a schematic elevational view of part of a form constructed in accordance with an embodiment of the invention;

Figure 12 shows a further embodiment of a wall form unit according to the present invention;

Figure 13a shows a ridged structure for interlocking panels accordint to the embodiment of Fig. 12; and

Figure 13b shows a complementary grooved structure for cooperation with the structure of Fig. 13a.

Detailed Description

With reference to Figure 1, a single form unit 20a is illustrated. In the construction of a structural component, for example a wall, several such form units 20a are utilized. Wall form units 20a are placed adjacent to, and in lateral alignment with, other form units to make a complete form structure, as illustrated in Figure 10.

A single form unit 20a has a pair of spaced, generally planar and transversely aligned panel members 22a and 24a. In one embodiment, panel members 22a and 24a are made from a lightweight, temperature insulating material such as polystyrene or an extruded form. The panels may however, be made of materials other than those which are particularly adapted to provide for temperature insulation, but which will retain the liquid material.

In Figure 1, form unit 20a is shown with a single tie member 26a in detail. However, to provide greater stability for a form unit, a pair of tie members 26a and 28a may be employed.

As shown in Figures 2 and 3, each tie member 26a comprises three components: a transversely oriented spacer member 30a and a pair of vertically oriented unit connecting members 34a and 36a. In Figures 2 and 3, the form unit 20a, including the tie member 26a, is shown in its disassembled state. However, spacer member 30a may be easily attached to vertical unit connecting members 34a and 36a in the manner hereafter described. In one embodiment of the invention, spacer member 30a has a recess extending substantially the full vertical length of the spacer member, as is clearly illustrated by a top view in Figure 4. Spacer member 30a, and elements 34a and 36a, are made from a material such as polypropylene, nylon 6/6, PVC or A.B.S.

Spacer member 30a also has an indentation 62a on the upper transverse arm 63a of the spacer member 30a and an indentation 64a on the lower transverse arm 65a of the spacer member 30a, although other embodiments of this invention may have a plurality of such indentations. Each indentation 62a and 64a is adapted to be able to receive, and support at that location, a concrete strengthening material such as steel rebar. It will be appreciated that when several form units are arranged laterally adjacent to each other, lengths of rebar may be supported laterally on the indentations 62a and 64a of successive laterally positioned form units. To assist in the insertion and retention of lengths of rebar, the indentations 62a and 64a may be made from a resilient material.

Each of the vertical form unit connecting members 34a and 36a has a fin 58a and 60a

extending substantially the full vertical length of the inside end of the connecting member. Recesses 38a and 40a are so arranged to cooperate with the fins 58a and 60a such that each of the said fins can be received into one of said recesses though one of two apertures in panels 22a and 24a. It will be appreciated if panels 22a and 24a are constructed of a material such as polystyrene, it will be easy for a person assembling form unit 20a to create the apertures required for the interconnection between the spacer member 30a and the vertical unit connecting members 34a and 36a. However, greater efficiency may be achieved if the apertures are at least pre-marked, if not preformed.

The attachment between recesses 38a and 40a and fins 58a and 60a is illustrated in Figure 4. In this figure, a positive attachment is created when the fin 60a slides into the recess 40a in a vertical direction. The recess 40a narrows at its outer margin 41a in order to grasp the correspondingly narrowed portion 61a of the fin 60a and provide a snug fit between spacer member 30a. and connecting elements 34a and 36a. The recess does not reach all the way to the upper end of the spacer element 30a, thus preventing further sliding of the connecting elements 34a and 36a, as is illustrated in Figure 5.

This connection, between the fins 58a and 60a and the recesses 38a and 40a, is not permanent, and the form units can be reshaped if it is discovered that a mistake was made.

Once the spacer member 26a is attached to the vertical unit connecting members, such as 36a, the vertical unit connecting members are oriented vertically and have a surface which lies against the outward facing surface of a panel.

A may be seen in Figure 1, connecting elements 34a and 36a have a laterally (in direction of axis Y) extending channel or groove 76a in their upper lateral surfaces 75a and lower lateral surfaces 77a. A linking element 71a has a laterally extending tongue or protrusion 72a which extends upwards from an upper, lateral surface 74a and downwards from a lower, lateral surface 79a.

A pair of form units may be positioned one on top of the other wherein the channel of a lower form unit will be received in corresponding and respective protrusion of a linking element, which is then received in a corresponding and respective channel of an upper form unit (not shown). The result is that displacement of a first upper form unit relative to a second lower form unit is resisted.

The mechanism for providing a positive connection between adjacent vertically positioned

form units is illustrated in further detail in Figures 6,7,8, and 9.

In Figure 6, the lower portion of a typical unit connecting member 34a and the upper portion of a typical linking element 71a are shown disconnected from each other. The unit connecting member and the linking element both lie against the outer surfaces of their respective panels. Formed in the lower portion of member 34a is a recess 76a defined by an opening and vertically oriented side walls 82a, 84a and a base 80a. The side walls 82a,84a are each saw-toothed.

Connection member 54a has at its upper end an arrow formation 86a with an arrowhead 88a. The saw-tooth pattern of the walls 82a,84a is such that the sloped sides of arrowhead 88a are guided and carried past the individual teeth during axial insertion of the arrow formation 86a into the recess 76a in the direction of axis z of Figure 1.

The lower portion of the connecting member is deformable and permits side walls to be displaced allowing insertion of the arrowhead 88a into the recess. But the side walls are resilient. Thus, once arrowhead 88a has passed a pair of oppositely positioned sawteeth on the sidewalls 82a and 84a, axial removal of the arrowhead 88a is prevented as the side portions of the arrowhead engage the rear sides of the saw- teeth.

However, even when two form units 20a and 20d have been interconnected through use of linking element 71a and connection members 34a and 36a as shown in Figure 9, the recess 76a is still accessible. Thus, if it is desired to disconnect the connection between arrowhead 86a and the side walls 82a and 84a of the recess, a transverse application of force in a manner generally depicted in Figure 9 (generally in the direction along of axis Y in Figure 1), permits arrowhead 88a to become dislodged from the side walls.

The dimensions of the arrowhead formation 86a and the materials from which it is made, are such that it would be quite stiff and a have a relatively high degree of resistance to bending. Typically it would require a lever device to be employed to bend the arrowhead out of the recess to release the connection. Such a lever device might be a crow bar or a hammer claw.

When building a form from many form units, it is necessary that there also be a lateral interconnection between form units. This can be accomplished by erecting a form with form units such as those of Figure 1 placed in a pattern as shown in Figure 10. In this embodiment, each form

unit has a pair of vertical form unit connecting members. Each form unit is off-set in its lateral position relative to form unit above and below. Taking one such form unit 20e, one of the pair of connecting members 26e is connected to a connecting member 28g of a form unit 20g, and also to a connecting member 28k of a form unit 20k. The other of the pair of connecting members 28e is connected to connecting member 26f of a form unit 20f also to a connecting member 26h of a form unit 20h.

In use, individual panels and the components of the tie members may be shipped to a construction site. The components of the tie members can be conveniently packaged as kits. Unassembled, the components of the form system can be efficiently carried by conventional transport devices. Once at the site, the wall forming units can be easily assembled by using a pair of panels and the components of at least one tie member, but preferably using as least two tie members. For each tie member, a spacer portion is positioned in between the two panels, with its connecting members each passing through an aperture in a panel. A pair of vertical connecting members will be secured in a vertical orientation, against the outer surface of each panel and then will be attached to the spacer member by the attachment of the connecting members to the spacer members as described above.

