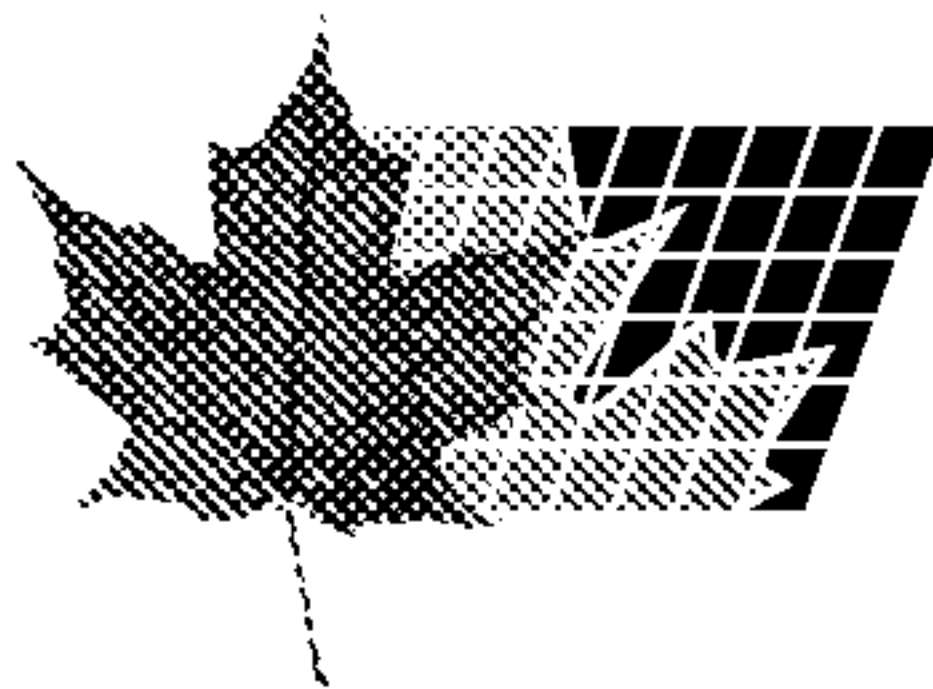




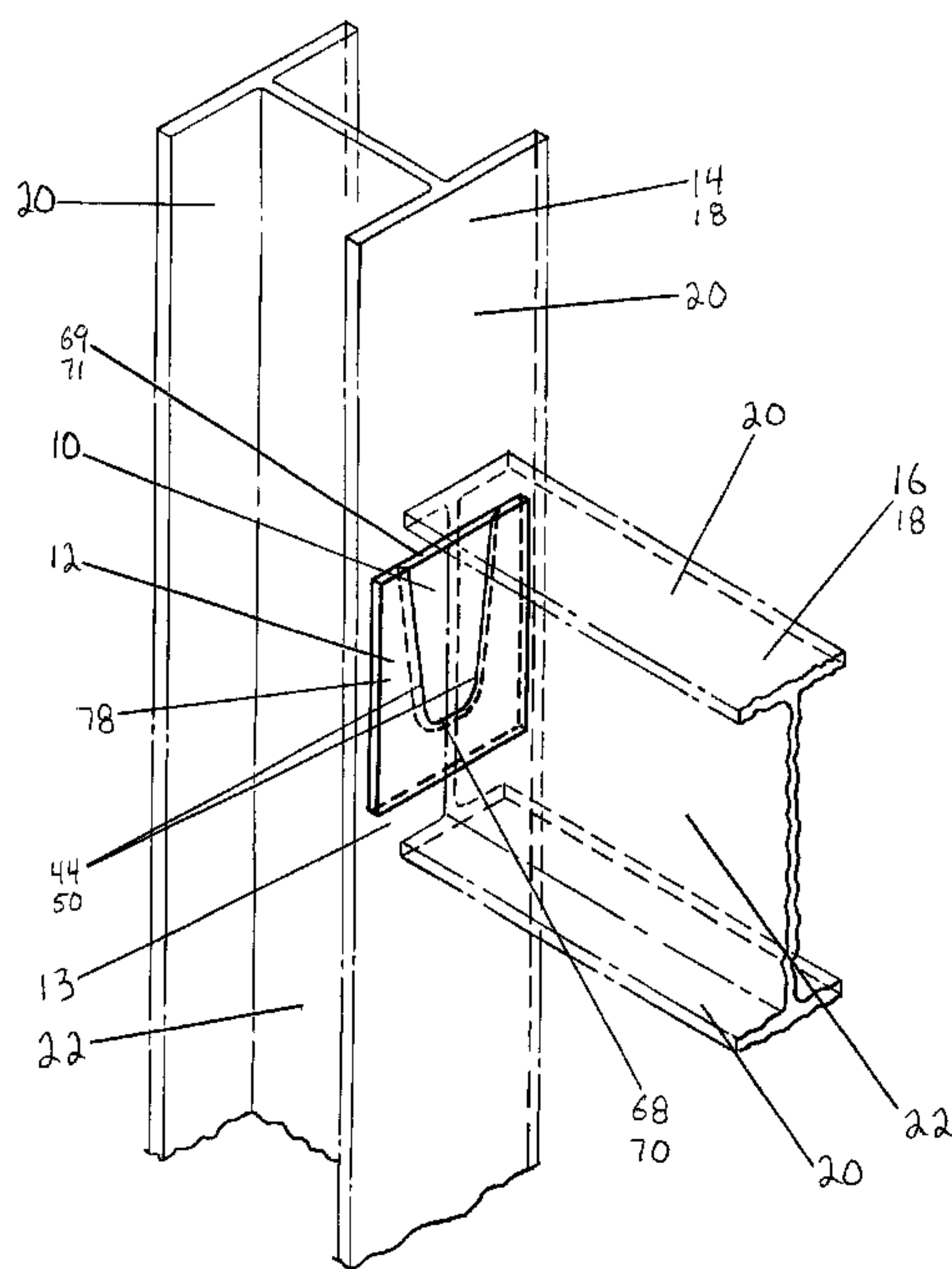
(72) NORTH, GEORGE, CA

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(51) Int.Cl.⁷ E04C 3/00, E04B 1/38

(54) **CONNECTEUR D'ELEMENT DE STRUCTURE**

(54) **STRUCTURAL MEMBER CONNECTOR**



FIELD OF THE INVENTION

The present invention relates to the interconnection of structural members such as beams and columns.

Many structures are built with skeletons of steel or some other suitable material such as concrete. When fabricating such a structure of beams and columns, the beams must be attached to the columns or to other beams. In the construction of steel structures, the structural members were formerly rivetted together but now they are usually bolted or welded. These procedures are labourious because the beams must be held in precise alignment while the welds are made, or the bolts are inserted and the nuts are tightened.

Means have been developed for connecting structural members which do not require either bolting or welding. One approach involves pairs of joint planar faces having studs and slots which interlock so as to hold the joint faces together. This approach eliminates the need for bolts or welding in many applications. However, in its usual form, it does not overcome the necessity, during installation, of precisely aligning the structural members, which have to be positioned so that the respective studs and slots are aligned vertically, and the two planar faces are parallel and touching. In one approach, the studs and slots are similarly tapered to have a trapezoidal cross-section. This means that it is not necessary, during installation, to have the studs and slots precisely aligned vertically, but it is still necessary to have the planar faces parallel and touching.

