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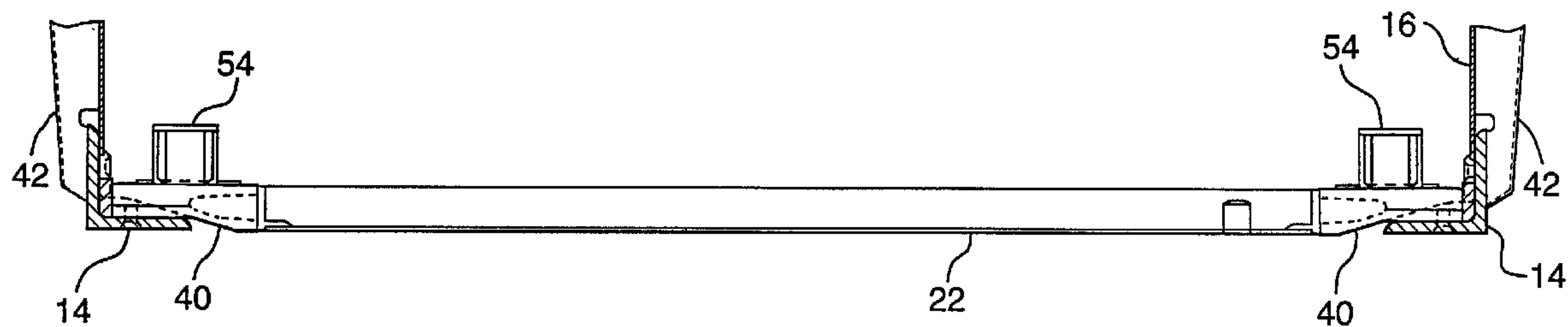
(72) Inventeurs/Inventors:
BUTCHER, RONALD S., CA;
FORBES, JAMES W., CA

(73) Propriétaire/Owner:
NATIONAL STEEL CAR LIMITED, CA

(74) Agent: BLAKE, CASSELS & GRAYDON LLP

(54) Titre : STRUCTURE DE WAGON PLAT SURBAISSE

(54) Title: WELL CAR STRUCTURE



(57) Abrégé/Abstract:

A well car has a retractable guide assembly for changing the effective width of a container well of a railroad freight car. The guide assembly has a housing having a pair of spaced apart walls. The guide assembly includes a pair of walls with cams in the nature of a pair of aligned slots. The guide has a bar that follows the slots between an extended position and a retracted position. The well car also has a floor structure that includes several cross members for supporting containers carried in the well. Some of the cross members have a pair of container support bracket castings at either end, and a beam member rigidly mounted between the container support brackets to yield a rigid cross member. The container support castings are bolted to the side beams of the car.



ABSTRACT

A well car has a retractable guide assembly for changing the effective width of a container well of a railroad freight car. The guide assembly has a housing having a pair of spaced apart walls. The guide assembly includes a pair of walls with cams in the nature of a pair of aligned slots. The guide has a bar that follows the slots between an extended position and a retracted position.

The well car also has a floor structure that includes several cross members for supporting containers carried in the well. Some of the cross members have a pair of container support bracket castings at either end, and a beam member rigidly mounted between the container support brackets to yield a rigid cross member. The container support castings are bolted to the side beams of the car.

WELL CAR STRUCTURE

Field of Invention

This invention relates to cross members for supporting containers
5 carried in a rail road well car and to a rail road freight car including a longitudinal
well for carrying intermodal cargo containers that has container support cross
members.

Background of Invention

Intermodal cargo containers are standardized in various lengths such
10 as 20, 24, 40, 45, 48 and 53 ft. The standardized cargo containers are regularly
stacked one on top of another on a railway freight car for transport.

The ever increasing demand to increase the payload of railway cars
and commercial competitiveness has forced manufacturers to design lighter railway
cars which can still safely withstand the various dynamic forces which act upon the
15 cargo containers during transport.

United States Patent No.4,599,949, discloses a light weight container
car. The container car comprises a pair of longitudinally extending side sills of
double web construction welded to a plurality of transverse beams and cross
beams for strengthening the side sills from lateral deflection. Two cross beams
20 are welded to a centred pad and extend between adjacent transverse beams.

United States Patent No. 4,771,706, discloses a container carrying
railroad car with supporting castings. The car body has opposing side walls and
end walls defining a well in which a container can be received. The supports for
the bottom of the container within the well have a plurality of metal casings joined

to each side wall. Each casting has a substantially vertical leg jointed to an exterior stiffener on the side wall and an arm extending substantially horizontally inward under the side chord or angle towards the centre of the car on which a container bottom can be supported.

5 United States Patent No. 4,909,157, discloses a railway car having a plurality of spaced metal castings jointed to each side wall. Each casting has an L-shape with the vertical leg jointed at the bottom of the side wall to an exterior stiffener and the arm of the casting extending laterally horizontally inwardly under the side bottom chord or angle to aid in supporting a container in the well.

10 In order to stack two cargo containers, the railroad car must have a well to carry the two stacked containers as low as possible to meet the height restrictions of the rail system. The load bearing surfaces are generally vertically offset from the support points and the coupling points of the railroad car. As a result, unbalanced moments are created which must be counterbalanced with an
15 opposite moment.

 United States Patent No.4,599,949, discloses an end bulkhead jointed to the side sills. The bulkhead has a plurality of strengthening baffles.

 United States Patent No. 4,807,722, discloses a railway car wherein each end of the car has a stub sill knee to transfer loads from the coupling to a
20 lower horizontal shear plate in the well area which can collect snow which must be cleared before loading the car.

 Although these patents effectively counterbalance the unbalanced moments, the structure has not been fully satisfactory.

 Intermodal cargo containers are also standardized in terms of width.

A cargo container can have either a 96 inch or 102 inch width. A well of a railroad freight car is generally manufactured to receive the larger width container. However, if a narrower width container is loaded into the wider well, the narrower container is prone to overturn within the container well. Retractable
5 guides have been proposed to effectively narrow the width of the container well.

United States Patent No. 4,754,709, discloses a railroad car for carrying a container. The car body has opposing side walls having guides mounted along each side for reducing the width of the wells spaced therebetween so as to centre in the well, a container having a width less than the well width so as to
10 limit sideward movement of the container in the well when the car rocks. However, such guides must be deployed prior to the container being deposited in the well, since the guide pivots through a space which is occupied by the container after it has been deposited in the well.

United States Patent No. 4,930,426, discloses a device for changing
15 the effective width of a container well of a freight car. A guide body is slid laterally inwardly and locked in the inner position for guiding a narrower container. A latch comprising a bar and aperture is used to lock the guide body in either the inner or outer position. However, the latch is prone to jam with ice under freezing conditions and therefore will lock in a particular position.

20 Summary of the Invention

The disadvantages of the prior art may be overcome by providing a retractable guide assembly which is deployable regardless of whether a cargo container has been loaded and which is not prone to rust or jam.

According to one aspect of the invention, there is provided a

retractable guide assembly for changing the effective width of a container well of a railroad freight car. The guide assembly comprises a housing having a pair of spaced apart walls, each having an inverted U-shaped slot, and a guide for slidably mounted between the walls for translational movement relative to the housing.

5 The guide is slidable between a retracted position and an extended position in which a portion of the guide projects beyond the housing. The guide has a bar for extending through each slot of the walls for travelling therealong in a cam relationship as the guide slides between the retracted positions and the extended position.

10 According to another aspect of the invention, there is provided a retractable guide assembly for attachment to an upper edge of a wall of a railroad car. The retractable guide assembly comprises a housing and a guide. The housing has a base and a pair of spaced opposed walls mounted on the base. Each wall has a matching, inverted generally U-shaped slot with downwardly
15 depending slot arms, one of which is angled away from the other and the other has a basal abutment. The guide is slidably mounted between the walls. The guide has a convex bumper face extending between the walls, a bar extending from the guide adapted for sliding travel in each of the walls slots, and a downwardly depending protrusion formed below the convex bumper face. The
20 convex bumper face is extendable beyond the housing by seating the bar in the slot arm having the basal abutment and is retractable by seating the bar in the slot arm angled away from the other.

According to another aspect of the invention, there is provided a retractable guide assembly for changing the effective width of a container well
25 of a railroad freight car. The guide assembly comprises a housing and a guide.

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The housing has a pair of spaced apart walls, each having an inverted U-shaped slot. The guide is pivotally mounted between the walls for rotational movement relative to the housing. The guide is pivotable between a retracted position and an extended position in which a portion of the guide projects beyond the housing.

- 5 The guide has a radially extending slot and a bar slidably engaging the radially extending slot for reciprocal movement relative to an axis of rotation of the guide. The bar extends through each of the U-shaped slots of the walls for travelling therealong in a cam relationship. When the bar is in a radially inward position, the guide is pivotable between the retracted and extended positions and when the
- 10 bar is in a radially outward position, the guide is restrained in either of the retracted and extended positions.

According to still another aspect of the invention there is a cross member assembly for a rail road well car. The well car has a pair of end structures and a pair of first and second side beams extending between the end structures and has a

15 cargo carrying well defined therebetween. The side beams have an upper region and a lower region. The lower region has an upwardly extending portion and a laterally inwardly extending arm, wherein the cross member assembly comprises a first end fitting, a second end fitting, and a medial portion extending rigidly between the end fittings. The first end fitting is attachable to the first side beam

20 and the second end fitting is attachable to the second side beam. The first end fitting has a first portion formed to mate with the upwardly extending portion of the side beam, and a second portion formed to locate above the laterally inwardly extending arm of the side beam. The first end fitting has bolt holes defined therein to permit the first end fitting to be bolted to the first side beam.

25 In another aspect of the invention there is a cross member assembly for a rail road well car. The well car has a pair of end structures and a pair of first and

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second side beams extending between the end structures and has a cargo carrying well defined therebetween. Each of the first and second side beams have a top chord, a bottom chord, and a web extending between the top chord and the bottom chord. Each of the bottom chords is an angle having an upwardly extending arm and an inwardly extending arm, wherein the cross member assembly comprises a first container support bracket, a second container support bracket, and a transverse beam member mounted rigidly between the first and second brackets. The first bracket is attachable to the bottom chord of the first side beam and the second bracket is attachable to the second side beam. The first bracket has a first portion formed to mate with the upwardly extending arm of the bottom chord of the first side beam, and a second portion formed to locate above the laterally inwardly extending arm of the bottom chord of the first side beam. The first portion of the first bracket has bolt holes defined therein to permit the first portion of the first bracket to be bolted to the upwardly extending arm of the first side beam.

In another aspect of the invention there is a cross member assembly for a rail road well car. The well car has a pair of end structures and a pair of first and second side beams extending between the end structures and has a cargo carrying well defined therebetween. The side beams have an upper region and a lower region. The lower region has an upwardly extending portion and a laterally inwardly extending arm, wherein the cross member assembly comprises a first end fitting, a second end fitting, and a medial portion extending rigidly between the end fittings. The first end fitting is attachable to the first side beam and the second end fitting is attachable to the second side beam. The first end fitting has a body having a first end for attachment to the first side beam, and a second end located laterally inboard of the first end when the first end is attached to the first

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side beam. The second end is rigidly attached to the medial portion of the cross member assembly. The first end of the first end fitting has a flange formed thereacross for mating connection with the upwardly extending portion of the side beam. The body has a downwardly facing surface formed to locate above the
5 laterally inwardly extending arm of the side beam. The body has an upwardly facing surface upon which lading can bear. The flange has bolt holes defined therein to permit the flange to be bolted to the first side beam.

In another aspect of the invention there is a railroad freight car including a longitudinal well for carrying intermodal cargo containers, comprising a structural
10 frame having side beams, end structures and a floor. The side beams are connected to the end structures at opposite ends of the side beams. Each of the side beams has a top chord and a bottom chord and a web extending between the top chord and the bottom chord. The floor extends between the lower chords of the side beams. The floor includes a plurality of load supporting transverse beam
15 members spaced along the car body at container support points. The load supporting transverse members extend between container support brackets mounted on the lower chords of the side walls. The bottom chords of the side beams are a first bottom chord and a second bottom chord respectively. The first bottom chord has an upwardly extending arm, and an inwardly extending arm
20 extending toward the second bottom chord. The first bottom chord has an upwardly extending arm and an inwardly extending arm extending toward the second bottom chord. A first of the container support brackets is mounted to the first bottom chord member. A second of the container support brackets is mounted to the second bottom chord member opposite to the first bracket. One of
25 the transverse members is a first transverse member rigidly mounted between the first and second container support brackets. The first container support bracket

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has a first portion mounted against the upwardly extending arm of the first bottom chord, and a second portion mounted above the inwardly extending arm of the first bottom chord. The second container support bracket has a first portion mounted against the upwardly extending arm of the second bottom chord, and a
5 second portion mounted above the inwardly extending arm of the second bottom chord. The first portion of the first container support bracket is bolted to the upwardly extending arm of the first bottom chord member. The first portion of the second container support bracket is bolted to the upwardly extending arm of the second bottom chord member.