As many form units are built as required to construct a complete form for the desired structure. If the form is not continuous, the ends of the form may blocked in a conventional means, so as to provide a complete cavity which will hold the liquid concrete.

In a construction project, the lower most form units may be secured to a base in lateral alignment (for example, a previously poured footing) providing an interconnection between a concrete footing made with a sill secured to the concrete (eg. by concrete nails) and then providing interconnections between the sill and the vertical unit connecting members.

Thereafter, form units may be placed on top of the base form units and interconnected such as in the manner described above. Preferably, each form unit will comprise at least a pair of laterally spaced tie members. This will provide for greater vertical stability of the form and assist in the construction process.

Once the concrete has set, the panels will remain in situ. The vertical unit connecting members will provide a base to which other finishing components may be attached (for example,

dry wall for interior walls, siding on exterior walls).

A further embodiment of the present invention is illustrated in Fig. 12. Fig. 12 shows a cutaway view of a wall form unit 100, including a tie assembly 104, previously referred to as a tie member, connecting two opposing panels 108.

Tie assembly 104 is an interconnected assembly of a spacer member 112 and two connecting members 116. Spacer member 112 consists of edges 120 spaced apart by a plurality of arm members 124. As illustrated, arm members 124 can be provided with indentations 126 for supporting reinforcing members, such as conventional rebar, as described above. Edges 120 have a generally T-shaped profile for engaging complementary T-shaped channel 130 provided on connecting members 116. An end 132 of each edge 120 is also provided with an abutment 134 which limits the sliding engagement between edges 120 and channel 130.

As described above, connecting members 116 consist of a support portion 136 supporting a projecting coupling 138, previously designated a connection means. Coupling 138 is formed by two opposing rows 140 and 142 of staggered teeth 144 defining channel 130. The substantially L-shaped teeth 144 give channel 130 its T-shaped profile complementary to edge 120.

In this further embodiment of the present invention, the support portion 136 of connecting member 116 is embedded in its respective panel 108. Typically, connecting member 116 is an extruded, or otherwise molded, plastic component and panel 108 is a blown polystyrene panel. Connecting members 116 can be prefabricated and then provided to insulating panel manufacturers. The polystyrene panels can then be manufactured in known conventional manners to incorporate the connecting members 116 in a predetermined arrangement suitable for their interconnection to form wall form unit 100. In a preferred embodiment, the connecting members 116 are embedded in the panel such that coupling 138 is disposed within a groove 146, but still accessible for interconnection with the edges 120 of spacer member 112.

A further feature of this embodiment, as shown in Figs. 13a and 13b, is the provision of an integral means for interlocking the panels 108 to form a wall form system. A ridged, interlocking structure 150 is provided at one edge of the panel 108, and a complementary grooved interlocking structure152 is provided on the opposite edge. The ridged interlocking structure 150 and grooved interlocking structure 152 permit the wall form units 100 to be stacked and retain the units 100 in

place. As will be apparent to those skilled in the art, a wall form system constructed of stacked wall form units 100 will not require separate interconnecting means as described in the previous embodiment.

The outer facing surfaces of the panels may be recessed to provide a recess into, which the vertical unit connecting members may be received such that when the form unit is assembled, the vertical connecting members have outward facing surfaces which sit flush with the remaining parts of the outer surfaces of the panels.

The above-described embodiments of the invention are intended to be examples of the present invention and alterations and modifications may be effected thereto, by those of skill in the art, without departing from the scope of the invention which is defined solely by the claims appended hereto.

Claims:

1. A tie assembly (104) for a wall form unit (100), the tie assembly (104) for connecting first and second panels (108) for containing a pourable, curable construction material to form a wall section, the tie assembly characterized by:

a spacer member (112) for maintaining the first and second panels (108) in a predetermined relationship, the spacer member (112) having spaced apart, opposing edges (120), each edge (120) having a generally T-shaped profile;

first and second connecting members (116) embedded in the first and second panels (108), respectively, the connecting members (116) each having a coupling (138) composed of opposing, staggered rows (142, 144) of teeth (140) defining a channel (130) having a T-shaped profile complementary to, and for sliding engagement with, the edges (120) of the spacer member (112); and

an abutment (134) on said spacer member to limit the sliding engagement and retain the spacer member (116) within the channel (130).

2. A tie assembly (104) according to claim 1, wherein the tie assembly (104) is formed of a material selected from the group of polypropylene, nylon 6/6, polyvinyl chloride and ABS.

3. A tie assembly (104) according to claim 1, wherein the opposing edges (120) are spaced apart by a plurality of arm members (124).

4. A tie assembly (104) according to claim 3, wherein at least one of the plurality of arm members (124) includes an indentation (126) for receiving a reinforcing member in transverse relation to the arm members (124).

5. A connecting member (116) for embedding in a wall panel (108), forming a portion of a wall form unit (100) for containing a pourable, curable construction material to form a wall section, the connecting member (116) characterized by:

a coupling (138) composed of opposing, staggered rows (142, 144) of teeth (140) defining a channel (130) for sliding engagement with an edge (120) of a spacer member (112), the channel (130) having a generally T-shaped profile.

6. A spacer member (112) for maintaining first and second panels (108) of a wall form unit (100) in a predetermined relationship, characterized by:

opposing edges (120) that are spaced apart by arm members (124), each edge (120) having a generally T-shaped profile for attaching to a coupling (138) of a connecting member (116), the coupling (138) including a channel (130), defined by opposing, staggered rows (142, 144) of teeth (140), the channel (130) having a T-shaped profile complementary to the edges (120).

7. A spacer member (112) according to claim 6, further characterized by an abutment (134) to retain the spacer member (116) within the channel (130).