Another approach to connecting structural members which does not require either bolting or welding involves two mating pieces wherein one piece is a metal tang attached to and protruding above a metal plate and the second piece is comprised of two guides parallel to each other and attached perpendicularly to a second metal plate, such that when the pieces mate the protruding portion of the metal tang is positioned between the two guides and the bottom edge of the second plate rests on the top edge of the first plate. The protruding portion of the metal tang is tapered in one direction so the structural members are drawn towards the member it is being attached to as it is lowered into place, which means that the two pieces do not have to be precisely vertically aligned as they are mated. However, the two pieces do have to be aligned from side to side in order for the metal tang to properly engage the two guides.

Both of these approaches to connecting structural members involve a labourious positioning of the structural members; and protrusions (studs or metal tangs) which may be easily bent or otherwise damaged during handling of the structural member. These approaches to connecting structural members do not provide any resistance to uplifting of the vertically supported structural member.

Therefore there is a need in the art for a way of connecting structural members which: does not require bolting or welding; does not require precise alignment of the structural members during installation; does not have protrusions which can be easily bent; and resists uplift.

SUMMARY OF THE INVENTION

In one aspect of the invention and in general terms the invention comprises a structural member connector comprising:

- (a) a shear plate having two shear plate edges and one of said shear plate edges having a bevel; and

- (b) a receptor plate having a notch having two notch sides, said notch sides being aligned in a substantially similar manner as said shear plate edges and one of said notch sides having a bevel so as to correspond to the bevel on the shear plate edge which has a bevel;

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wherein the shear plate and the receptor plate may be mated.

The shear plate edges may not be parallel. The structural member connector may also have bevels on both the shear plate edges and both the notch sides.