10

Description of the Drawings

In drawings which illustrate embodiments of the invention,

- Figure 1 is a side elevational view of a railroad car of the present invention loaded with stacked intermodal cargo containers;
- 15 Figure 2 is a top plan view of the railroad car of Figure 1;
- Figure 3 is a section view of a main transverse member of the railroad car of Figure 1;
- Figure 4 is a sectional view of an intermediate transverse member of the railroad car of Figure 1;
- 20 Figure 5 is a perspective view of a pair of container support brackets for connecting the main transverse member of Figure 3;
- Figure 6 is a transverse sectional view of one of the pair of the connecting brackets of Figure 5;

- Figure 7 is a transverse sectional view of the side wall of the railroad car of the present invention, illustrating a first embodiment of a retractable lateral guide in a retracted position;
- 5 Figure 8 is a transverse sectional view of the connection between the main transverse member, the container support bracket and the side wall of the railroad car of Figure 1;
- Figure 9 is a sectional view of the container support bracket of Figure 8 along the lines 9-9;
- 10 Figure 10 is a side elevational view of the end structure of the railroad car of Figure 1;
- Figure 11 is an end elevational view of the end structure of the railroad car of Figure 1 illustrating a second embodiment of the retractable lateral guide;
- 15 Figure 12 is a partial side sectional view of the bulkhead portion of the end structure of Figure 10 from the reverse angle;
- Figure 13 is a detailed top plan view of a longitudinally inner section of the frame structure of Figure 2;
- Figure 14 is a detailed top plan view of a longitudinally outer section of the frame structure of Figure 2;
- 20 Figure 15 is a transverse elevational view of the second embodiment of the retractable lateral guide;
- Figure 16 is a top plan view of the retractable lateral guide of Figure 15;
- Figure 17 is an end elevational view of the end structure of a railroad

car of the present invention illustrating the retractable lateral guide of Figure 7.

Description of the Invention

The railroad freight car of the present invention is illustrated in
5 Figures 1 to 17. The freight car is constructed in accordance with standard practice, the car having a longitudinally extending load bearing frame structure formed by opposing side beams comprising top chords 12, bottom chords 14, side walls 16 and end structures 18. The frame structure is mounted at its ends on trucks 20 which run on tracks. The side walls 16 and bulkhead wall 68 (Fig. 12)
10 define a well for receiving intermodal cargo containers 7, 8 and 9.

Referring to Figures 2, 13 and 14, the floor of the well extends between bottom chords 14 and comprises load supporting transverse members 22, intermediate transverse members 24 and end sills 26. Extending between adjacent transverse members are diagonal struts 28 and 30 which are
15 symmetrical about the centre transverse member 22. Diagonal struts 28 are approximately parallel to each other on one side of the centre transverse member but symmetrically opposed on opposite sides of the centre transverse member. Diagonal struts 30 extend opposite to the adjacent diagonal strut 28.

Since the floor of the well is open, safety regulations require that
20 some support be provided in the event that the bottom of the cargo container falls out. Safety struts will support the cargo container load in such event.

Safety struts 32 and 34 extend longitudinally between transverse members 24 and end sills 26. One end of the safety strut 32 is rigidly mounted while the opposite end is slidingly mounted. In the preferred embodiment, safety

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struts 32 are welded into a bracket 36 at one end and pinned to bracket 38. The struts 32 have a slot at the pinned end and are so located that the strut receives no axial loads when the bottom chord 14 is strained. Pin 39 extends from the end of struts 32 and travels in the slot at the pinned end. As bottom cord 14 is strained, pin 39 is able to travel along the slot preventing axial loads from being transferred to struts 32. The welded end is thus protected from high fatigue loads. Both ends of struts 32 may be pin connected with some increase in strut weight.

Bracket 38 preferably receives both diagonal strut 28 and the pinned end of safety strut 32. Bracket 38' preferably receives both diagonal strut 30 and the end of safety strut 34. Bracket 38 and 38' and bracket 36 and 36' are identical except that bracket 38' and 36' are sized to receive the smaller diagonal strut 30 and safety strut 34, respectively.

The combination of opposed diagonal struts and transverse members produces a relatively light weight and rigid frame structure of the freight car.

Transverse members 22 and intermediate transverse members 24 are preferably connected to the bottom chord 14 by bolts. Preferably, each intermediate transverse member 24 is a hollow rectangular beam (Fig. 4) having a flange on each side thereof for bolting to the bottom chord 14.

In the preferred embodiment, bottom chord 14 is a 90° open corner angle having one arm welded to the side wall 16 which is welded to top chord 12. Top chord 12 is preferably a square or rectangular box beam. Extending between top chord 12 and bottom chord 14 perpendicular to side wall 16 are vertical side wall braces 42.

Referring to Figure 5, container support bracket 40 has a horizontal

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platform 44 having a flange 46 at one end extending perpendicular thereto and merging with a horizontal flange 48 on each side thereof. Flanges 46 and 48 have bolting holes 50 extending therethrough. The bolting holes in flange 46 are preferably countersunk. The end opposite the flange 46 is a hollow 52. The
5 mouth of the hollow is narrowed to fit inside of hollow transverse member 22 and provide backing for a weld joint. Bracket 40 can be cast, forged or machined, but is preferably cast.

During assembly, transverse member 22 is welded to brackets 40 at each end thereof. Brackets 40 are then bolted to both the vertical and horizontal
10 arms of bottom chord 14. An impact stop block 53 is mounted on the vertical arm of bottom chord 14 beyond the outer transverse members 22. (Figure 8)

On the brackets of the longitudinally outermost transverse member 22 is a container guide 54 and a locating cone 56. (Figure 9) The spacing between cones and guides is the positioning distance of a standard cargo container
15 to position the four corners of a cargo container within the well.

Referring to Figures 10, 11, 12 and 14, the end structures 18 are more particularly illustrated. Both end structures are identical; however, for simplicity only one end is illustrated. Top chord 12 extends from the well longitudinally outwardly to overlap the body bolster 64 under which the railroad
20 truck means 20 is pivotally connected. Stub centre sill 66 extends from the bulkhead wall 68 to the extreme end of the car. The stub centre sill 66 is the main draft load connection between railroad cars. The connection can either be drawbars or standard couplings.

Extending between side walls 16 is shear plate 60 which forms the

top surface of body bolster 64 and stub centre sill 66. Optionally, an upper bolster 64 may be incorporated. Main bolster 64 is connected to side walls 16. Shear plate 60 is integrally connected to bulkhead wall 68 which is connected to end sills 26 and side walls 16. Extending upwardly from shear plate 60 is fixed
5 container guide assembly 70 which comprises a plate 72 and a perpendicular flange 74. Fixed guide assembly 70 protects the end structures 18 from damage during loading and unloading of the cargo containers.

The bottom flange 76 of side sill ends extends downwardly towards the bottom chords 14. Flanges 78 and 79 reinforce the bend in flange 76. Web 69
10 lies outboard of side wall 16 in line with bulkhead wall 68.

The outer edge of the shear plate 60 is defined essentially by the body bolster outer webs 61 and the stub centre sill webs 63 with a large transition curve 65 between the two lines. A diagonal stiffening member 67 is provided near the curved edge.

15 As illustrated in Figures 7 and 17, the retractable lateral guide assemblies 82 are shown in a retracted position (solid lines) and an extended position (broken lines 82a). Retractable guide assemblies 82 comprises a housing 84 having two side walls 88, a tie bar 98 and a fixed locking bar 99 to provide structural integrity. Each side wall 88 has a matching inverted U-shaped slot 90.
20 One arm 92 of the slot is angled away from the other arm 94. At the base of arm 94 is a basal abutment 96. Bar 99 has a square cross section which is rotated presenting a detent.

Slidably extending between the two walls 88 is guide 100 which has two side walls connected by a contoured plate top and inner surface. In the
25 preferred embodiment, guide 100 has a generally chevron shape presenting a

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bumper surface 89. The top plate of guide 100 has a hand hold aperture for gripping and moving the guide. Guide 100 has a bar 102 through the two side plates and extends outwardly therefrom for slidingly engaging slot 90 in a cam relationship. Guide 100 has a lower edge having a protrusion 104 defining two
5 notches 106 and 108.

As illustrated in Figures 7 and 17, housing 84 is mounted onto the top of a side beam angular reinforcement 86 which is part of the top chord 12. A plurality of like lateral guides are spaced about the perimeter of the well of the freight car 10.

10 In a retracted position, bar 102 is slid towards the end of arm 92 of slot 90, whereby notch 106 will rest upon bar 99. The length of arm 92 and notch 106 will stably retain the guide in a retracted position. To move the guide into an extended position, the operator may lift the guide 100 by the hand hold or push laterally on bar 102 and move the guide relatively transversely inwardly. Bar
15 102 will move along slot 90 into arm 94. Protrusion 104 will extend forwardly until notch 108 rests on bar 99. Abutment 96 will restrain the bar 102 from travelling transversely outwardly while fixed locking bar 99 will abut protrusion 104 stably retaining the guide in the extended position.

To retract the guide 100, the operator lifts the guide 100 by the
20 hand hold to clear bar 99 and bar 102 out of slot arm 94, and then moves guide 100 laterally outward to the position in Figure 7.

When the guides 100 are in the extended position the effective width of the well is reduced. Narrower cargo containers will abut against the guides. When the guides 100 are in the retracted position, wider cargo containers may be

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loaded into the well.

Referring to Figures 15 and 16, a second embodiment of a retractable guide assembly 120 is illustrated. Guide assembly 120 is mountable on the top chord 12 of a railroad freight car. Guide assembly 120 comprises a housing 122 and a pivotally mounted guide 124. Housing 122 has an open transverse outer face, a sloped face 125 and side walls 128. Each side wall 128 has an inverted U-shaped slot 126. Slot 126 is sized to slidably receive bar 130 which extends outwardly from guide 124.

Guide 124 has a pivot pin 132 which pivotally connects guide 124 to housing 122. Guide 124 has an offset shape such that when the guide is in an extended position as illustrated in Figure 15, a bumper surface 134 is presented. Bumper surface 134 directs a container away from the side wall of car and effectively reduces the width of the well.

Guide 124 has side wall walls 136. Each side wall 136 has a slot 138 radially extending from the axis of rotation of pivot pin 132 and sized to slidably receive locking bar 130. Locking bar 130 reciprocally slides relative to pivot pin 132.

The inner corners of the U-shaped slot 126 are shaped so that when lateral forces are applied to the bumper surface 134 the weight of the guide 124 will tend to force locking bar 130 to the remote ends of the U-shaped slot 126.

In use, the operator can slide locking bar 130 relative to pivot pin 132. In a position radially inwardly, guide 124 can pivot about the axis of rotation of pivot pin 132 between an extended position (solid lines) to a retracted

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position (broken lines) as locking bar 130 travels along slot 126. The operator then urges locking bar 130 to one of the remote ends of slot 126 locking the guide 124 in either the extended or retracted position.

When the guide 124 is in the extended position, the effective width
5 of the well is reduced to retain narrower containers. If the container rocks, it will bear against the bumper surface 134 of guide 124.

When the guide 124 is retracted, the well is suitable for wider containers. Wider containers will also bear against bumper surface 134 or against the housing inner flange 127.

10 The retractable lateral guides of the first and second embodiment can be deployed and retracted before or after the narrower container has been installed. As the container bears against the bumper surface, the forces will tend to urge the locking mechanism into a locked or seated condition reducing the possibility of the lateral guides from releasing.

15 Additionally, the placement of the movable parts reduces the possibility of injuring the operator.

Although the disclosure describes and illustrates the preferred embodiments of the invention, it is understood that the invention is not limited to these particular embodiments. Many variations and modifications will now occur
20 to those skilled in the art. For definition of the invention, reference is made to the appended claims.

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We claim:

1. A cross member assembly for a rail road well car, the well car having a pair of end structures and a pair of first and second side beams extending between the end structures and having a cargo carrying well defined therebetween, the side beams having an upper region and a lower region, said lower region having an upwardly extending portion and a laterally inwardly extending arm, wherein said cross member assembly comprises:
 - a first end fitting, a second end fitting, and a medial portion extending rigidly between said end fittings;
 - said first end fitting being attachable to the first side beam and said second end fitting being attachable to the second side beam;
 - said first end fitting having a first portion formed to mate with the upwardly extending portion of the side beam, and a second portion formed to locate above the laterally inwardly extending arm of the side beam; and
 - said first end fitting having bolt holes defined therein to permit said first end fitting to be bolted to said first side beam.
2. The cross member assembly of claim 1 wherein said first portion of said first end fitting includes a first flange having bores defined therein to permit said first flange to be bolted to the upwardly extending portion of the side beam.
3. The cross member assembly of claim 2 wherein said first end fitting has an upwardly facing surface for supporting a load placed in the well, said upwardly facing surface lies in a plane, and said first flange extends upwardly of said plane.
4. The cross member assembly of claim 2 wherein said first flange has four horizontal bores defined therein through which to fasten said first flange to the upwardly extending portion of the first side beam.
5. The cross member assembly of claim 1 wherein said second portion of said first end fitting includes a flange for mating engagement with the laterally inwardly extending arm of the first side beam.
6. The cross member assembly of claim 1 wherein:

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said first portion of said first end fitting includes a first flange having bores defined therein to permit said first flange to be bolted to the upwardly extending portion of the side beam; and

5 said second portion of said first end fitting includes a second flange having a bore defined therein to permit said second flange to be bolted to the laterally inwardly extending arm of the first side beam.

7. The cross member assembly of claim 6 wherein said second portion of said first end fitting includes a third flange having a bore defined therein to permit said third
10 flange to be bolted to the laterally inwardly extending arm of the first side beam.