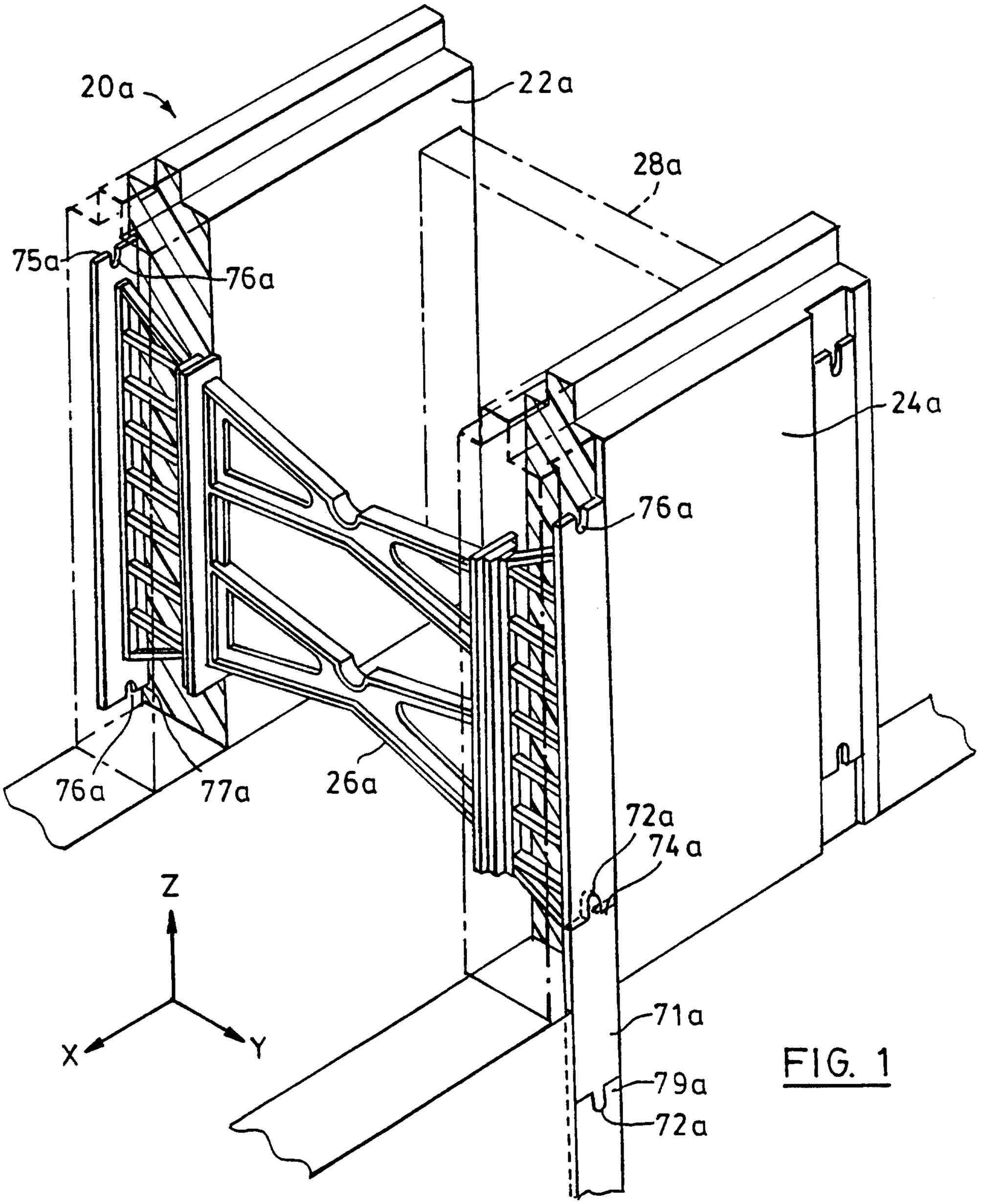


FIG. 1

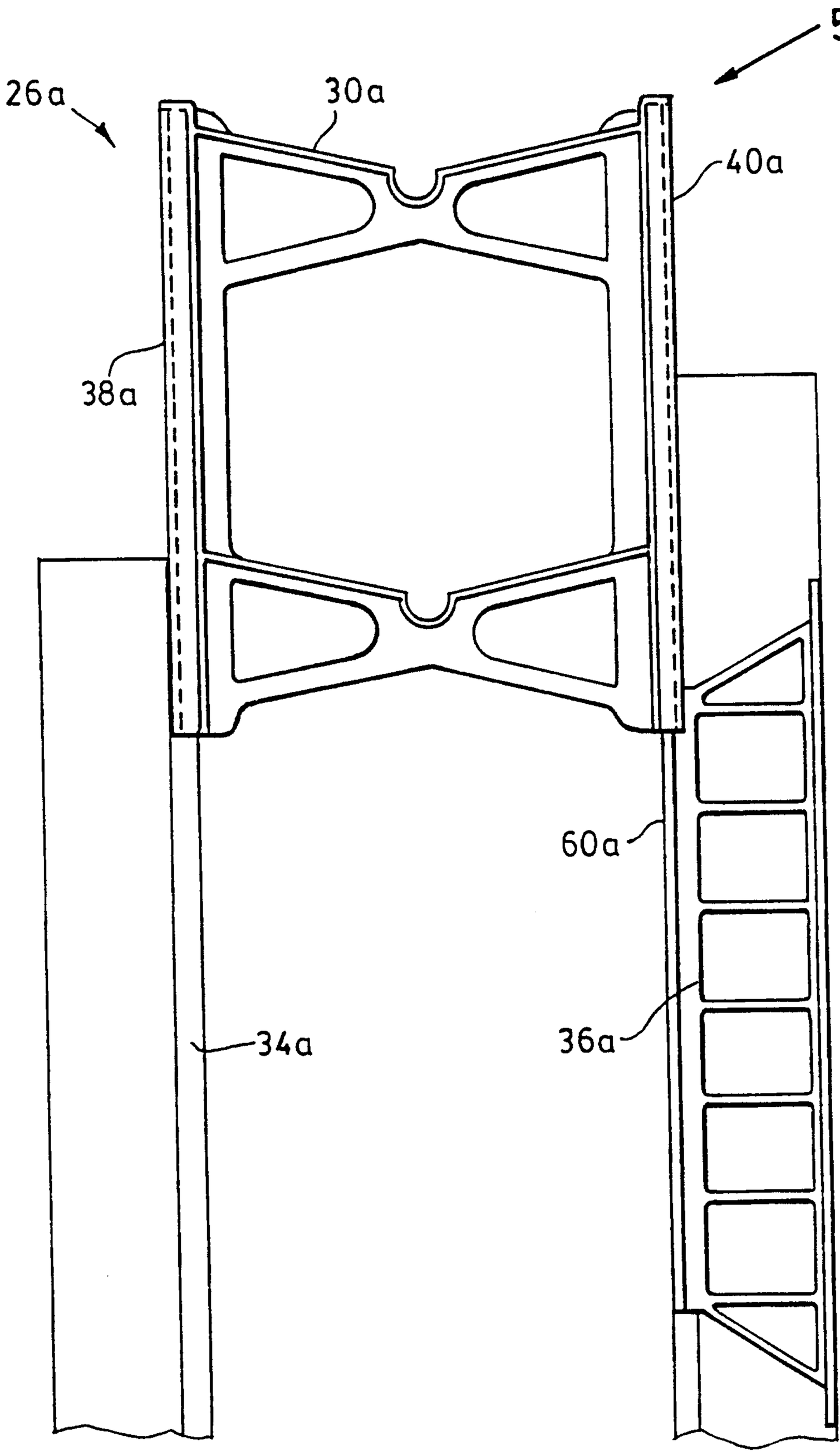


FIG. 2

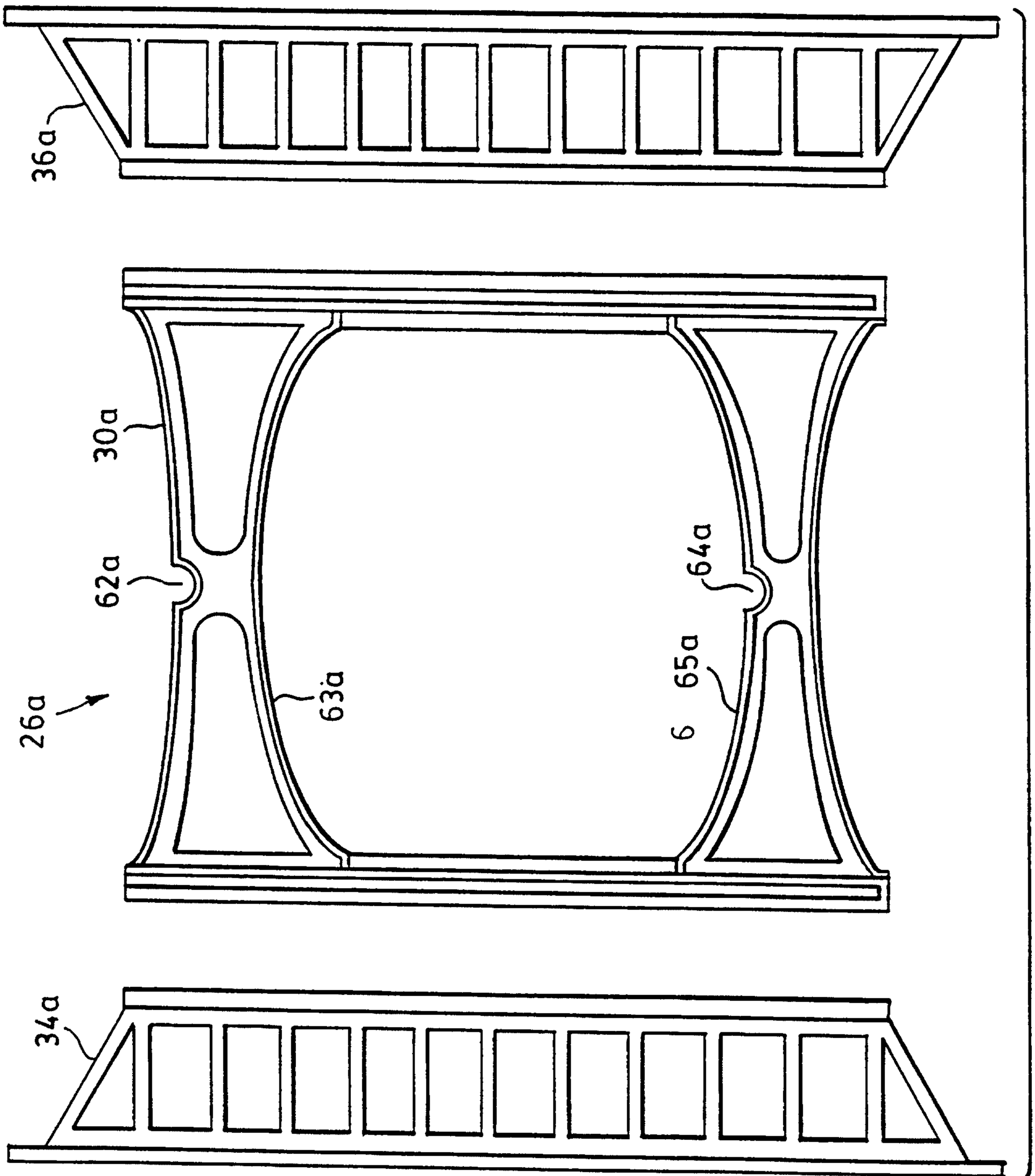