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The structural member connector may also have a means for preventing disengagement of the shear plate and the receptor plate, being:

- (a) a beak on the shear plate;

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- (b) an adhesive on the mating surfaces of the shear plate and receptor plate;

- (c) a skid resistant coating applied to the shear plate;

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- (d) a wedging means comprising:

- (i) a tapered recess on that surface of the shear plate which is closest to the structural member to which the receptor plate is fixed; and

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- (ii) a floating body positioned in said tapered recess; and

- (e) a pinning means comprising:

- (i) a channel suitable for receiving a pin in the receptor plate;

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(ii) a channel suitable for receiving a pin in the shear plate, which is aligned with said channel in the receptor plate when the receptor plate and shear plate are properly mated; and

5 (iii) a retaining pin;

wherein said retaining pin may be positioned in the channel in the mated receptor plate and shear plate so as to inhibit said mated shear plate and receptor plate from disengaging.

10 The pinning means may also have a means for holding said retaining pin in said channel comprising:

(a) two tangs attached to one end of said pin; and

15 (b) a tapered spike at the inner end of said channel;

wherein, when the retaining pin is driven into said channel, said spike will be positioned between said tangs and if suitable force is applied to the retaining pin, said tangs will spread.

20 The shear plate edges and the notch sides may be curved. The receptor plate notch and the shear plate may each have a side which is stepped. The stepped sides may be a shear plate edge and a notch side.

25 BRIEF DESCRIPTION OF THE DRAWINGS

The invention will now be described by way of an exemplary embodiment with reference to the accompanying simplified, diagrammatic, not-to-scale drawings.

Figure 1 shows a receptor plate and a shear plate.

Figure 2 shows the receptor plate attached to a column and the shear plate attached to a beam, with the receptor plate and shear plate mated.

5

Figure 3 shows the receptor plate attached to a square tubing beam and the shear plate attached to a square tubing column, with the receptor plate and shear plate mated.

10 Figure 4 is a top view of the receptor plate attached to a square tubing column and the shear plate attached to a channel beam, with the receptor plate and shear plate mated.

Figure 5 is a sectional elevation view of the same assembly as is shown in Figure 4.

15 Figure 6 is a top view of four beams attached with receptor and shear plates to a column.

Figure 7 is a sectional elevation view of a concrete column to which a receptor plate is attached and a concrete beam to which a shear plate is attached.

20 Figure 8 is an elevation view of a mated receptor plate and shear plate showing welds spanning the mating joint.

Figure 9 is a sectional elevation view of the shear plate and the receptor plate backing showing a beak on the shear plate.

25 Figure 10 is a sectional elevation view of the shear plate and the receptor plate backing showing a tapered recess in the shear plate and a floating body.

Figure 11 is a sectional elevation view of the shear plate, receptor plate and the receptor plate backing showing a bolt passing through the shear plate and the receptor plate backing.

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Figure 12 shows a shear plate with a curved shear plate small end having a bevel on the shear plate small end.

Figure 13 shows a shear plate with a curved shear plate small end without a bevel on the shear plate small end.

Figure 13A shows a shear plate with a straight shear plate small end without a bevel on the shear plate small end.

Figure 14 is a sectional elevation view of two flanged beams attached so as to form a T showing the shear plate attached to the end of the center web of one beam and the receptor plate positioned outside of the flange edges on the other beam.

Figure 15 is an elevation view of two flanged beams attached so as to form a T showing the receptor plate attached to a supporting member substantially perpendicular to the beam which can be thought of as forming the top of the T and the shear plate attached to the side of the center web of the other beam.

Figure 16 is a sectional top view of the same assembly shown in Figure 15.

Figure 17 is an elevation view of two flanged beams showing three receptor plates attached to a plate attached to and substantially perpendicular to the positioned beam and three shear plates attached to the side of the center web of the incoming beam.

Figure 17A is a sectional elevation view of two flanged beams showing three receptor plates attached to the center web of the positioned beam and three shear plates attached to the end of the center web of the incoming beam.

Figure 18 is a top view of a pipe column and a beam with a center web showing a curved receptor plate and shear plate.

Figure 19 is an elevation view of two flanged beams attached so as to form a T showing a side-entry receptor plate.

Figure 20 shows a stepped shear plate.

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Figure 21 shows retaining pin channels in the receptor plate and shear plate.

Figure 21A is a sectional view of a shear plate showing a trapezoidal pin channel.

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Figure 22 shows a retaining pin with two tangs

Figure 23 shows a modified retaining pin channel for use with short retaining pins in confined locations.

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Figure 24 is a sectional elevation view of a column to column connection.

Figure 25 shows spiral shaped shear plate - receptor plate combination.

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Figure 25A shows a spiral shaped shear plate - receptor plate combination modified for side entry.

Figure 26 is a sectional view of a shear plate with a flat bevel.

Figure 27 is a sectional view of a shear plate with a steep bevel.