8. The cross member assembly of claim 1 wherein:
 said first portion of said first end fitting includes a first flange, said first flange having a first face for contacting the upwardly extending portion of the
15 first side beam, said first face lying in a vertical plane and having bores defined therein to permit said first flange to be bolted to the upwardly extending portion of the side beam; and
 said second portion of said first end fitting includes a second flange having a second face for mating engagement with the laterally inwardly extending
20 arm of the first side beam, said second face lying in a horizontal plane.

9. The cross member assembly of claim 8 wherein said bores defined in said first flange have horizontal axes, and said horizontal axes of said bores are offset upwardly from said horizontal plane of said second face of said second flange.
25

10. The cross member assembly of claim 8 wherein said second flange has a bore defined therein to permit said second flange to be bolted to the laterally inward extending arm of said first side beam, said bore in said second flange has a vertical axis, and said vertical axis of said bore in said second flange is horizontally offset laterally
30 inboard of the vertical plane of said first face of said first flange.

11. The cross member of claim 8 wherein:
 said bores defined in said first flange have horizontal axes, and said horizontal axes of said bores are offset upwardly from said horizontal plane of said
35 second face of said second flange; and

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5 said second flange has a bore defined therein to permit said second flange to be bolted to the laterally inwardly extending arm of said first side beam, said bore in said second flange has a vertical axis, and said vertical axis of said bore in said second flange is horizontally offset laterally inboard of the vertical plane of said first face of said first flange.

12. The cross member assembly of claim 2 wherein said first flange has four horizontal bores formed therein through which to fasten said first flange to said upwardly extending portion of the side beam and said second and third flanges each
10 have a vertical bore formed therein through which to admit bolts to fasten said second and third flanges to said second portion of the side beam.

13. The cross member assembly of claim 1 wherein:
15 said first end fitting is a bracket, said first portion is a vertically extending flange formed across a first end of the bracket, and said second portion of said first end fitting is a horizontally extending portion of said bracket extending from said first end toward a second end of said bracket, said second end of said bracket lying laterally inboard of said first end of said bracket when said first flange is attached to the upwardly extending
20 portion of the first side beam;
 said horizontally extending portion of said bracket includes a wide region and a narrow region, said wide region lying adjacent to said first end of said bracket, and said narrow region lying adjacent to said second end of said first bracket.

25 14. The cross member assembly of claim 13 wherein said medial portion of said cross member assembly is a transverse beam member, said transverse beam member having a length between said first and second end fittings, and a width perpendicular to said length, and said wide region of said first bracket is wider than said transverse beam
30 member.

35 15. The cross-member assembly of claim 13 wherein said wide region of said horizontally extending portion of said bracket includes a second flange, and said second flange meets said vertically extending flange at a corner.

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16. The cross member assembly of claim 13 wherein said wide region of said horizontally extending portion of said bracket is the same width as said flange.
17. The cross member assembly of claim 13 wherein said wide region merges with
5 said narrow region away from said vertically extending flange.
18. The cross member assembly of claim 13 wherein said wide region is tapered to merge with said narrow region toward said second end of said bracket.
- 10 19. The cross member assembly of claim 13 wherein said wide region extends away from said vertically extending flange and merge on smoothly curved corners with said narrow region.
20. The cross member assembly of claim 1 wherein:
15 said first end fitting is a bracket, said first portion of said first end fitting is a first flange, said first flange being a vertically extending flange formed across a first end of the bracket, and said second portion of said first end fitting is a horizontally extending portion of said bracket extending from said first end toward a second end of said bracket, said second end of
20 said bracket lying laterally inboard of said first end of said bracket when said first flange is attached to the upwardly extending portion of the first side beam;
- said horizontally extending portion of said bracket includes a wide region and a narrow region, said wide region lying adjacent to said first end of said
25 bracket, and said narrow region lying adjacent to said second end of said first bracket;
- said horizontally extending portion has an upwardly facing surface, said upwardly facing surface having a length measured laterally inboard from said first flange to said second end, and a width measured in a width
30 direction perpendicular to said length as wide as the narrow region; and
- said horizontally extending portion includes a second flange and a third flange, said second and third flanges extending in said width direction to opposite sides of said surface, said second and third flanges being locatable above the laterally inwardly extending portion of said first side
35 beam.

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21. The cross member assembly of claim 20 wherein:
 said second flange intersects with said first flange at a first corner;
 said third flange intersects with the first flange at a second corner.
- 5 22. The cross member assembly of claim 20 wherein said second and third flanges
 each have a face for contacting said laterally inwardly extending arm of said first side
 beam, and said respective faces are co-planar.
- 10 23. The cross member assembly of claim 20 wherein:
 said second flange meets said first flange at a first corner;
 said third flange meets said first flange at a second corner; and
 said second and third flanges extend away from said first and second corners
 respectively and toward said second end of said bracket.
- 15 24. The cross member assembly of claim 23 wherein said second and third flanges
 merge with said narrow region away from said first and second corners.
- 20 25. The cross member assembly of claim 23 wherein said second and third flanges
 are tapered to merge with said narrow region toward said second end of said bracket.
26. The cross member assembly of claim 23 wherein said second and third flanges
 extend away from said first and second corners, respectively, and merge on respective
 smooth radii with said narrow region away from said respective corners.
- 25 27. The cross member assembly of claim 20 wherein said upwardly facing surface is
 horizontal and said second and third flanges lie at a level lower than said upwardly
 facing surface.
- 30 28. The cross member assembly of claim 20 wherein said first end fitting has a first
 vertical thickness abreast of said second and third flanges, and said second and third
 flanges have a second vertical thickness that is less than the first vertical thickness.
- 35 29. The cross member assembly of claim 20 wherein:
 said second flange intersects with said first flange at a first radiused corner;
 said third flange intersects with the first flange at a second radiused corner; and

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said second and third flanges extend away from said first and second radius corners, respectively, and each of said second and third flanges merge with said second portion of said bracket at a smoothly radiused transition located away from said first and second radiused corners.

5

30. The cross member assembly of claim 13 wherein said bracket has a protruding portion formed at said second end of said bracket, said protruding portion mating with an end of said medial portion.

10 31. The cross member assembly of claim 30 wherein said protruding portion is hollow.

32. The cross member assembly of claim 30 wherein said medial portion is a transverse beam member and said protruding portion has a shoulder, and meets said
15 transverse beam member at said shoulder.

33. The cross member assembly of claim 32 wherein said shoulder has a horizontal portion adjacent to said upwardly facing surface, and vertical portions to either side of said horizontal portion.

20

34. The cross member assembly of claim 1 wherein said first end fitting is welded to said medial portion.

35. The cross member assembly of claim 1 wherein a container support cone is
25 mounted to said first end fitting.

36. The cross member assembly of claim 13 wherein said horizontally extending portion of said bracket has a flat upwardly facing surface, and a container cone is mounted to said flat surface.

30

37. The cross-member assembly of claim 13 wherein said horizontally extending portion of said bracket has a flat upwardly facing surface, and a container guide is mounted to said flat surface of said horizontal portion of said bracket.

- 20 -

38. The cross-member assembly of claim 13 wherein said horizontally extending portion of said bracket has a flat upwardly facing surface, and a container cone and a container guide are mounted to said flat surface of said horizontal portion of said first bracket.

5

39. The cross member assembly of claim 1 wherein said first end fitting is a casting.

40. The cross member assembly of claim 1 wherein said second end fitting is the same as said first end fitting.

10

41. A cross member assembly for a rail road well car, the well car having a pair of end structures and a pair of first and second side beams extending between the end structures and having a cargo carrying well defined therebetween, the side beams each having a top chord, a bottom chord, and a web extending between the top and bottom chords, the bottom chord being an angle having an upwardly extending leg connected to the web, and a horizontal leg extending laterally inboard from the vertical leg, wherein said cross member assembly comprises:

15

a first bracket, a second bracket, and a transverse beam member rigidly mounted between said first and second brackets;

20

said first bracket being mountable to the first side beam and said second bracket being mountable to the second side beam;

said first bracket having a narrow end connected to said transverse beam member, and a wide end having bores formed therein to permit said wide end of said first bracket to be bolted to said bottom chord member of said first side beam; and

25

said first bracket having a first portion locatable against the upwardly extending leg of the bottom chord, and a second portion locatable against the horizontal leg of the bottom chord.

42. The cross member assembly of claim 41 wherein said first bracket is welded to said transverse beam member.

30

43. The cross member assembly of claim 41 wherein said first and second brackets have flat upwardly facing surfaces upon which to place a load.

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44. The cross member assembly of claim 43 wherein said first and second brackets have container guides mounted to said flat surfaces.

45. The cross member assembly of claim 43 wherein said first and second brackets
5 have container support cones mounted to said flat surfaces.

46. A cross member assembly for a rail road well car, the well car having a pair of end structures and a pair of first and second side beams extending between the end structures and having a cargo carrying well defined therebetween, each of the first and
10 second side beams having a top chord, a bottom chord, and a web extending between the top chord and the bottom chord, each of the bottom chords being an angle having an upwardly extending arm and a laterally inwardly extending arm, wherein said cross member assembly comprises:

15 a first container support bracket, a second container support bracket, and a transverse beam member mounted rigidly between said first and second brackets;

said first bracket being attachable to the bottom chord of the first side beam and
said second bracket being attachable to the second side beam;

20 said first bracket having a first portion formed to mate with the upwardly extending arm of the bottom chord of the first side beam, and a second portion formed to locate above the laterally inwardly extending arm of the bottom chord of the first side beam; and

25 said first portion of said first bracket having bolt holes defined therein to permit said first portion of said first bracket to be bolted to the upwardly extending arm of the first side beam.

47. A cross member assembly for a rail road well car, the well car having a pair of end structures and a pair of first and second side beams extending between the end
30 structures and having a cargo carrying well defined therebetween, the side beams having an upper region and a lower region, the lower region having an upwardly extending portion and a laterally inwardly extending arm, wherein said cross member assembly comprises:

35 a first end fitting, a second end fitting, and a medial portion extending rigidly between said end fittings;

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said first end fitting being attachable to the first side beam and said second end fitting being attachable to the second side beam;

said first end fitting having a body having a first end for attachment to the first side beam, and a second end located laterally inboard of the first end when the first end is attached to the first side beam, said second end being rigidly attached to said medial portion of said cross member assembly;

said first end of said first end fitting having a flange formed thereacross for mating connection with the upwardly extending portion of the side beam;

said body having a downwardly facing surface formed to locate above the laterally inwardly extending arm of the side beam;

said body having an upwardly facing surface upon which lading can bear; and

said flange having bolt holes defined therein to permit said flange to be bolted to said first side beam.

15

48. The cross member assembly of claim 47 wherein said upwardly facing surface lies in a plane, and said flange extends upwardly of said plane.

20

49. The cross member assembly of claim 47 wherein said flange is a first flange and a second flange is formed at said first end of said body for mating engagement with the laterally inwardly extending arm of the first side beam.

25

50. The cross member assembly of claim 49 further comprising a third flange formed at said first end of said body; said second flange and third flanges being formed on opposite sides of said body.

30

51. The cross member assembly of claim 50 wherein said second and third flanges have bores defined therein to permit said second and third flanges to be bolted to the second portion of the side beam.

52. The cross member assembly of claim 50 wherein said second and third flanges are tapered to merge with said body toward said second end thereof.

35

53. The cross member assembly of claim 50 wherein:
said second and third flanges meet said first flange at respective first and second

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corners;

said second and third flanges extend away from said first and second corners,
respectively; and

each of said second and third flanges merge with said body away from said first
and second corners.

54. The cross member assembly of claim 50 wherein said second and third flanges
extend along said body away from said first flange, and are each tapered to merge with
said body away from said first and second corners.

55. The cross member assembly of claim 50 wherein said second and third flanges
extend away from said first and second corners, respectively, and each merge on
respective smooth radii with said body away from said respective corners.

56. The cross-member assembly of claim 47 wherein said body has a wide portion
adjacent said first end, and a narrow portion adjacent said second end, and said wide
portion merges with said narrow portion.

57. The cross-member assembly of claim 56 wherein said wide region and said
narrow region merge at smooth radii.

58. The cross member assembly of claim 47 wherein said flange is a first flange,
said body has first and second sides bordering said flat surface, said first and second
sides extending away from said first flange toward said second end; and second and
third flanges extending from said first and second sides, respectively.

59. The cross member assembly of claim 58 wherein said second and third flanges
each have respective upwardly facing surfaces; and said upwardly facing surfaces of
said second and third flanges are stepped downward relative to said upwardly facing
surface of said body.

60. The cross-member assembly of claim 47 wherein said second end fitting is the
same as said first end fitting, and both said first end fitting and said second end fitting
are welded to said transverse beam member.