FIG.3

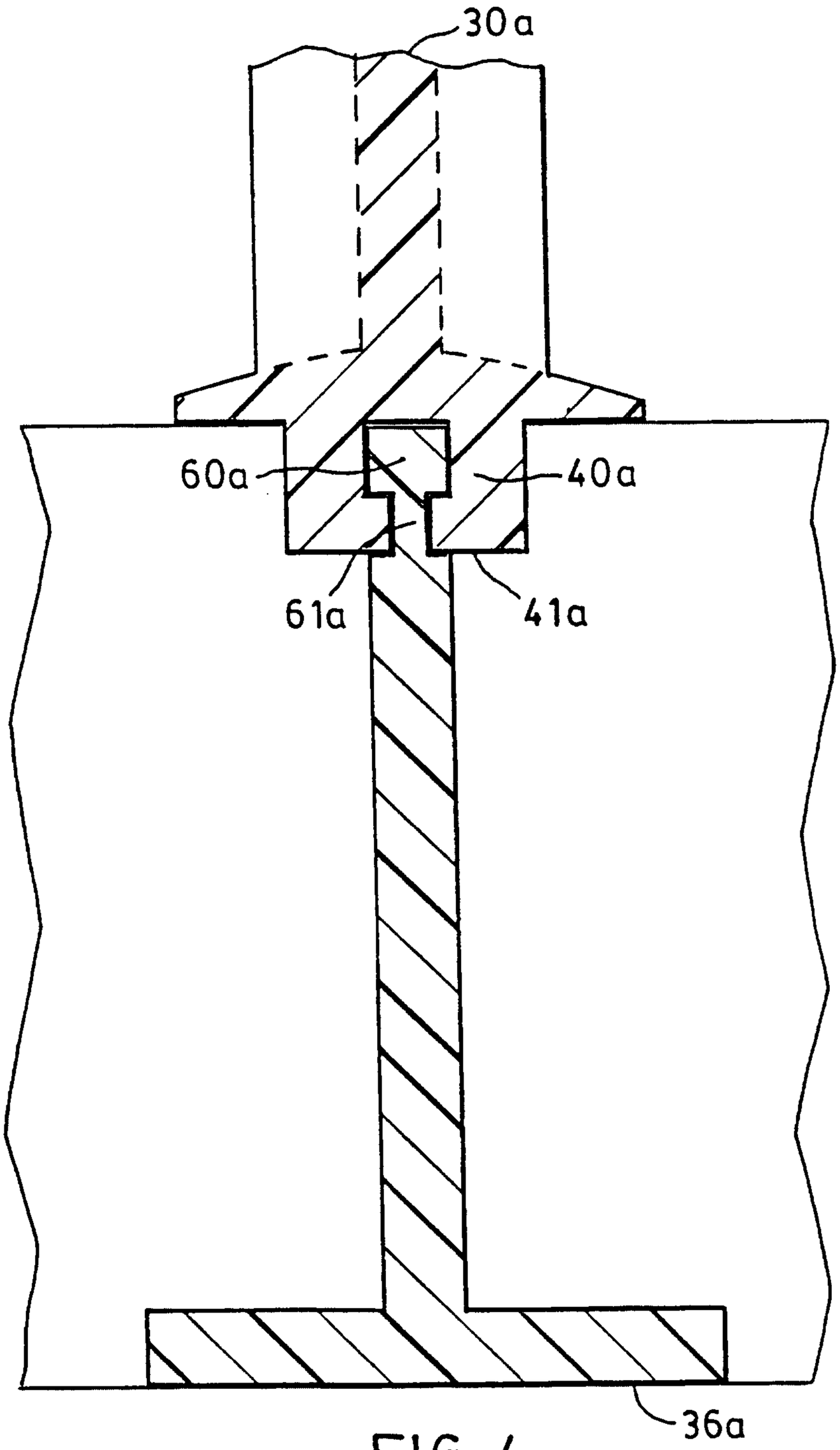


FIG. 4

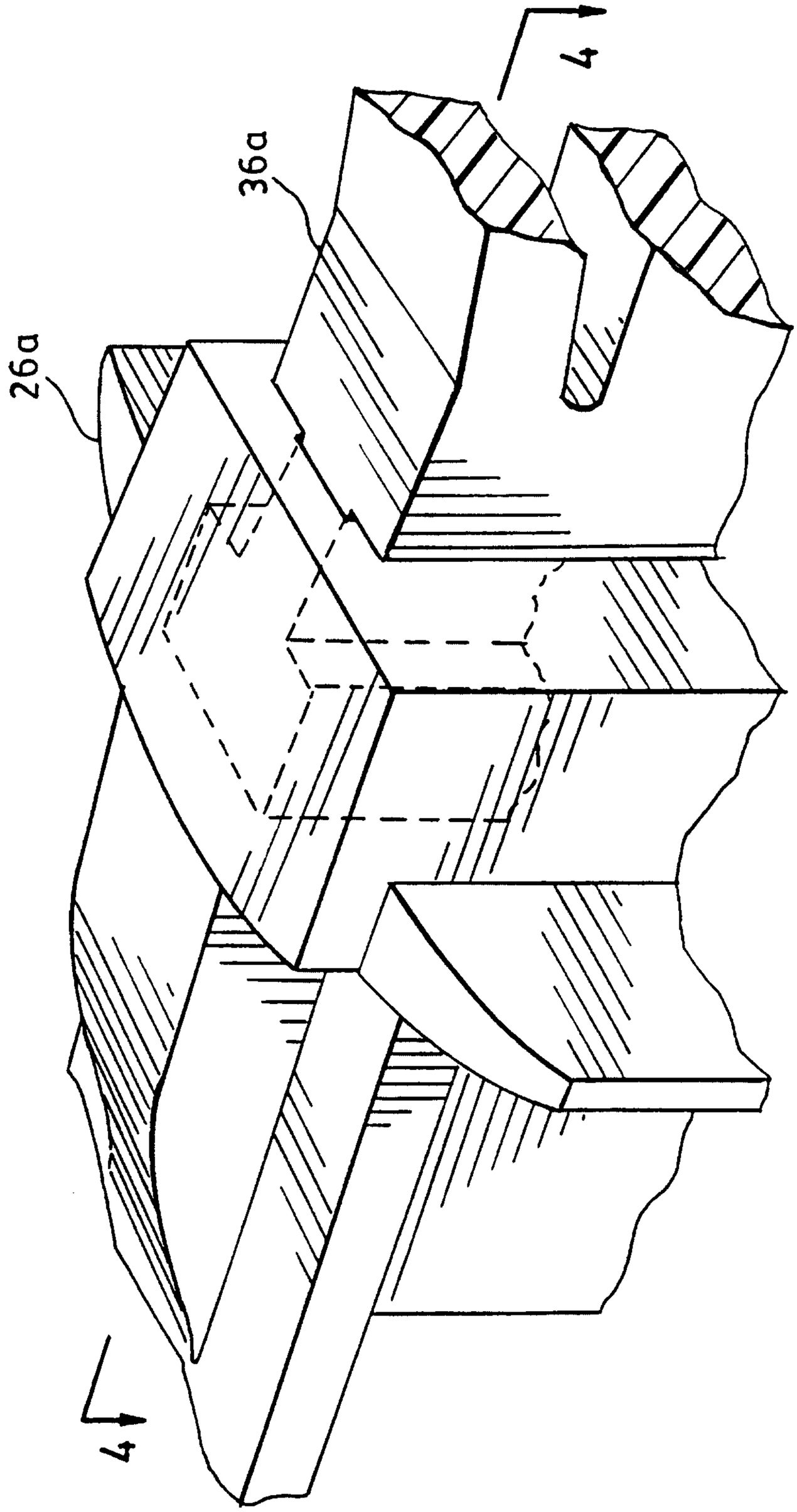


FIG. 5