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Figure 28 shows a stepped, side-entry receptor plate - shear plate pair.

DETAILED DESCRIPTION OF THE DRAWINGS

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The invention according to the Figures comprises a shear plate (10) and a receptor plate (12) which are used to connect structural members, including: column (14) to column (14); beam (16) to column (14); beam (16) to beam (16); truss to column (14); truss to truss; girt to truss; purlin to column (14); and other suitable structural members.

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The shear plate (10) is a plate having two edges, the shear plate edges (44). In an embodiment illustrated in Figure 1, the shear plate edges (44) are not parallel. Thus the shear plate (10) may be wider at the shear plate big end (69) than it is at the shear plate small end (68). At least one of the shear plate edges (44) has a bevel (46). In the illustrated embodiment, both of the shear plate edges (44) have a bevel (46).

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The receptor plate (12) is a plate having a receptor plate notch (48). In an embodiment illustrated in Figure 1, the two sides of the receptor plate notch (48), the receptor plate notch sides (50), are not parallel, such that the receptor plate notch opening (71) is wider than the receptor plate notch end (70). At least one of the receptor plate notch sides (50) has a bevel (46). As shown in Figure 2, in use, the shear plate (10) and the receptor plate (12) mate. Therefore, in any particular embodiment, the receptor plate notch sides (50), the receptor plate notch end (70) and the bevel (46) on the receptor plate notch (48), are configured so that the receptor plate (12) can mate with the relevant shear plate (10).

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There are various possible configurations for the shear plate small end (68), including: straight and bevelled as shown in Figure 1; curved and bevelled as shown in Figure 12; curved and not bevelled as shown in Figure 13; straight and not bevelled as shown in Figure 13A; and other suitable configurations. The configuration of the receptor plate notch end (70) must permit the shear plate (10) and the relevant receptor plate (12) to mate.

25

In use with steel structural members the receptor plate (12) and shear plate (10) may be attached to the relevant structural member by bolts, welds or other suitable means (not shown). In use with concrete structural members (28) the receptor plate (12) and shear plate (10) may be attached to the concrete structural members (28) with concrete anchors (30), as shown in Figure

30

7, or other suitable means.

In one embodiment with steel structural members, the receptor plate (12) and shear plate (10) are welded to the steel structural members. It is preferable to not weld on the shear plate edges (44) or the receptor plate notch sides (50) as these surfaces are involved in the mating of the shear plate (10) and receptor plate (12). The shear plate (10) may be welded to a flat surface with the use of plug weld holes (not shown). The receptor plate (12) may be welded around its periphery to attach it to a flat surface. The shear plate (10) may also be welded to the end of some structural members, as in Figure 2, where the shear plate (10) is attached to the center web (22) of the beam (16). However, the shear plate (10) is usually not attached directly to structural members such as pipe (24) or square tubing (26), because they lack a central component to which to attach the shear plate (10). The receptor plate (12), on the other hand, can be attached to the end of a pipe (24) or square tubing (26), because it can be welded on its periphery. However, the receptor plate (12) is usually not attached directly to the end of a center web (22), or similar component, because this does not provide enough support for the receptor plate (12). For example, in Figure 2, the receptor plate (12) is attached to the surface of the flange (20) of the column, because the receptor plate (12) would not be adequately supported if it were attached to the center web (22) of the beam (16), which is where the shear plate (10) is attached.

In simple terms, in any joining of two structural members, one structural member is giving vertical support to the other structural member. For example, as in Figure 2, the column (14) gives vertical support to the beam (16) which is attached to it. Where one beam (16) is being attached to another beam (16), the positioned beam (54) will give vertical support to the incoming beam (56), (Figures 14, 15 and 16). The orientation of the shear plate (10) and the receptor plate (12) depends on whether the shear plate (10) or the receptor plate (12) is attached to the structural member which is giving vertical support. In Figure 2, the receptor plate (12) is attached to the structural member which is giving vertical support, the column (14), so the receptor plate (12) is oriented with the receptor plate notch (48) open upwards. In Figure 3, the shear plate is attached to the structural member which is giving vertical support, the column (14), so the receptor plate (12) is oriented with the receptor plate notch (48) open downwards.

When the shear plate (10) is mated to the receptor plate (12), the taper of the receptor plate notch (48) and the shear plate (10); and the bevel (46) of the receptor plate notch sides (50) and the shear plate edges (44), act together in a double wedging action. In situations where the receptor plate (12) is attached to a surface, referred to as the receptor plate backing (13), this double wedging acts to clamp the shear plate face (11) to the receptor backing plate (13). In situations where the shear plate (10) is attached to a surface, referred to as the shear plate backing (76), this double wedging acts to clamp the receptor plate face (78) to the shear plate backing (76). In situations where both the shear plate (10) and the receptor plate (12) are attached to surfaces, the wedging action may act to clamp both the shear plate face (11) to the receptor plate backing (13) and the receptor plate face (78) to the shear plate backing (76). The clamping action of the shear plate (10) - receptor plate (12) pair is analogous to the clamping action of nut and bolt combinations. This clamping action creates a friction connection that resists, up to a quantifiable break-free point, movement in any direction, including upwards.