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61. A railroad freight car including a longitudinal well for carrying intermodal cargo containers, comprising:

a structural frame having side beams, end structures and a floor, said side beams being connected to said end structures at opposite ends of said side beams, each of said side beams having a top chord and a bottom chord and a web extending between said top chord and said bottom chord, said floor extending between said bottom chords of said side beams;

said floor including a plurality of load supporting transverse beam members spaced along said well at container support points, said load supporting transverse members extending between container support brackets mounted on said bottom chords of said side beams;

said bottom chords of said side beams being a first bottom chord and a second bottom chord respectively;

said first bottom chord having an upwardly extending arm, and a laterally inwardly extending arm extending toward said second bottom chord;

said second bottom chord having an upwardly extending arm and a laterally inwardly extending arm extending toward said first bottom chord;

a first of said container support brackets being mounted to said first bottom chord, a second of said container support brackets being mounted to said second bottom chord opposite to said first container support bracket;

one of said transverse beam members being a first transverse beam member rigidly mounted between said first and second container support brackets;

said first container support bracket having a first portion mounted against said upwardly extending arm of said first bottom chord, and a second portion mounted above said inwardly extending arm of said first bottom chord;

said second container support bracket having a first portion mounted against said upwardly extending arm of said second bottom chord, and a second portion mounted above said inwardly extending arm of said second bottom chord; and

said first portion of said first container support bracket is bolted to said upwardly extending arm of said first bottom chord, and said first portion of said second container support bracket is bolted to said upwardly extending arm of said second bottom chord.

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62. The railroad freight car of claim 61 wherein said first portion of said first container support bracket includes a first flange having bores defined therein to permit said first flange to be bolted to the upwardly extending arm of the bottom chord of the first side beam.

5

63. The railroad freight car of claim 62 wherein said first container support bracket has an upwardly facing surface for supporting a load placed in the well, said upwardly facing surface lies in a plane, and said first flange extends upwardly of said plane.

10

64. The railroad freight car of claim 63 wherein said first flange has four horizontal bores defined therein through which to fasten said first flange to the upwardly extending arm of the bottom chord of the first side beam.

15

65. The railroad freight car of claim 61 wherein said second portion of said first container support bracket includes a flange for mating engagement with the laterally inwardly extending arm of the bottom chord of the first side beam.

20

66. The railroad freight car of claim 61 wherein:
said first portion of said first container support bracket includes a first flange
having bores defined therein to permit said first flange to be bolted to the
upwardly extending arm of the bottom chord of the first side beam; and
said second portion of said first container support bracket includes a second
flange having a bore defined therein to permit said second flange to be
bolted to the laterally inwardly extending arm of the bottom chord of the
first side beam.

25

67. The railroad freight car of claim 66 wherein said second portion of said first container support bracket includes a third flange having a bore defined therein to permit said third flange to be bolted to said laterally inwardly extending arm of the bottom
chord of the first side beam.

30

68. The railroad freight car of claim 61 wherein:
said first portion of said first container support bracket includes a first flange,
said first flange having a first face for contacting the upwardly extending
arm of the bottom chord of the first side beam, said first face lying in a

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vertical plane and having bores defined therein to permit said first flange to be bolted to the upwardly extending arm of the bottom chord of the side beam; and

5 said second portion of said first container support bracket includes a second flange having a second face for mating engagement with the laterally inwardly extending arm of the bottom chord of said first side beam, said second face lying in a horizontal plane.

69. The railroad freight car of claim 68 wherein said bores defined in said first
10 flange have horizontal axes, and said horizontal axes of said bores are offset upwardly from said horizontal plane of said second face of said second flange.

70. The railroad freight car of claim 68 wherein said second flange has a bore defined therein to permit said second flange to be bolted to the laterally inwardly
15 extending arm of the bottom chord of said first side beam, said bore in said second flange has a vertical axis, and said vertical axis of said bore in said second flange is horizontally offset laterally inboard of the vertical plane of said first face of said first flange.

20 71. The railroad freight car of claim 68 wherein:
 said bores defined in said first flange have horizontal axes, and said horizontal axes of said bores are offset upwardly from said horizontal plane of said second face of said second flange; and
 said second flange has a bore defined therein to permit said second flange to be
25 bolted to the laterally inwardly extending arm of said first side beam, said bore in said second flange has a vertical axis, and said vertical axis of said bore in said second flange is horizontally offset laterally inboard of the vertical plane of said first face of said first flange.

30 72. The railroad freight car of claim 62 wherein said first flange has four horizontal bores formed therein through which to admit bolts to fasten said first flange to said upwardly extending arm of the bottom chord of said first side beam, and said second and third flanges each have a vertical bore formed therein through which to admit bolts to fasten said second and third flanges to said inwardly extending arm of said side
35 beam.

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73. The railroad freight car of claim 61 wherein:
said first portion is a vertically extending flange formed across a first end of said
first container support bracket, and said second portion of said first
5 container support bracket is a horizontally extending portion of said first
container support bracket extending from said first end toward a second
end of said first container support bracket, said second end of said first
container support bracket lying laterally inboard of said first end of said
first container support bracket; and
10 said horizontally extending portion of said first container support bracket
includes a wide region and a narrow region, said wide region lying
adjacent to said first end of said bracket, and said narrow region lying
adjacent to said second end of said first bracket.
- 15 74. The railroad freight car of claim 73 wherein said first transverse beam member
has a length between said first and second container support brackets, and a width
perpendicular to said length, and said wide region of said first container support bracket
is wider than said first transverse beam member.
- 20 75. The railroad freight car of claim 73 wherein said wide region of said
horizontally extending portion of said bracket includes a second flange, and said second
flange meets said first flange at a corner.
- 25 76. The railroad freight car of claim 73 wherein said wide region of said
horizontally extending portion of said first container support bracket is the same width
as said flange.
- 30 77. The railroad freight car of claim 73 wherein said wide region merges with said
narrow region away from said first flange.
78. The railroad freight car of claim 73 wherein said wide region is tapered to merge
with said narrow region toward said second end of said bracket.
- 35 79. The railroad freight car of claim 73 wherein said wide region extends away from
said first flange and merges on smoothly curved corners with said narrow region.

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80. The railroad freight car of claim 61 wherein:
 said first portion of said first container support bracket includes a first flange,
 said first flange being a vertically extending flange formed across a first
 5 end of the first container support bracket, and said second portion of said
 first container support bracket includes a horizontally extending portion
 extending from said first end toward a second end of said bracket, said
 second end of said bracket lying laterally inboard of said first end of said
 bracket;
- 10 said horizontally extending portion of said first container support bracket
 includes a wide region and a narrow region, said wide region lying
 adjacent to said first end of said first container support bracket, and said
 narrow region lying adjacent to said second end of said first container
 support bracket;
- 15 said horizontally extending portion has an upwardly facing surface, said
 upwardly facing surface having a length measured laterally inboard from
 said first flange to said second end, and a width measured in a width
 direction perpendicular to said length as wide as the narrow region; and
 said horizontally extending portion includes a second flange and a third flange,
 20 said second and third flanges extending in said width direction to
 opposite sides of said surface, said second and third flanges being
 located above the laterally inwardly extending arm of the bottom chord
 of said first side beam.
- 25 81. The railroad freight car of claim 80 wherein:
 said second flange meets said first flange at a first corner; and
 said third flange meets said first flange at a second corner.
82. The railroad freight car of claim 80 wherein said second and third flanges each
 30 have a face contacting said laterally inwardly extending arm of the bottom chord of said
 first side beam, and said respective faces are co-planar.
83. The railroad freight car of claim 80 wherein:
 said second flange meets said first flange at a first corner;
 35 said third flange meets said first flange at a second corner; and

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said second and third flanges extend away from said first and second corners respectively and toward said second end of said bracket.

5 84. The railroad freight car of claim 83 wherein said second and third flanges merge with said narrow region away from said first and second corners.

85. The railroad freight car of claim 83 wherein said second and third flanges are tapered to merge with said narrow region toward said second end of said bracket.

10 86. The railroad freight car of claim 83 wherein said second and third flanges extend away from said first and second corners, respectively, and merge on respective smooth radii with said narrow region away from said respective corners.

15 87. The railroad freight car of claim 80 wherein said upwardly facing surface is horizontal and said second and third flanges lie at a level lower than said upwardly facing surface.

20 88. The railroad freight car of claim 80 wherein said first portion has a first vertical thickness abreast of said second and third flanges, and said second and third flanges have a second vertical thickness that is less than the first vertical thickness.

25 89. The railroad freight car of claim 80 wherein:
said second flange intersects with said first flange at a first radiused corner;
said third flange intersects with the first flange at a second radiused corner; and
said second and third flanges extend away from said first and second radius corners, respectively, and each flange merges with said second portion at a smoothly radiused transition located away from said first and second radiused corners.

30 90. The railroad freight car of claim 73 wherein said first container support bracket has a protruding portion formed at said second end thereof, said protruding portion being mated with an end of the transverse beam member.

35 91. The railroad freight car of claim 90 wherein said protruding portion is hollow.

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92. The railroad freight car of claim 90 wherein said protruding portion has a shoulder, and meets said transverse beam member at said shoulder.

5 93. The railroad freight car of claim 92 wherein said shoulder has a horizontal portion adjacent to said narrow region, and vertical portions to either side of said horizontal portion.

94. The railroad freight car of claim 61 wherein said first and second container support brackets are welded to said transverse beam member.

10

95. The railroad freight car of claim 61 wherein a container support cone is mounted to said first container support bracket.

15 96. The railroad freight car of claim 73 wherein said horizontally extending portion of said first container support bracket has a flat upwardly facing surface, and a container cone is mounted to said flat surface.

20 97. The railroad freight car of claim 73 wherein said horizontally extending portion of said bracket has a flat upwardly facing surface, and a container guide is mounted to said flat surface of said horizontal portion of said bracket.

25 98. The railroad freight car of claim 73 wherein said horizontally extending portion of said bracket has a flat upwardly facing surface, and a container cone and a container guide are mounted to said flat surface of said horizontal portion of said first bracket.

99. The railroad freight car of claim 61 wherein said first container support bracket is a casting.

30 100. The railroad freight car of claim 61 wherein said second container support bracket is the same as said first end fitting.

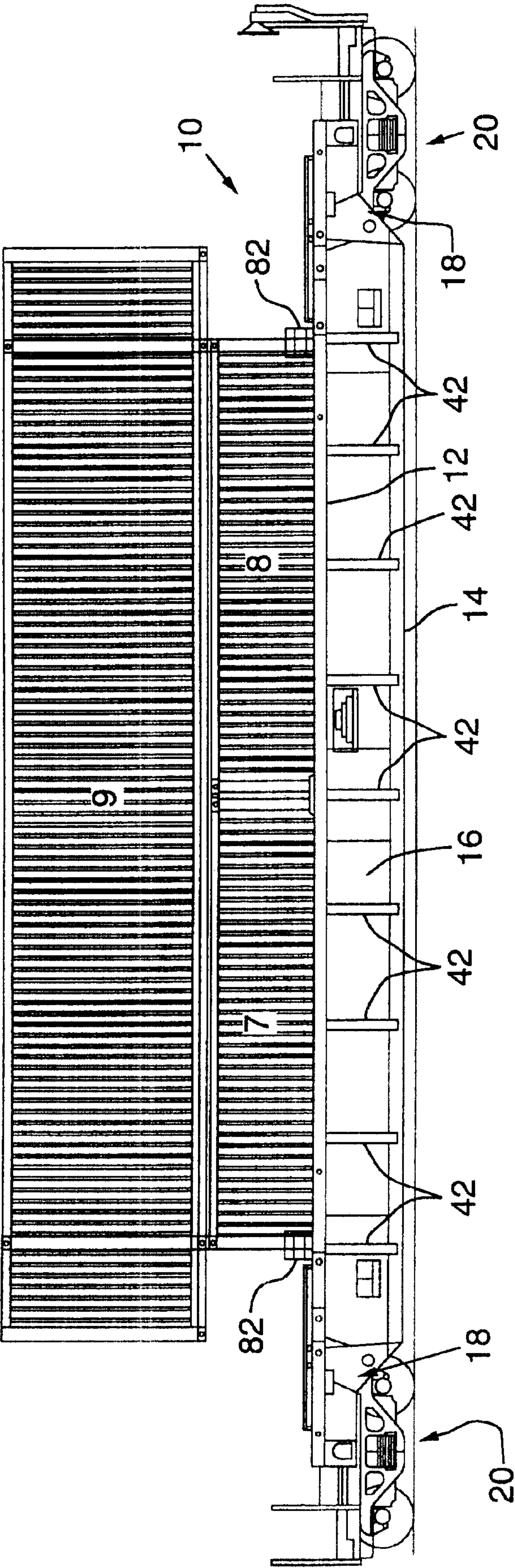


FIG.1.

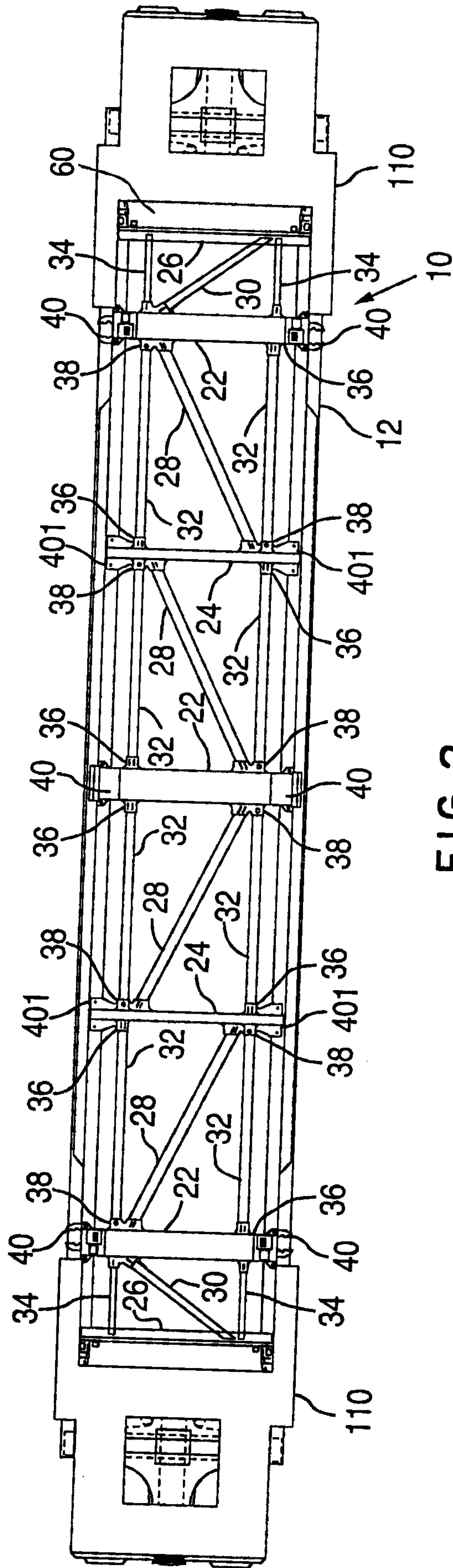


FIG. 2.