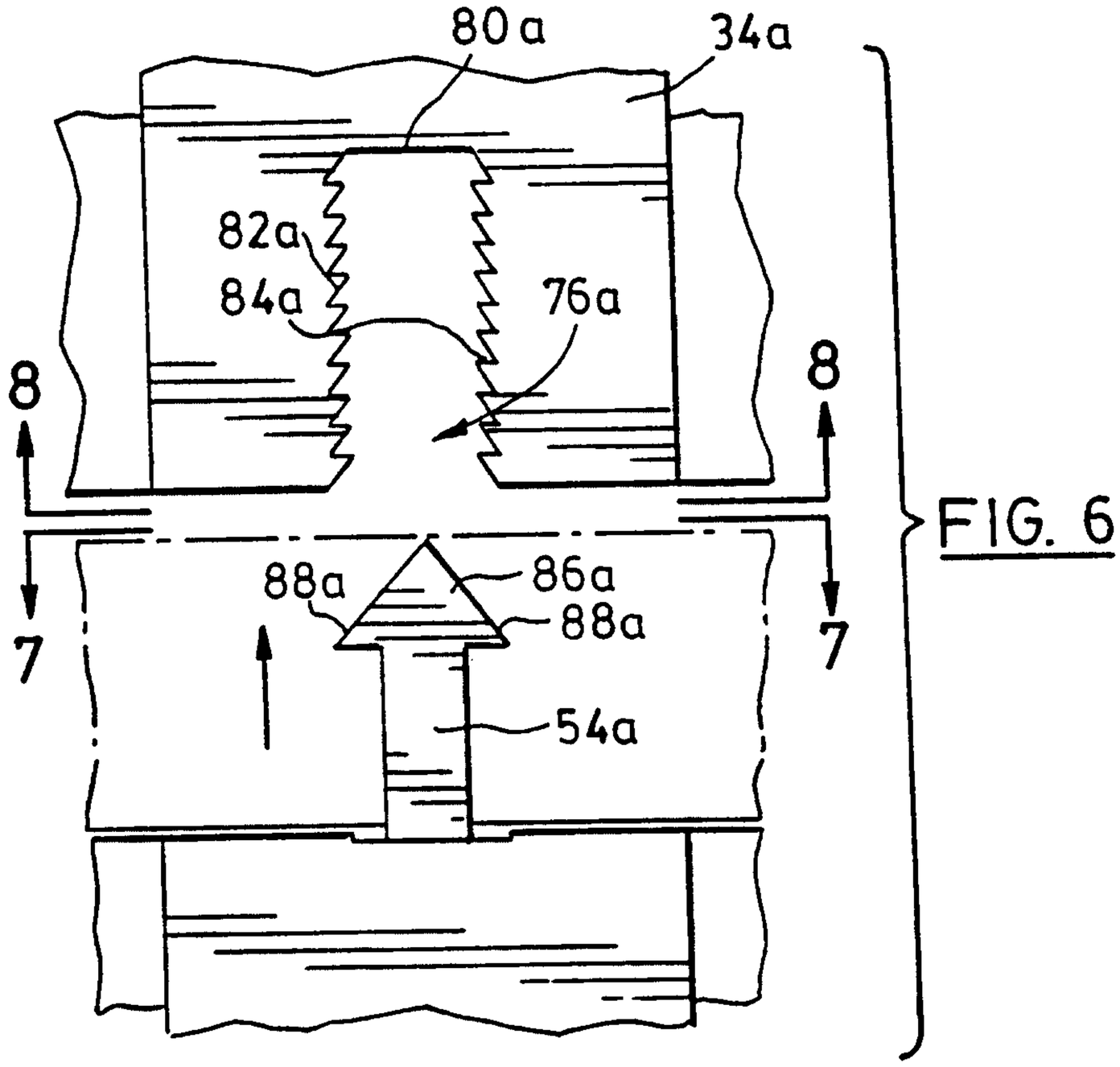


FIG. 6

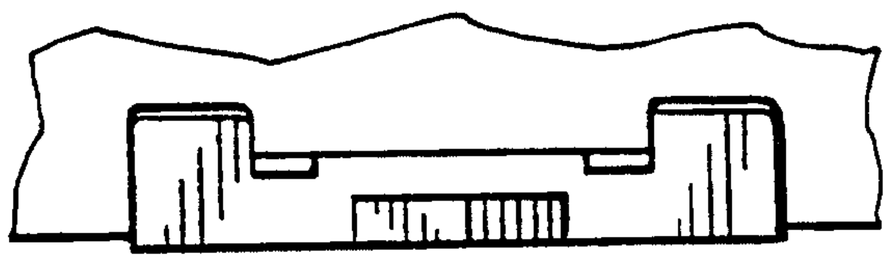


FIG. 7

FIG. 8

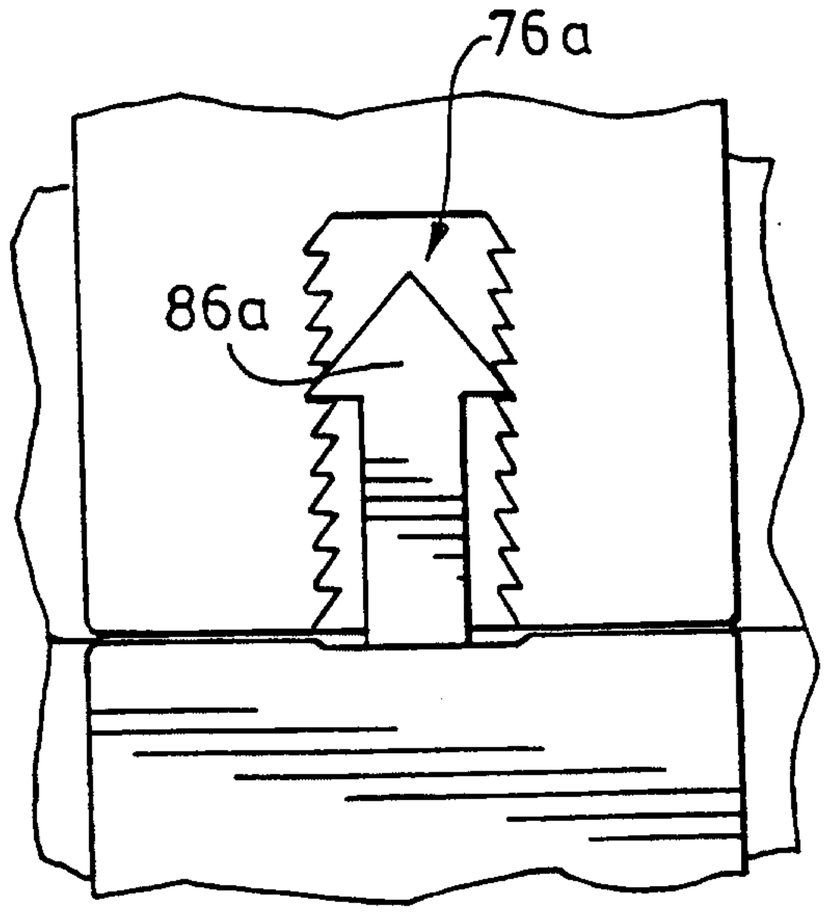