In one embodiment with additional resistance to upward movement, a beak (36) is located on the shear plate face (11), as shown in Figure 9, or on the receptor plate face (78). The beak (36) is tapered so that in use, the beak (36) offers little resistance as the shear plate (10) and receptor plate (12) are mated. The beak (36) acts as another wedge to resist upward movement. The clamping action of the mated shear plate (10) and receptor plate (12) pushes the beak (36) against the receptor plate backing (12) (or the shear plate backing (76) if the beak (36) is on the receptor plate face (78)) and the shape of the beak (36) resists any disengaging motion of the mated shear plate (10) and receptor plate (12).

In one embodiment with additional resistance to upward movement, an adhesive is applied between the shear plate (10) and the receptor plate (12). In one embodiment with additional resistance to upward movement, a skid resistant coating is applied to the shear plate face (11) and the receptor plate backing (13) prior to the mating of the shear plate (10) and the receptor plate (12). In one embodiment with additional resistance to upward movement, shown in Figure 8, the shear plate (10) and receptor plate (12) are welded together. In one embodiment with additional resistance to upward movement, shown in Figure 11, a bolt passes through the

shear plate (10) into the receptor plate backing (13).

In one embodiment with additional resistance to upward movement, shown in Figure 10, a tapered recess (38) is located in the shear plate face (11). A floating body (40), such as a wedge, is, when the shear plate (10) and receptor plate (12) are mated, disposed within the tapered recess (38) between the shear plate (10) and the receptor plate (12). Upward movement causes the floating body (40) to wedge in the tapered recess (38) and resist further upward movement.

In one embodiment with additional resistance to upward movement, shown in Figures 21 and 22, a pin channel (58) suitable for receiving a retaining pin (64) passes through the receptor plate (12) into the shear plate (10). The retaining pin (64) is kept in place within the pin channel (58) through the operation of the pin channel flare (60), the pin channel spike (62) and the retaining pin tangs (64). When the retaining pin (64) is driven into the pin channel (58), the pin channel spike (62) is positioned between the retaining pin tangs (66). If suitable force is applied to the retaining pin (64), the retaining pin tangs (66) will spread to occupy the pin channel flare (60) and the retaining pin tangs (66) will be wider than the pin channel (58). In situations where the shear plate (10) is not attached to a surface, or there is no receptor plate backing (13), the pin channel (58) and the retaining pin (64) may be configured so that the retaining pin (64) will not be dislodged from the pin channel (58), such as by making the pin channel (58) and retaining pin (64) trapezoidal, as shown in Figure 21A. In some situations, there is not sufficient room on either side of the shear plate (10) - receptor plate (12) pair to install the retaining pin (64). This can be dealt with by modifying the pin channel (58), as shown in Figure 23, so that a shorter retaining pin (64) can be used..

In one embodiment with additional resistance to upward movement, shown in Figure 25, the shear plate edges (44) and the receptor plate notch sides (50) are curved such that the shear plate (10) and receptor plate (12) have a rotational motion relative to each other as they are mated. The shear plate (10) and receptor plate (12) cannot be disengaged unless the rotational movement is reversed. The receptor plate (12) shown in Figure 25 can be modified to facilitate

side entry of a receptor plate (10) by shortening one of the receptor plate notch sides (50) as shown in Figure 25A.

5 The invention can be used to connect a variety of structural members in a variety of configurations. In one embodiment, shown in Figures 4 and 5, the beam (16) intersects the column (14), but the beam (16) does not terminate at the column (14). The receptor plate (12) and shear plate (10) can be attached to the surfaces of the beam (16) and column (14). Figure 6 is a top view showing four beams (16) attached to a column (14). As seen in Figure 6, using a shear plate (10) - receptor plate (12) pairs it is convenient to attach beams (16) to opposite sides
10 of the center web (22) of a column. As is apparent, it is not necessary to hold one beam in position, such as with chain or a pin bar through bolt holes, while the opposite beam is brought into position.