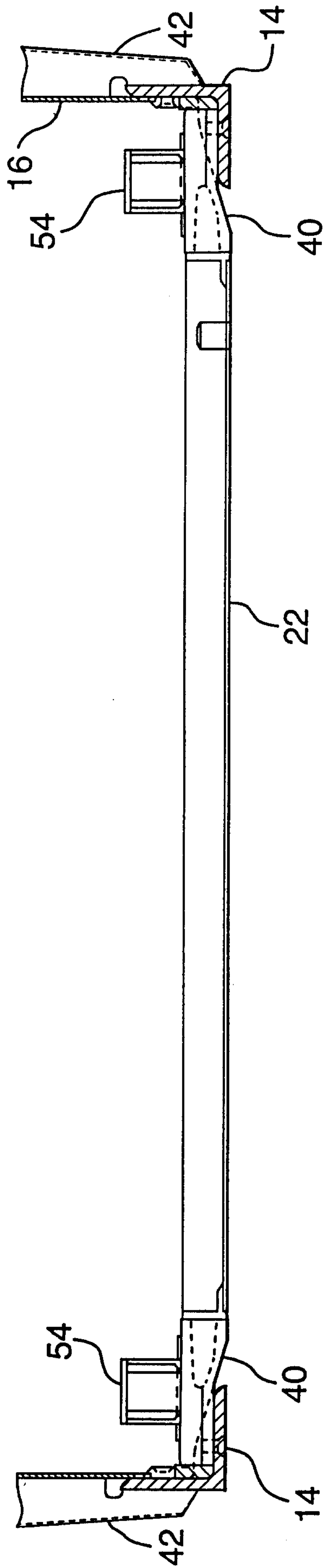


FIG. 3.

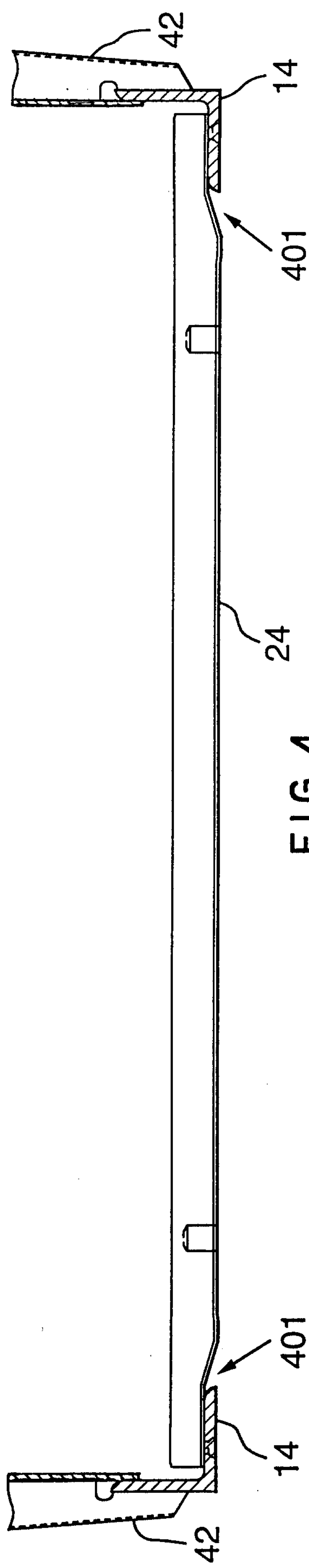
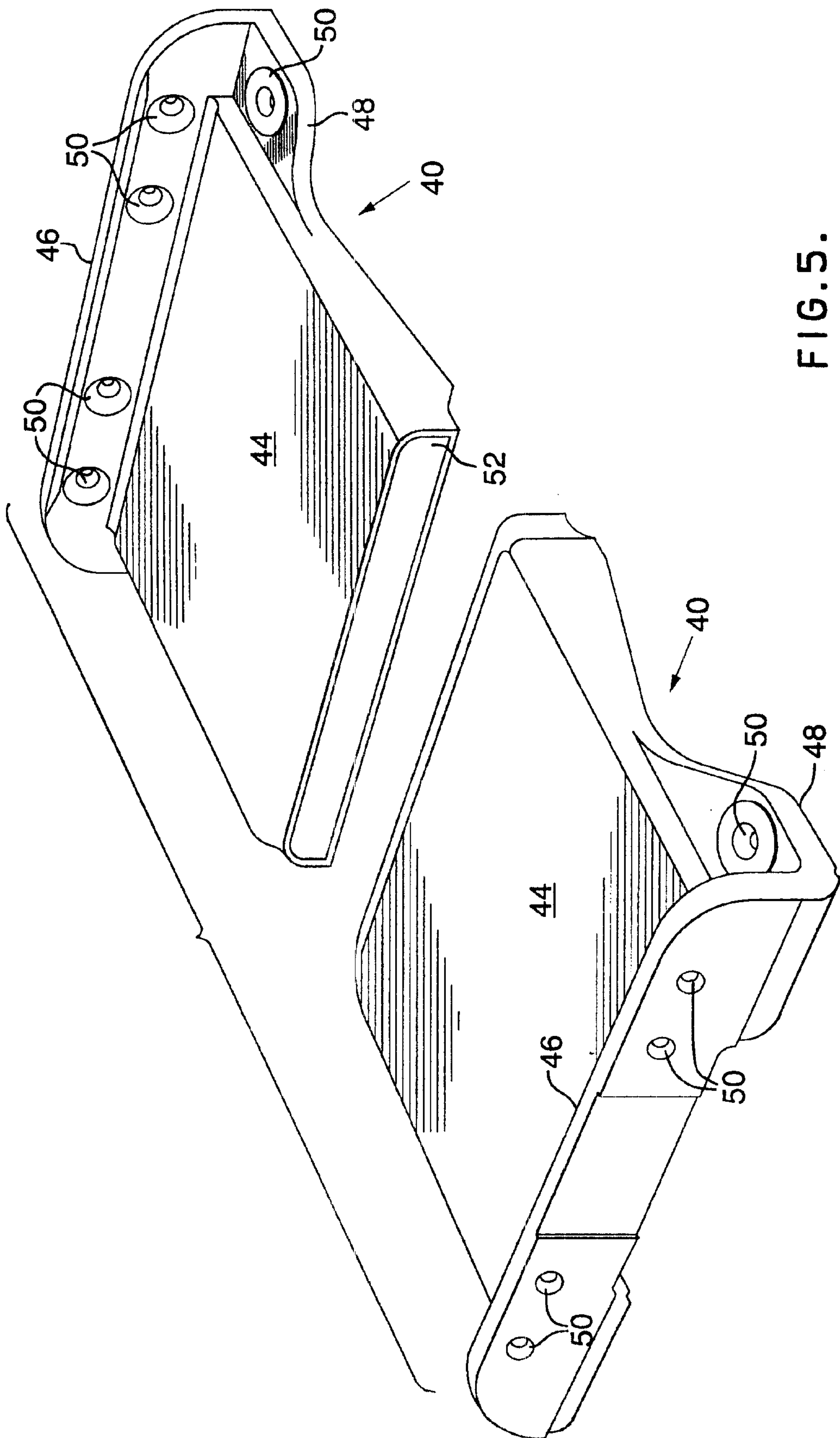


FIG. 4.



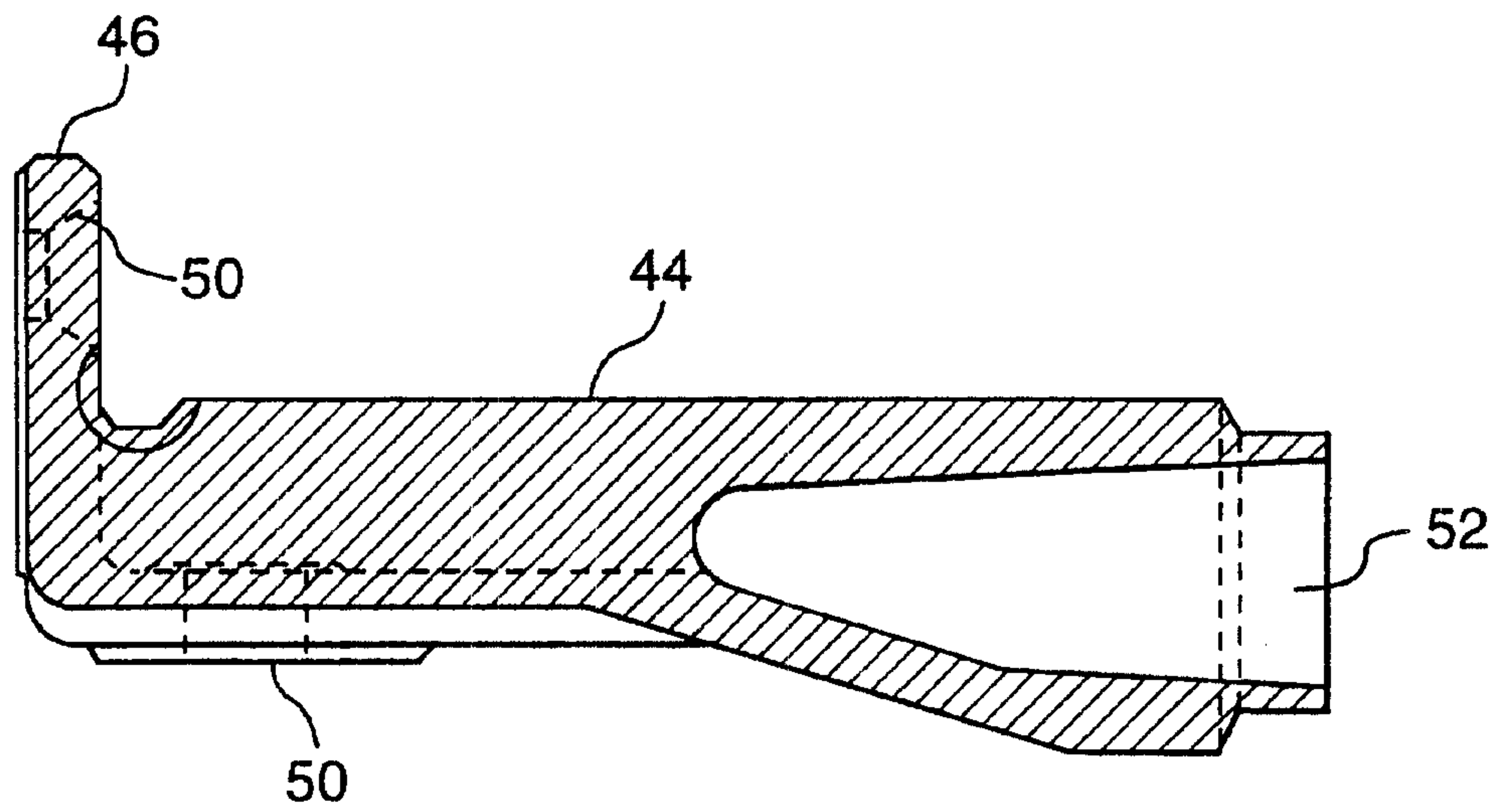


FIG. 6.