FIG. 9

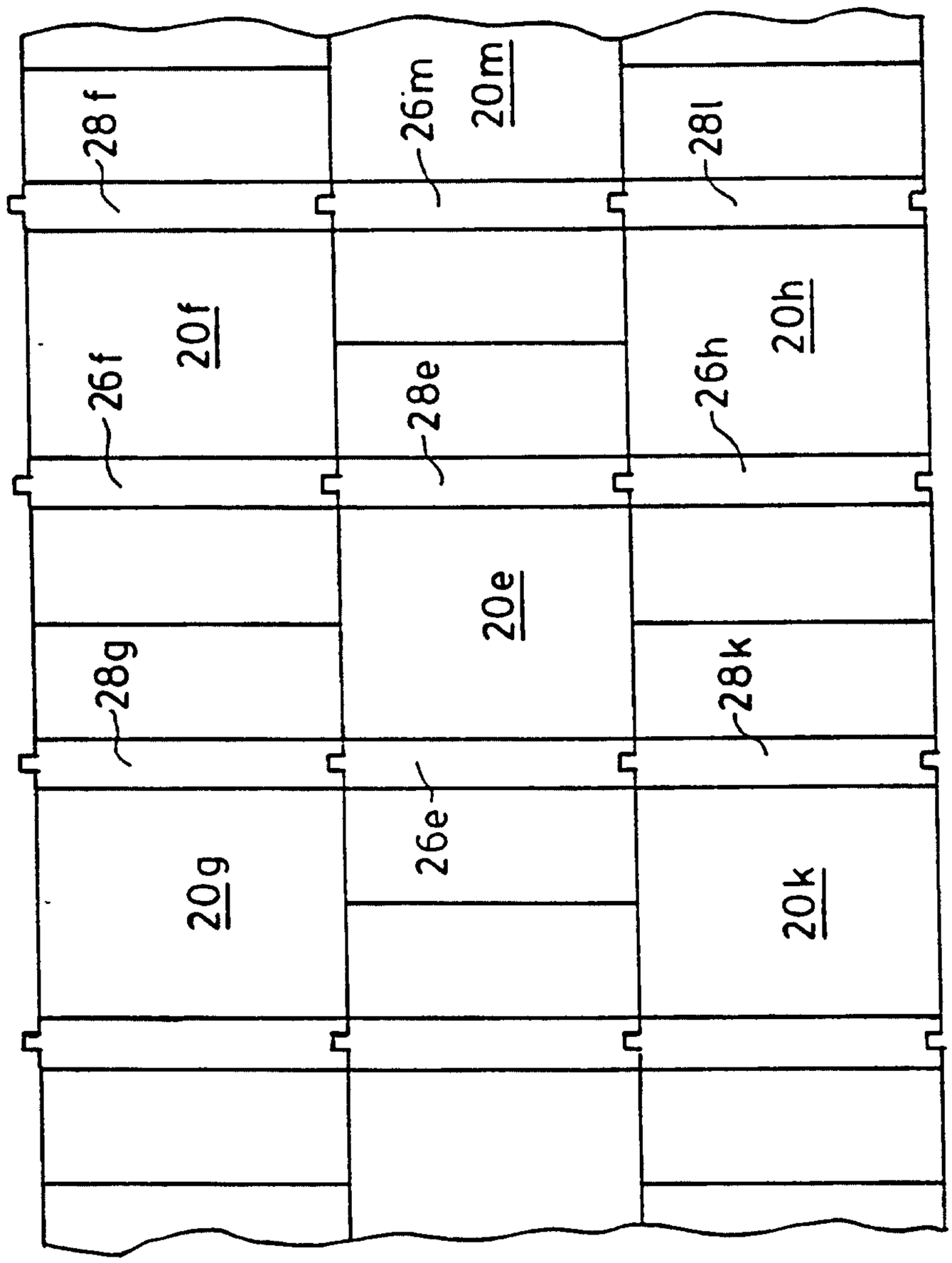


FIG.10

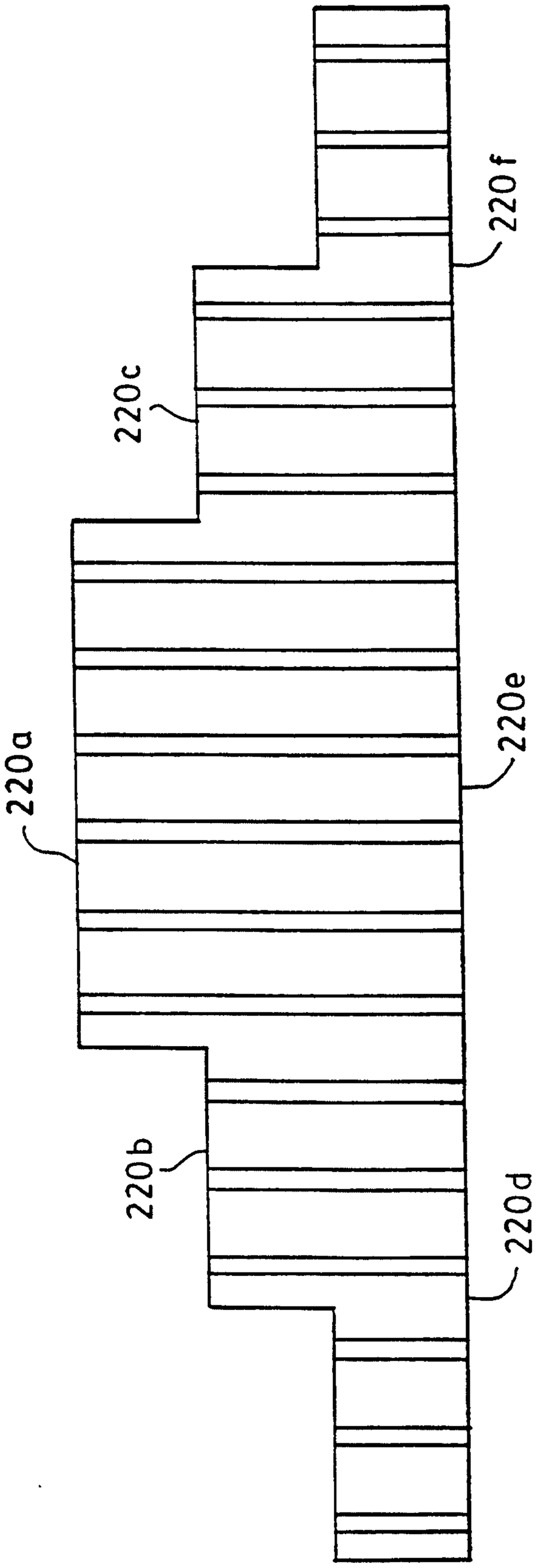


FIG. 11