15 The invention can be used to connect positioned beams (54) having center webs (22) to incoming beams (16) with or without center webs (22), in a variety of ways. In one embodiment, shown in Figure 14, the shear plate (10) is attached to the center web (22) of the incoming beam (56) and the receptor plate (12) is attached to a support member which provides the receptor plate backing (13). The receptor plate (12) is positioned so that the incoming beam (56) can be lowered from above to mate the shear plate (10) and receptor plate (12). In one embodiment,
20 shown in Figures 15 and 16, the shear plate (10) is attached to the side of the center web (22) of the incoming beam (56) and the receptor plate (12) is attached to a receptor plate backing (13) which protrudes from the center web (22) of the positioned beam (54) at whatever angle is required for the proper mating of the shear plate (10) and receptor plate (12).

25 The amount of sliding or displacement required to mate or disengage a receptor plate (12) - shear plate (10) pair depends on the angle of the bevel (46), and the angle between the shear plate edges (44) (and between the receptor plate notch sides (50)). Shear plates (10) and receptor plates (12) with a flat bevel (74), shown in Figure 26, overlap each other more than shear plates (10) and receptor plates (12) with a steep bevel (72), shown in Figure 27, and
30 therefore require greater displacement to mate or disengage. By the same token, the smaller the

angle between the shear plate edges (44) (and between the receptor plate notch sides (50)), the greater the displacement required to mate or disengage the shear plate (10) and receptor plate (12). For example, if the shear plate edges (44) (and receptor plate notch sides (50)) are parallel, the shear plate (11) would have to be displaced the length of the receptor plate notch sides (50) in order to disengage from the receptor plate (12). As an extreme example, with two shear plate (10) - receptor plate (12) pairs, both having the same bevel, where one pair has an angle between the shear plate edges (44) (and receptor plate notch sides (50)) of 10 degrees and the other pair has an angle between the shear plate edges (44) (and receptor plate notch sides (50)) of 90 degrees, mating or disengaging the pair where the angle is 90 degrees will require less displacement than disengaging the pair where the angle is 10 degrees. Therefore, by adjusting the bevel (46) and the angle between the shear plate edges (44) (and between the receptor plate notch sides (50)), the displacement required to mate and disengage the shear plate (10) and receptor plate (12) can be adjusted.

In situations where minimal mating displacement is preferred, such as is shown in Figures 17, where an incoming beam (56) is being attached under the flange (20) of a positioned beam (54), the bevel (46) and the angle between the shear plate edges (44) (and between the receptor plate notch sides (50)), can be adjusted to reduce the amount of vertical displacement required. As the angle between the receptor plate notch sides (50) increases, the receptor plate notch opening (71) grows larger. To avoid having receptor plates (12) and shear plates (10) which are inappropriately wide for the particular application, it is possible to use a plurality of smaller shear plate (10) - receptor plate (12) pairs, as shown in Figures 17 and 17A, while maintaining the angle between the receptor plate notch sides (50) necessary for minimal mating displacement.

As shown in Figure 19, in situations where there is little room for vertical displacement of the incoming beam (56) the receptor plate (12) may be oriented to receive the shear plate (10) from the side. A bolt (42) can be put through lugs projecting from the shear plate (10) and the receptor plate (12) to secure the connection after the beams (16) are in place. The load of the incoming beam (56) can be distributed through the use of a stepped shear plate small end (68)

and receptor plate notch end (70), as shown in Figure 28.

As shown in Figure 20, the top-entry shear plate (10) - receptor plate (12) pairs may also be stepped in order to distribute the load of the supported structural member.

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As shown in Figure 18, the shear plate (10) and receptor plate (12) need not be planar. The shear plate (10) and receptor plate (12) may be curved or take any shape which meets the engineering and aesthetic requirements of the particular structure.

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The invention may also be used to connect a column (14) to another column (14) as shown in Figure 24. Typically the shear plate (10) is sufficiently long so as to span the joint between the columns (14) and mate with the receptor plate (12). The shear plate (10) - receptor plate (12) pairs do not take any of the load of the upper column (14) and so the shear plate small end (68) can be shaped to aid erection by guiding the upper column (14) into place. A bolt (42) can be put through lugs projecting from the shear plate (10) and the receptor plate (12) to secure the connection after the upper column (14) is in place.

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As will be apparent to those skilled in the art, various modifications, adaptations and variations of the foregoing specific disclosures can be made without departing from the teachings of the present invention.

20

CLAIMS

- 25 1. A structural member connector comprising:
- (a) a shear plate having two shear plate edges and one of said shear plate edges being substantially bevelled; and
- 30 (b) a receptor plate having a notch having two notch sides, said notch sides being

aligned in a substantially similar manner as said shear plate edges and one of said notch sides being bevelled so as to correspond to the bevel on said bevelled shear plate edge;

5 wherein the shear plate and the receptor plate may be mated.

2. The structural member connector in claim 1 wherein said shear plate edges are both bevelled and said notch sides are both bevelled.