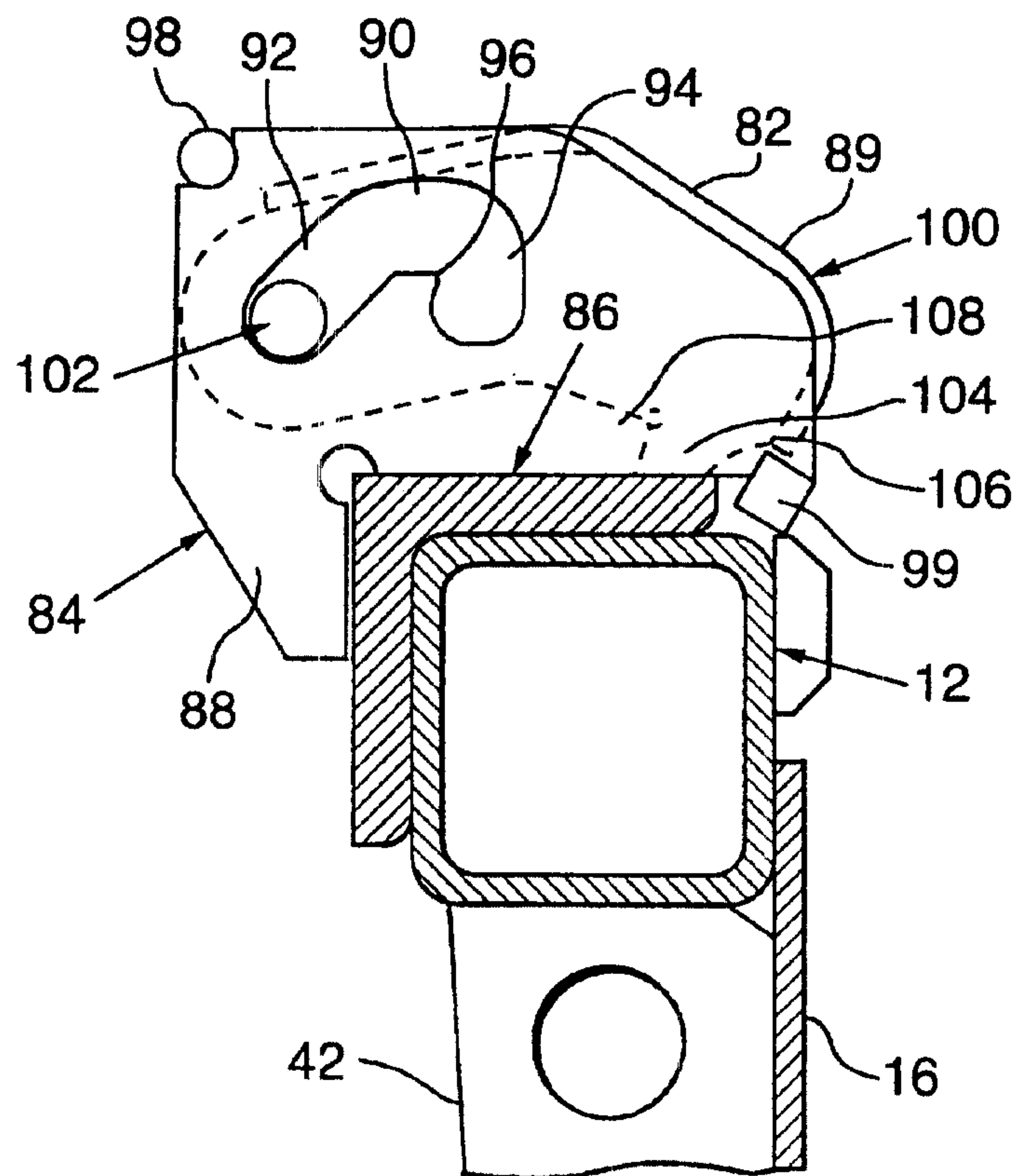


FIG. 7.

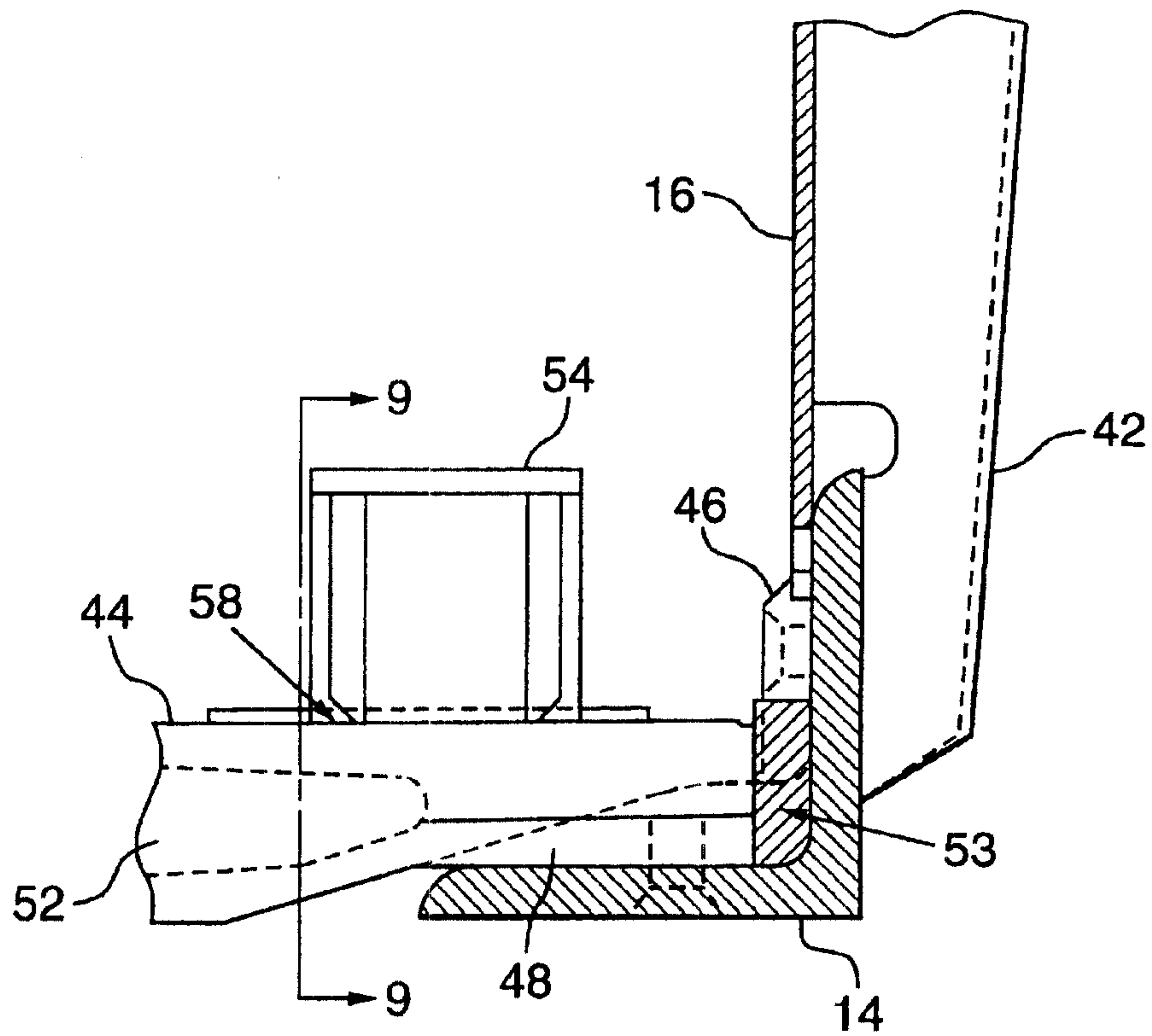


FIG.8.

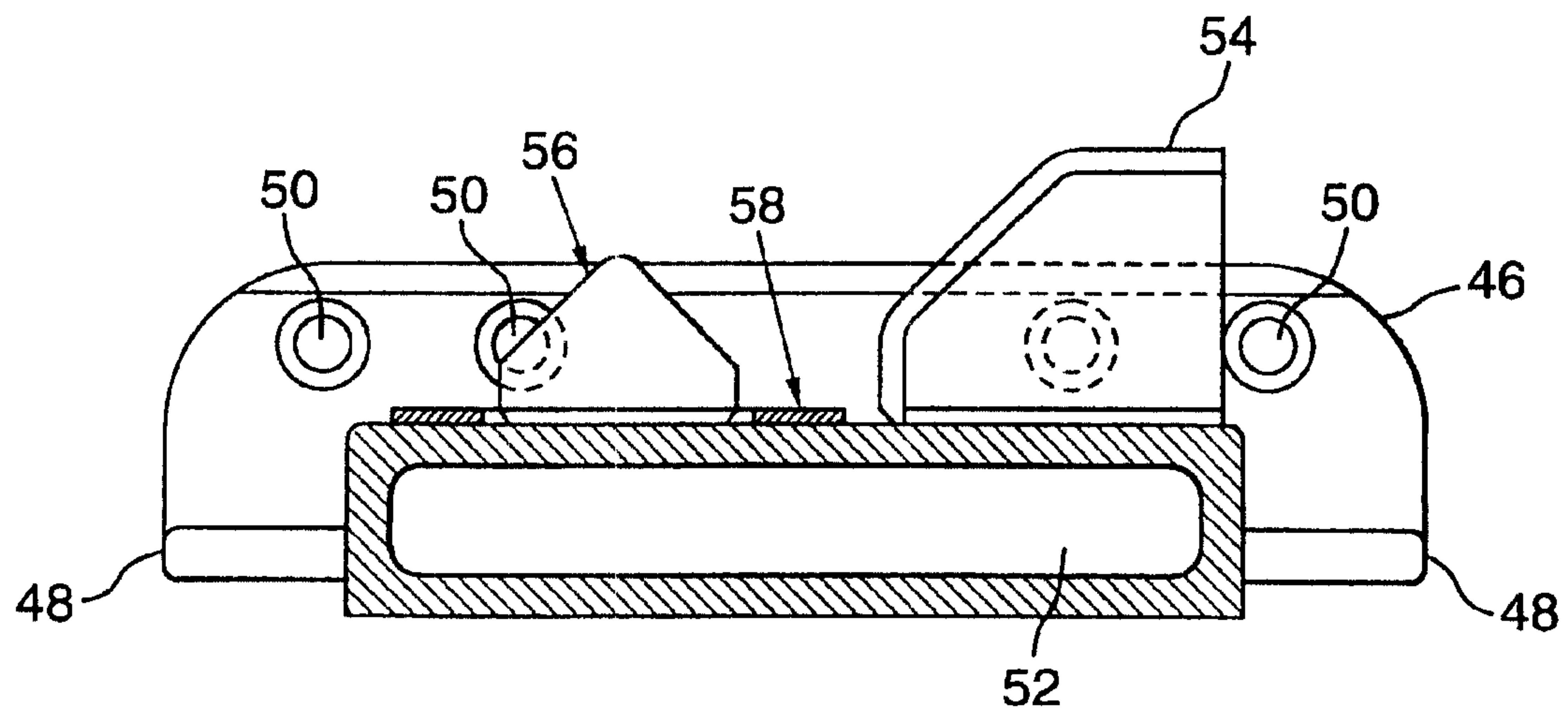


FIG.9.