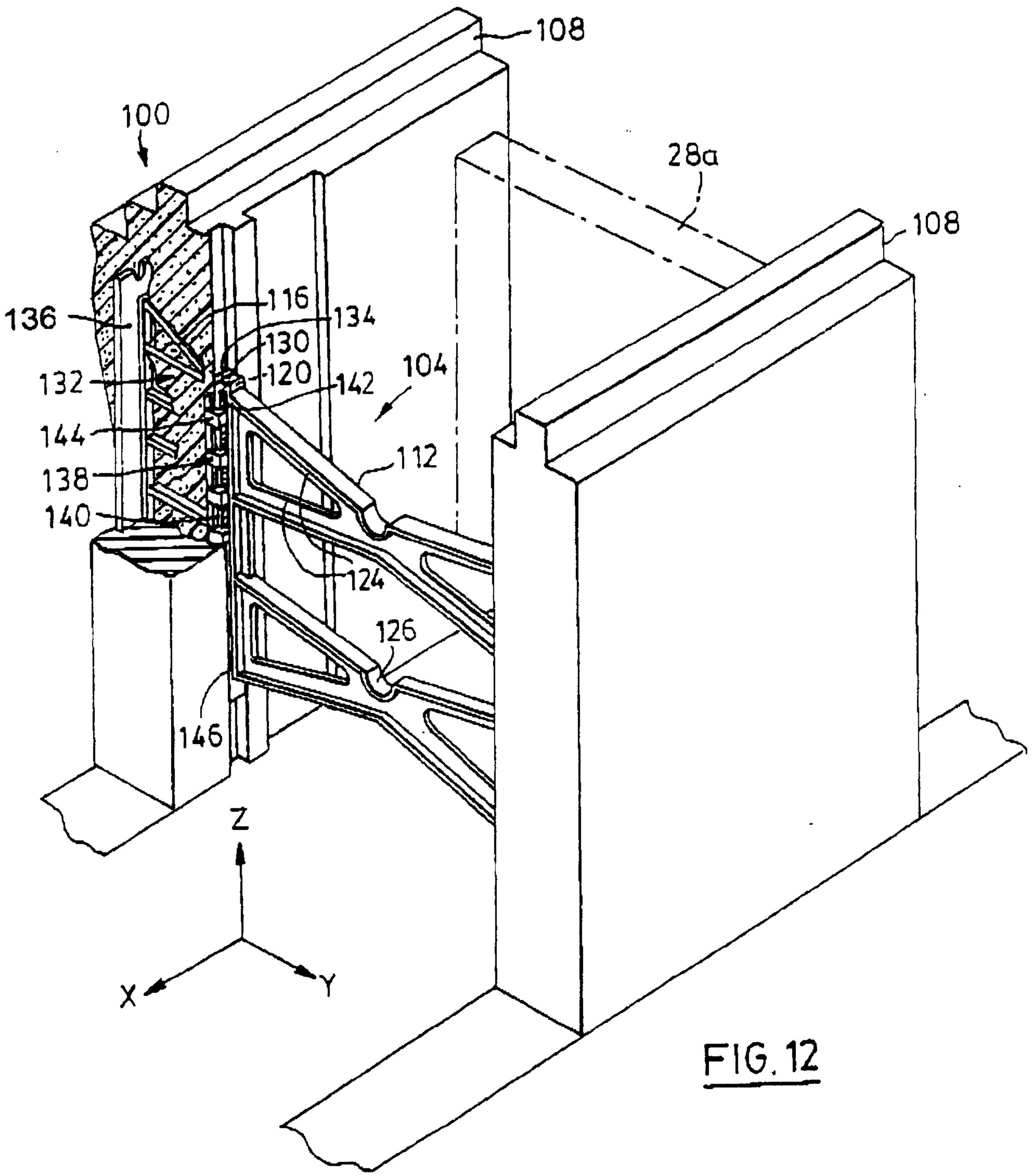

108
100
28a
108
116
134
136
130
132
120
142
104
144
112
138
140
124
126
146
Z
X
Y