10 3. The structural member connector in claim 1 further comprising a means for preventing disengagement of the shear plate and the receptor plate.

15 4. The structural member connector in claim 3 wherein the means for preventing disengagement of the shear plate and the receptor plate comprises a beak attached to the shear plate.

5. The structural member connector in claim 3 wherein the means for preventing disengagement of the shear plate and the receptor plate comprises a beak attached to the receptor plate.

20 6. The structural member connector in claim 3 wherein the means for preventing disengagement of the shear plate and the receptor plate comprises an adhesive between the shear plate face and the receptor plate backing.

25 7. The structural member connector in claim 3 wherein the means for preventing disengagement of the shear plate and the receptor plate comprises an adhesive between the receptor plate face and the shear plate backing.

30 8. The structural member connector in claim 3 wherein the means for preventing disengagement of the shear plate and the receptor plate comprises a skid resistant coating applied

to the shear plate.

9. The structural member connector in claim 3 wherein the means for preventing disengagement of the shear plate and the receptor plate comprises:

5

(a) a tapered recess on that surface of the shear plate which is closest to the structural member to which the receptor plate is fixed; and

(b) a floating body positioned in said tapered recess.

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10. The structural member connector in claim 3 wherein the means for preventing disengagement of the shear plate and the receptor plate comprises:

(a) a channel suitable for receiving a retaining pin in the receptor plate;

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(b) a channel suitable for receiving a retaining pin in the shear plate, which is aligned with said channel in the receptor plate when the receptor plate and shear plate are properly mated; and

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(c) a retaining pin;

wherein said retaining pin may be positioned in the channel in the mated receptor plate and shear plate so as to inhibit said mated shear plate and receptor plate from disengaging.

25

11. The structural member connector in claim 10 further comprising a means for holding said retaining pin in said channel.

12. The structural member connector in claim 11 wherein said means for holding said retaining pin in said channel comprises:

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(a) two tangs attached to one end of said retaining pin; and

(b) a tapered spike at the inner end of said channel;

5 wherein, when the retaining pin is driven into said channel, said spike will be positioned between said tangs and if suitable force is applied to the retaining pin, said tangs will spread.

13. The structural member connector in claim 1 or 2 wherein the shear plate edges and the notch sides are curved.

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14. The structural member connector in claim 1 or 2 wherein the receptor plate notch and the shear plate have a side which is stepped.

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15. The structural member connector in claim 14 wherein the stepped side is a shear plate edge and a notch side.

16. A structural member connector comprising:

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(a) a shear plate having two shear plate edges which are not parallel to each other and one of said shear plate edges being substantially bevelled; and

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(b) a receptor plate having a notch having two notch sides, said notch sides being aligned in a substantially similar manner as said shear plate edges and one of said notch sides being bevelled so as to correspond to the bevel on said bevelled shear plate edge;

wherein the shear plate and the receptor plate may be mated.

30

17. The structural member connector in claim 16 wherein said shear plate edges are both bevelled and said notch sides are both bevelled.

18. The structural member connector in claim 16 further comprising a means for preventing disengagement of the shear plate and the receptor plate.

19. The structural member connector in claim 16 wherein the means for preventing disengagement of the shear plate and the receptor plate comprises a beak on the shear plate.

20. The structural member connector in claim 16 wherein the means for preventing disengagement of the shear plate and the receptor plate comprises a beak on the receptor plate.

21. The structural member connector in claim 18 wherein the means for preventing disengagement of the shear plate and the receptor plate comprises an adhesive between the shear plate face and the receptor plate backing.

22. The structural member connector in claim 18 wherein the means for preventing disengagement of the shear plate and the receptor plate comprises an adhesive between the receptor plate face and the shear plate backing.

23. The structural member connector in claim 18 wherein the means for preventing disengagement of the shear plate and the receptor plate comprises a skid resistant coating applied to the shear plate.

24. The structural member connector in claim 18 wherein the means for preventing disengagement of the shear plate and the receptor plate comprises:

(a) a tapered recess on that surface of the shear plate which is closest to the structural member to which the receptor plate is fixed; and

(b) a floating body positioned in said tapered recess.

25. The structural member connector in claim 18 wherein the means for preventing

disengagement of the shear plate and the receptor plate comprises:

- (a) a channel suitable for receiving a retaining pin in the receptor plate;
- 5 (b) a channel suitable for receiving a retaining pin in the shear plate, which is aligned with said channel in the receptor plate when the receptor plate and shear plate are properly mated; and
- (c) a retaining pin;

10 wherein said retaining pin may be positioned in the channel in the mated receptor plate and shear plate so as to inhibit said mated shear plate and receptor plate from disengaging.