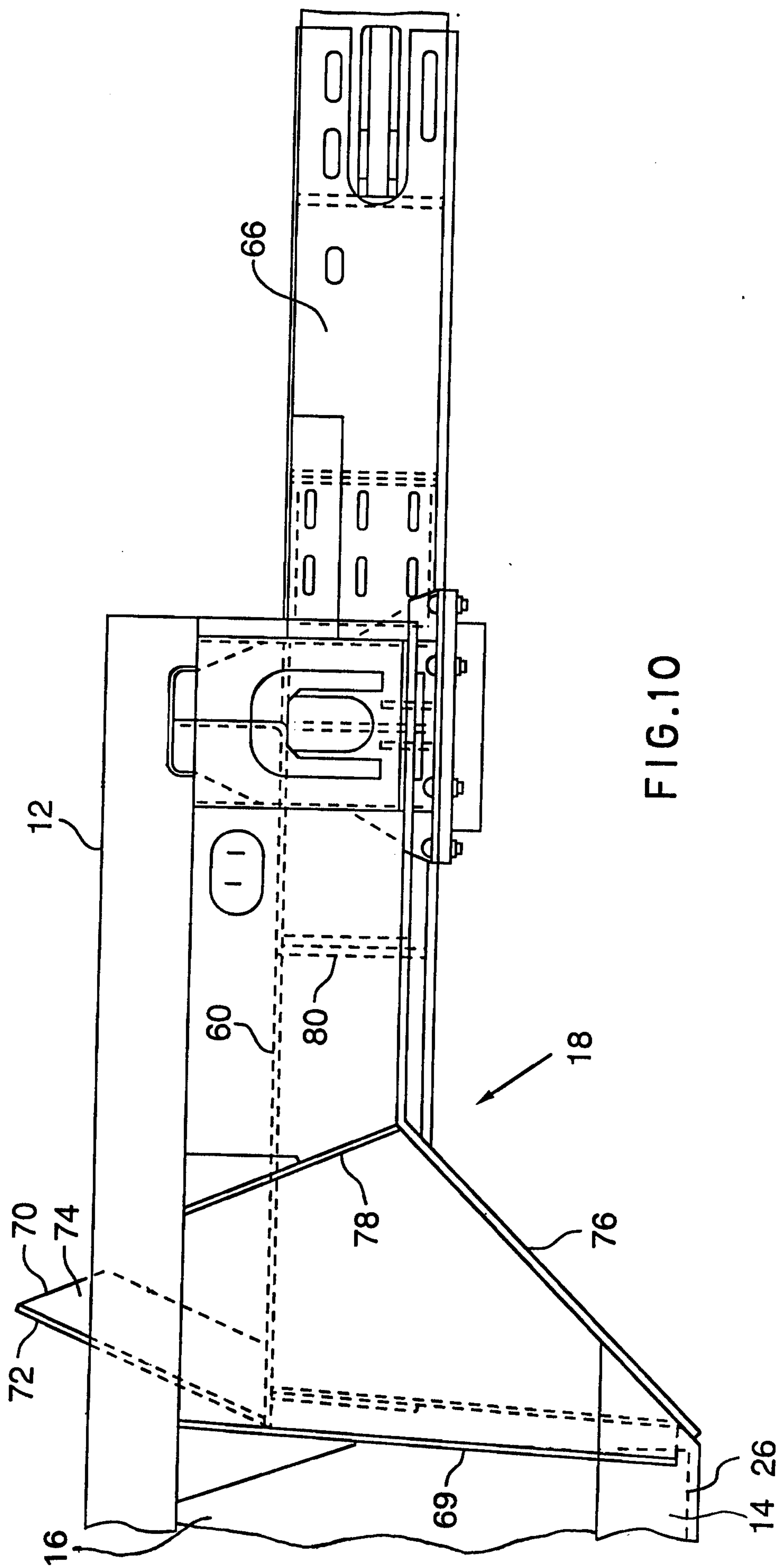


FIG.10

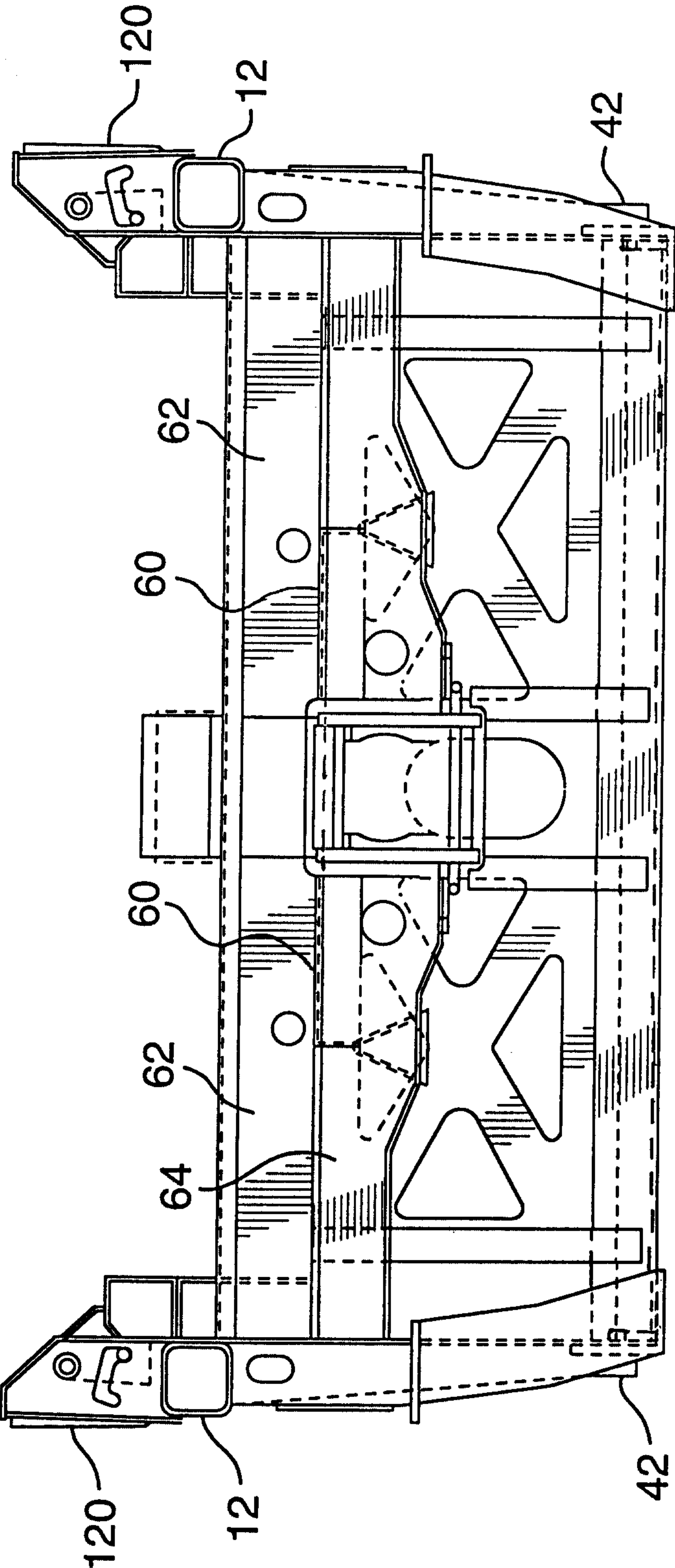


FIG.11.

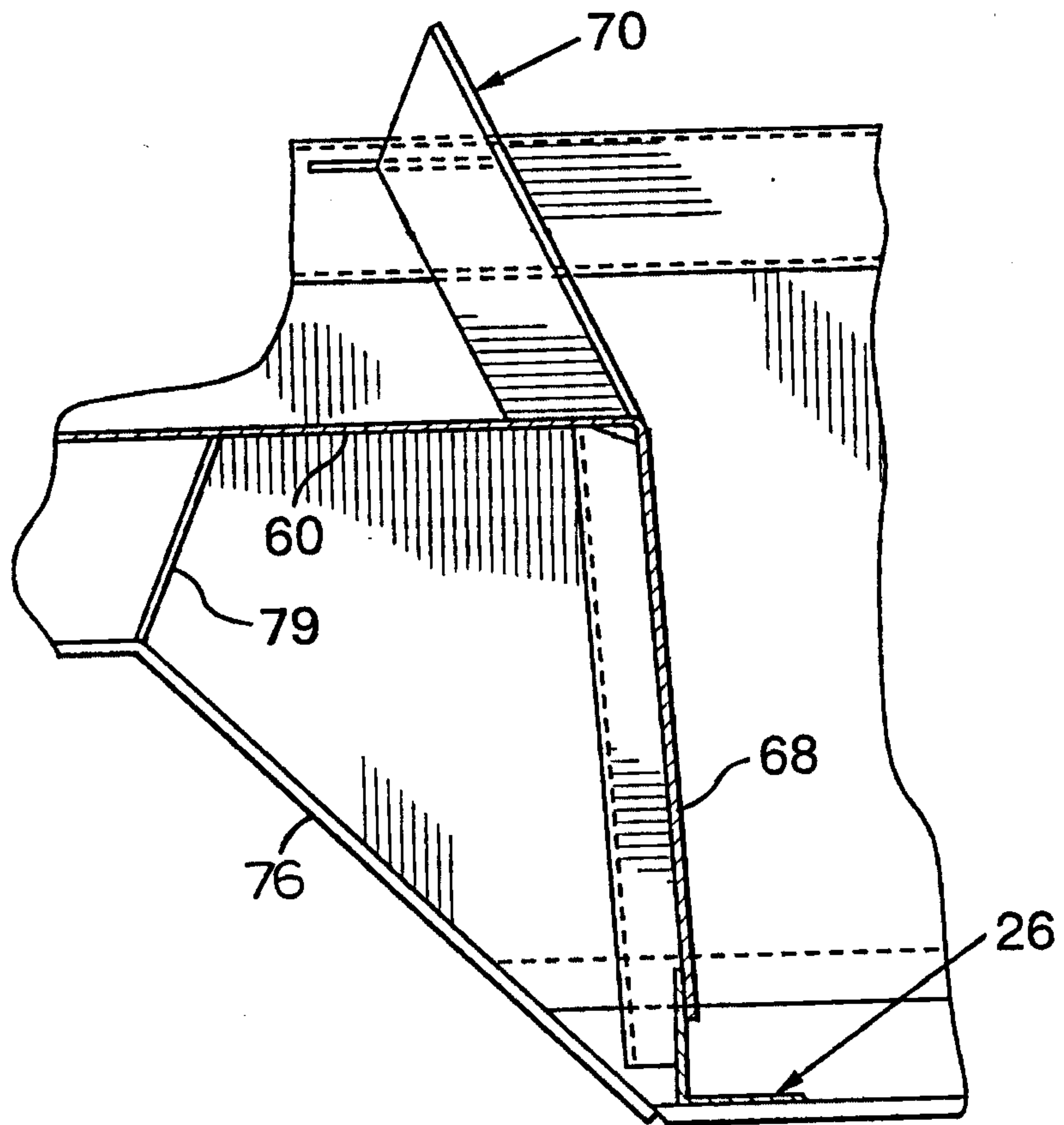


FIG. 12.

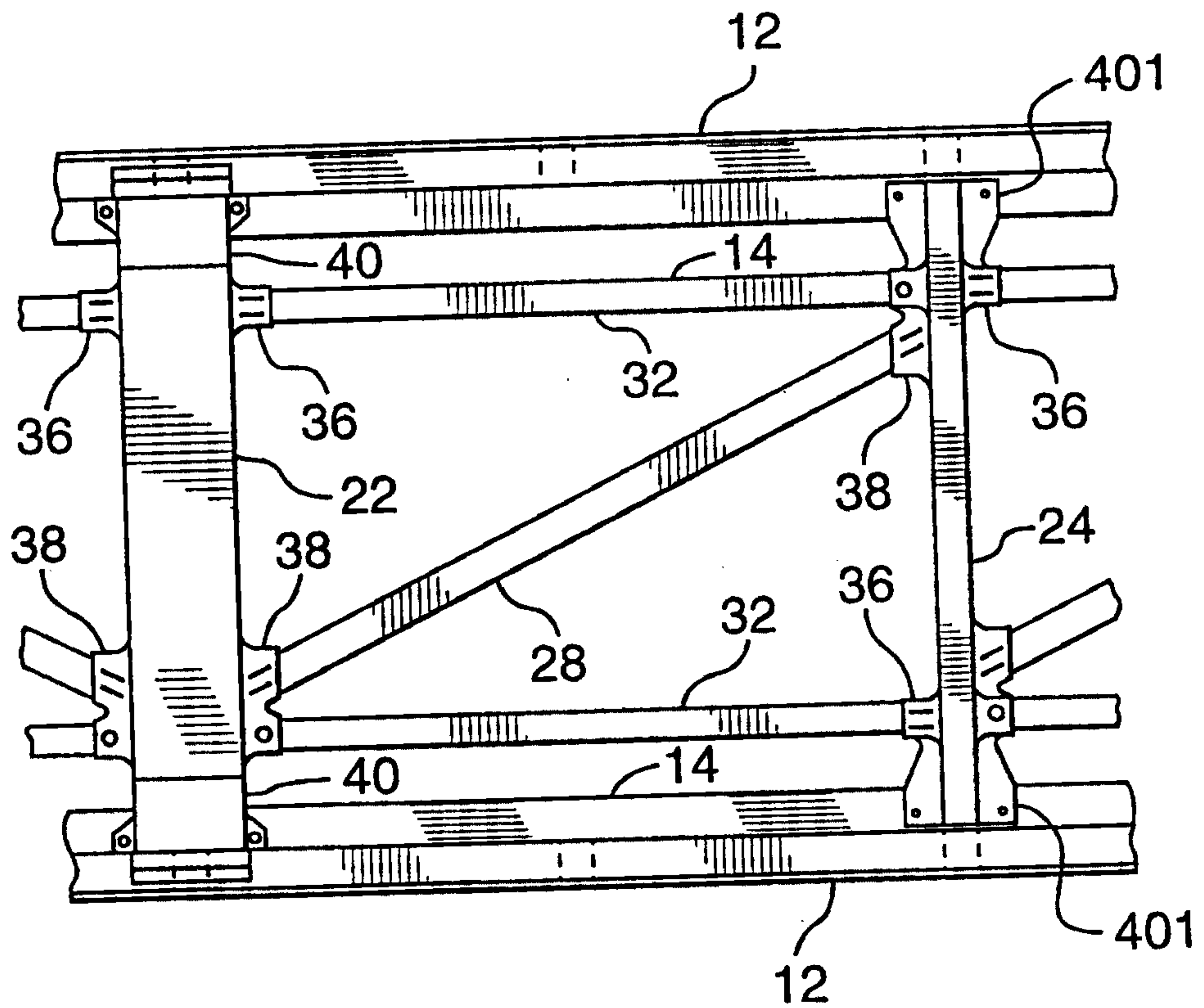


FIG. 13.