FIG. 12

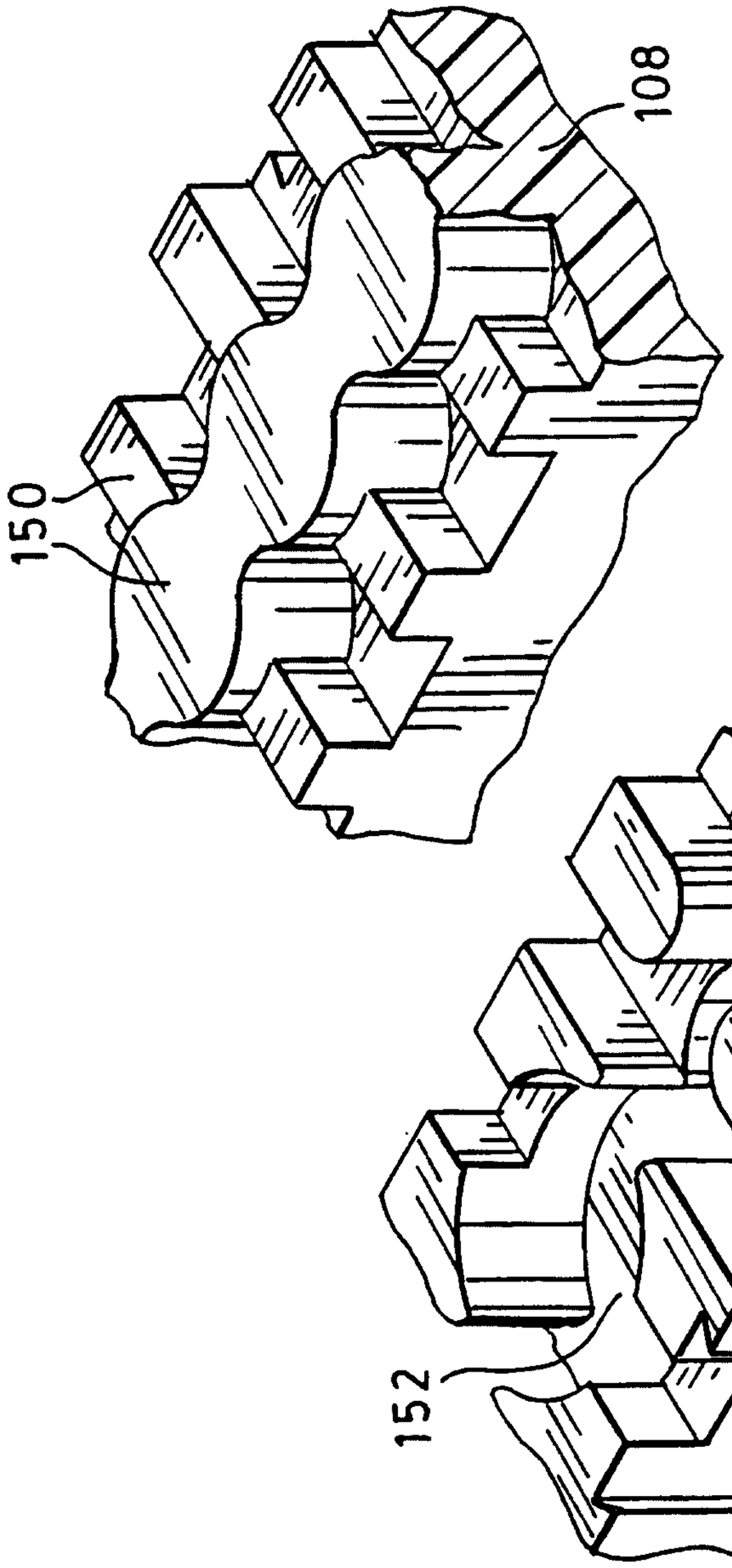
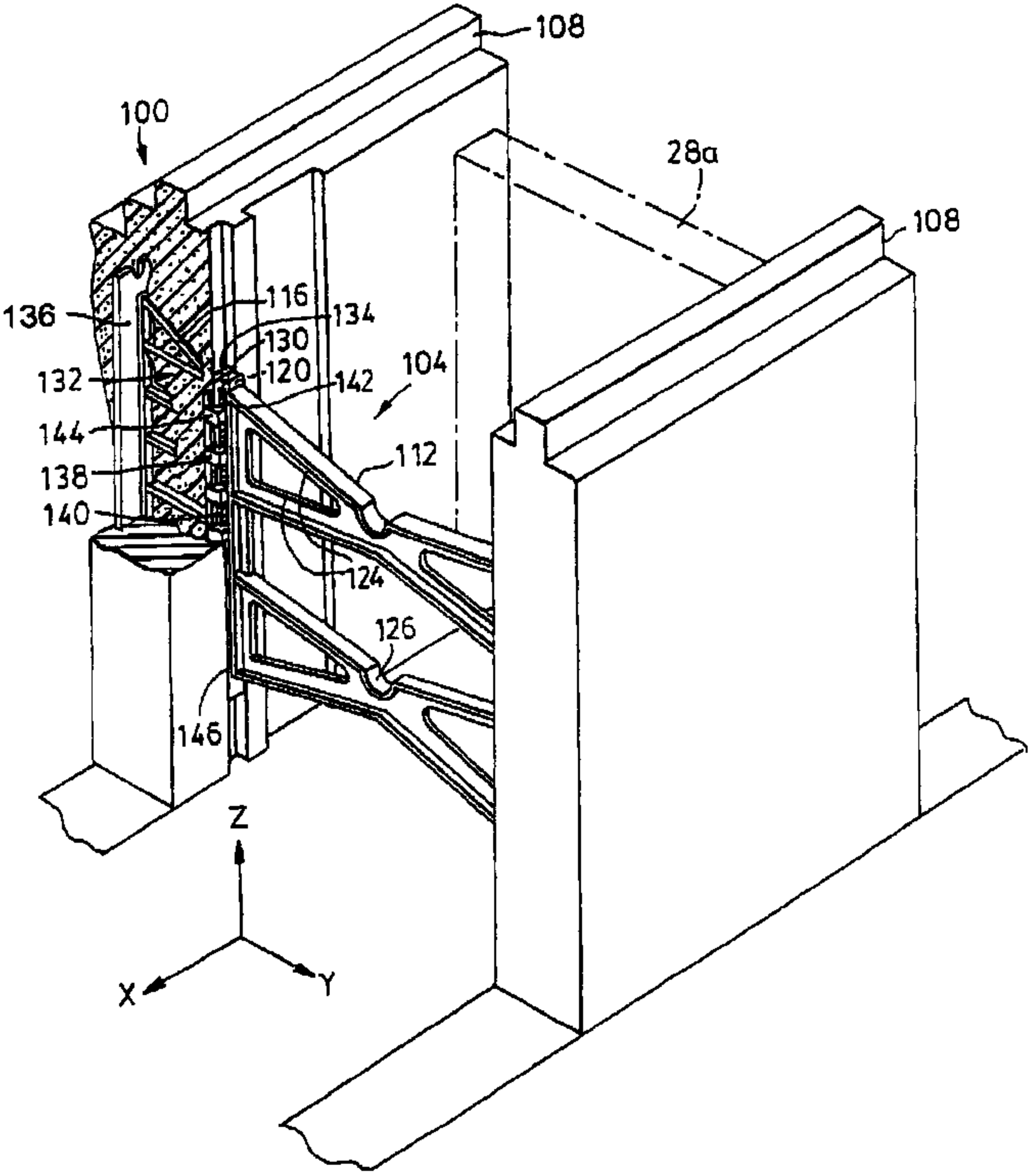


FIG. 13a

FIG. 13b


108
100
28a
108
116
134
136
130
120
142
104
132
144
112
138
140
124
126
146
Z
X
Y