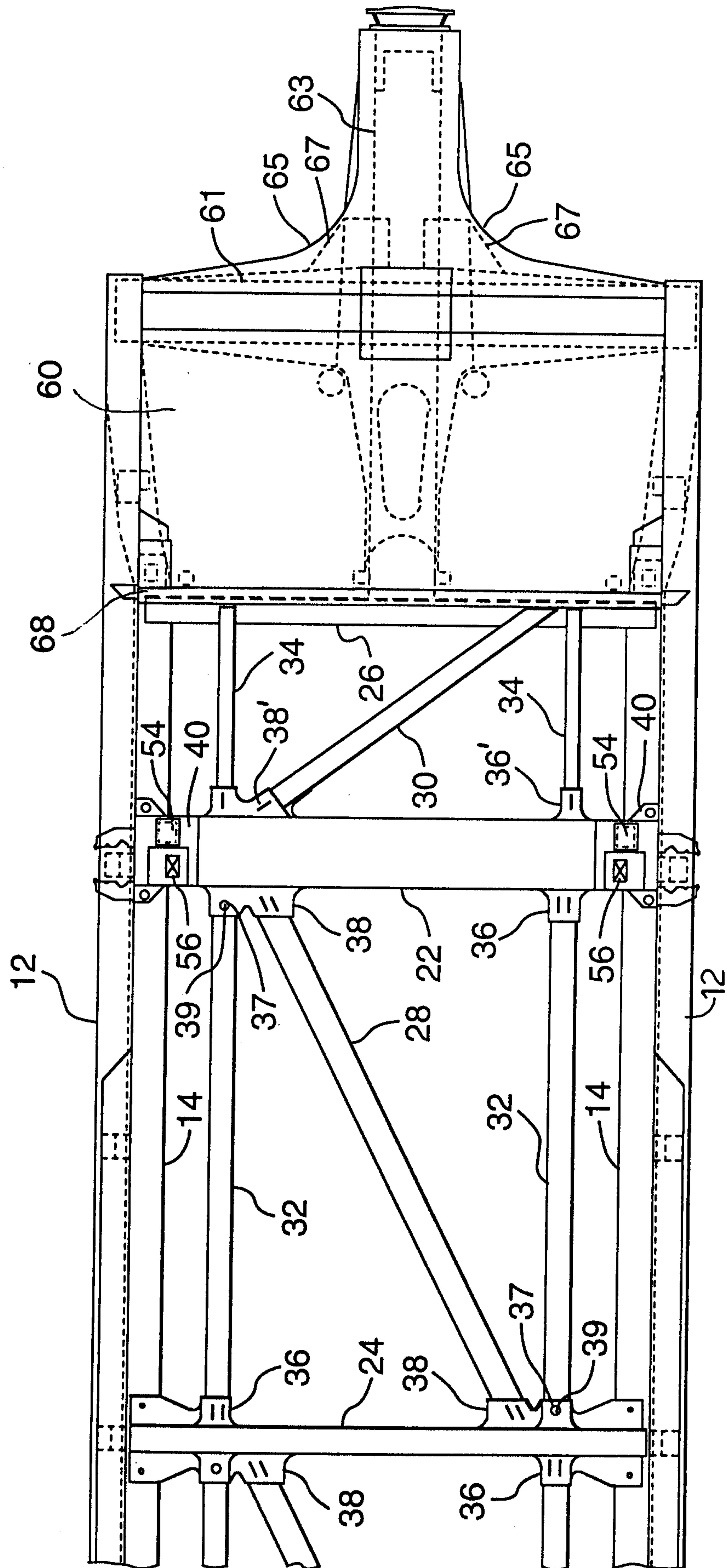


FIG.14.

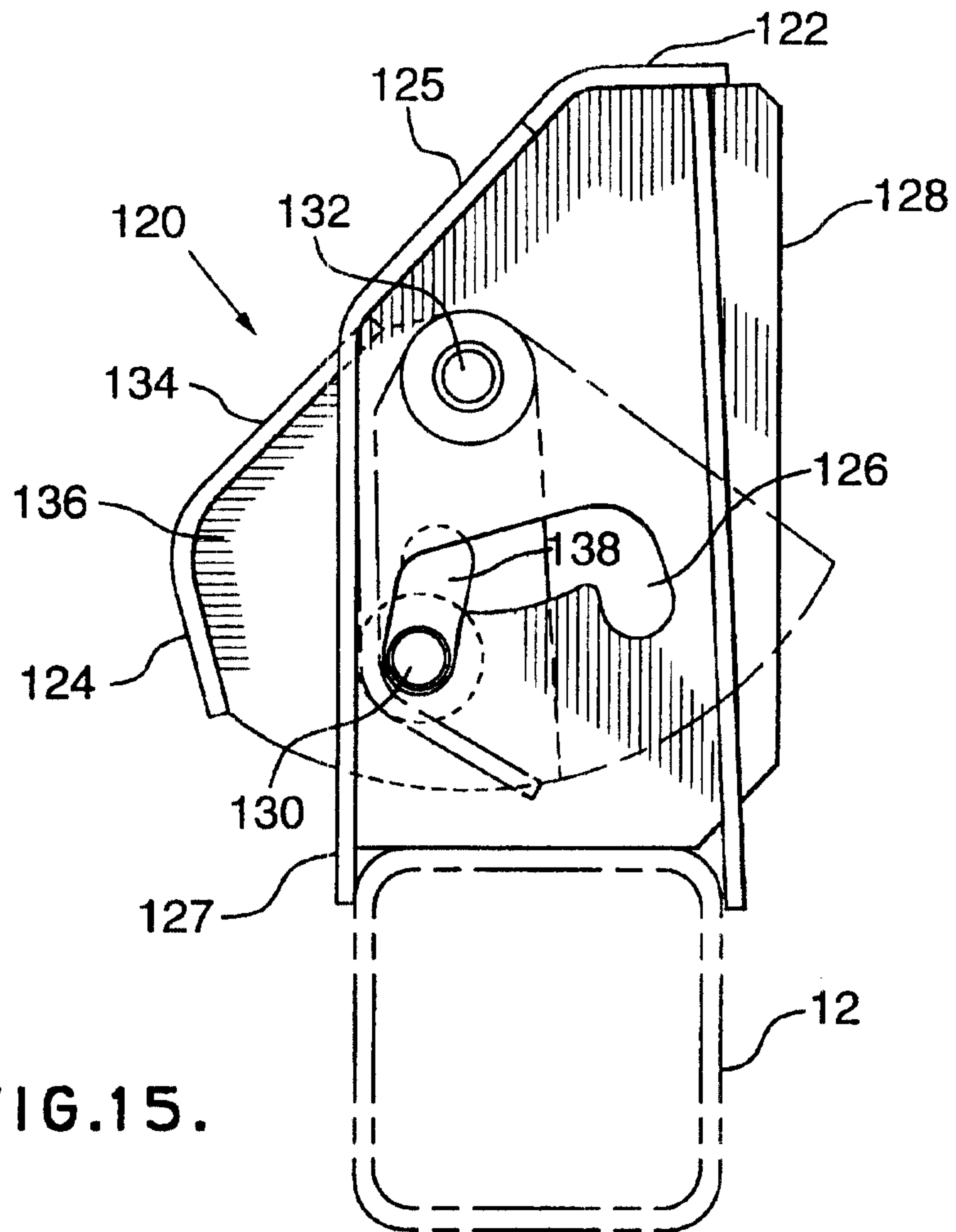


FIG. 15.

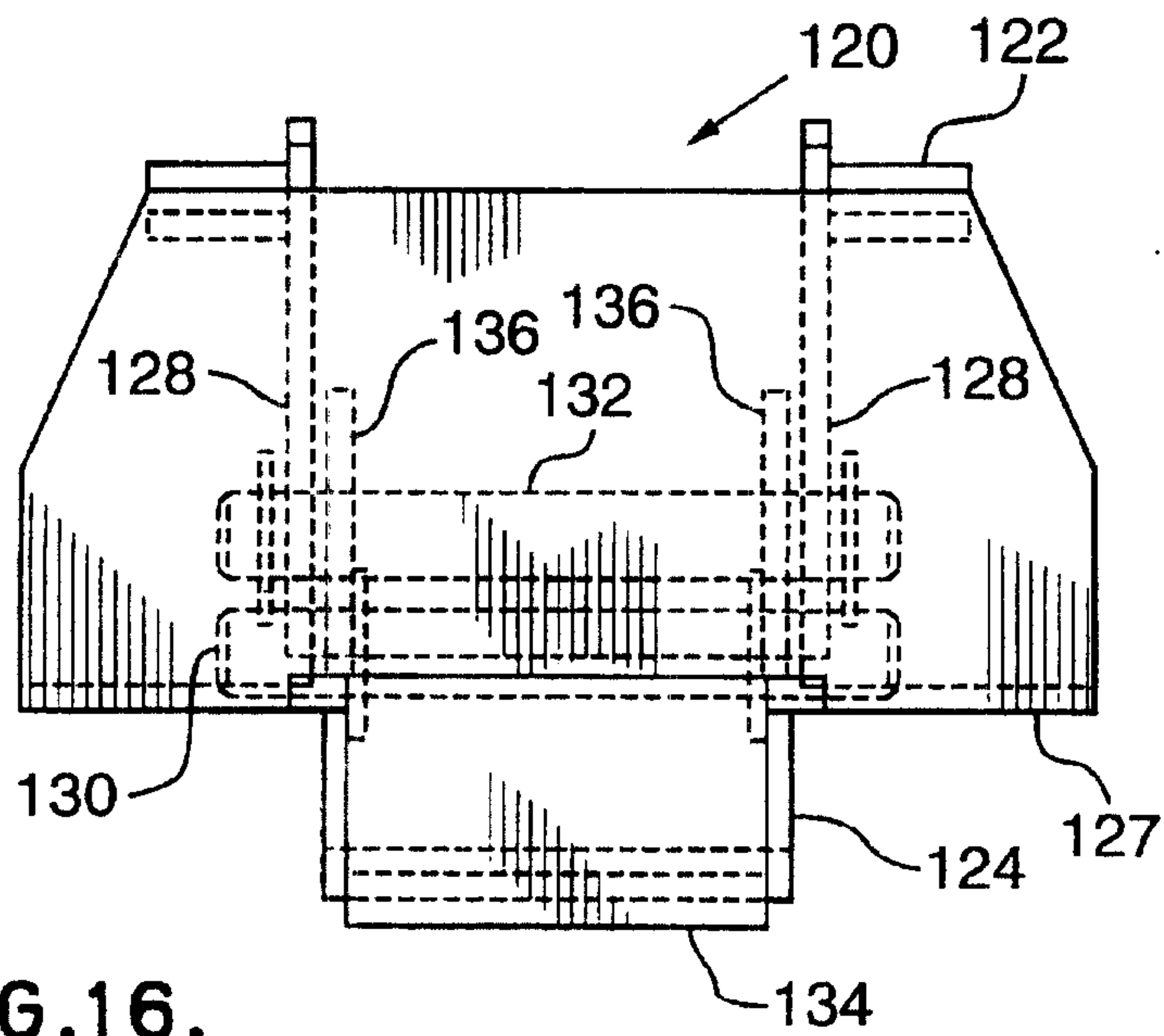


FIG. 16.

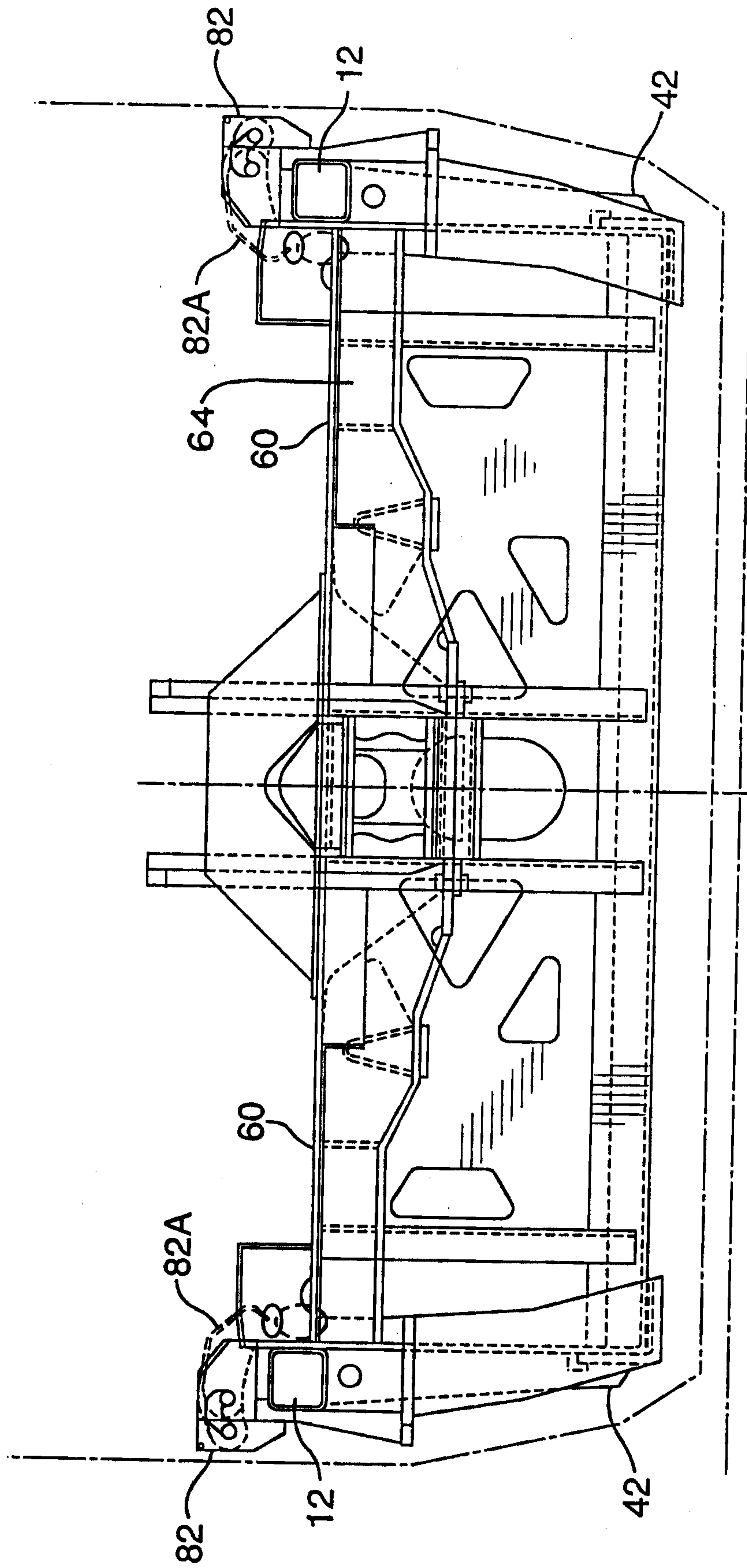


FIG.17.