15 26. The structural member connector in claim 21 further comprising a means for holding said retaining pin in said channel.

27. The structural member connector in claim 22 wherein said means for holding said retaining pin in said channel comprises:

- 20 (a) two tangs attached to one end of said retaining pin; and
- (b) a tapered spike at the inner end of said channel;

25 wherein, when the retaining pin is driven into said channel, said spike will be positioned between said tangs and if suitable force is applied to the retaining pin, said tangs will spread.

28. The structural member connector in claim 16 or 17 wherein the shear plate edges and the notch sides are curved.

30 29. The structural member connector in claim 16 or 17 wherein the receptor plate notch and

the shear plate have a side which is stepped.

30. The structural member connector in claim 29 wherein the stepped side is a shear plate edge and a notch side.

Fig. 1.

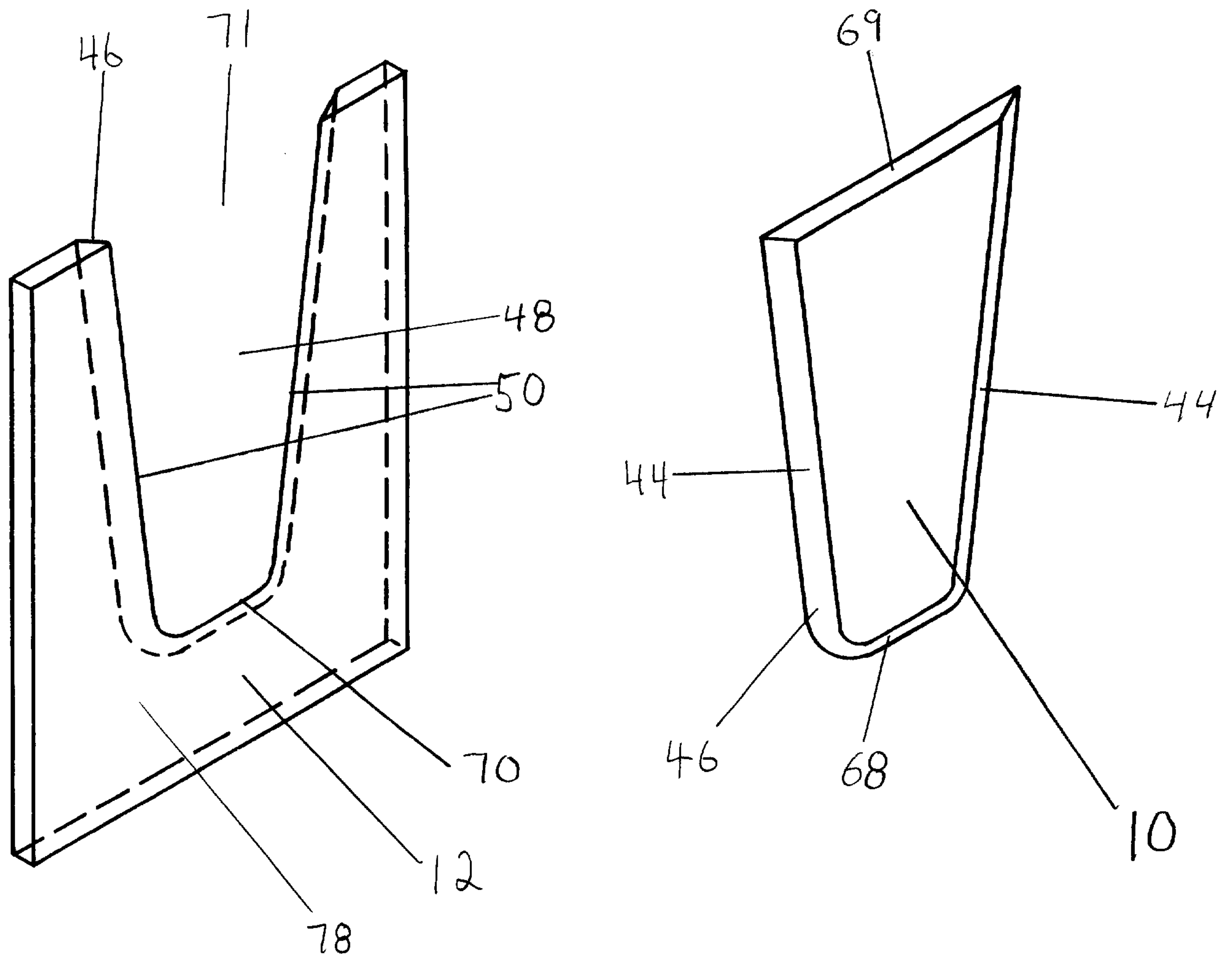


Fig. 2.

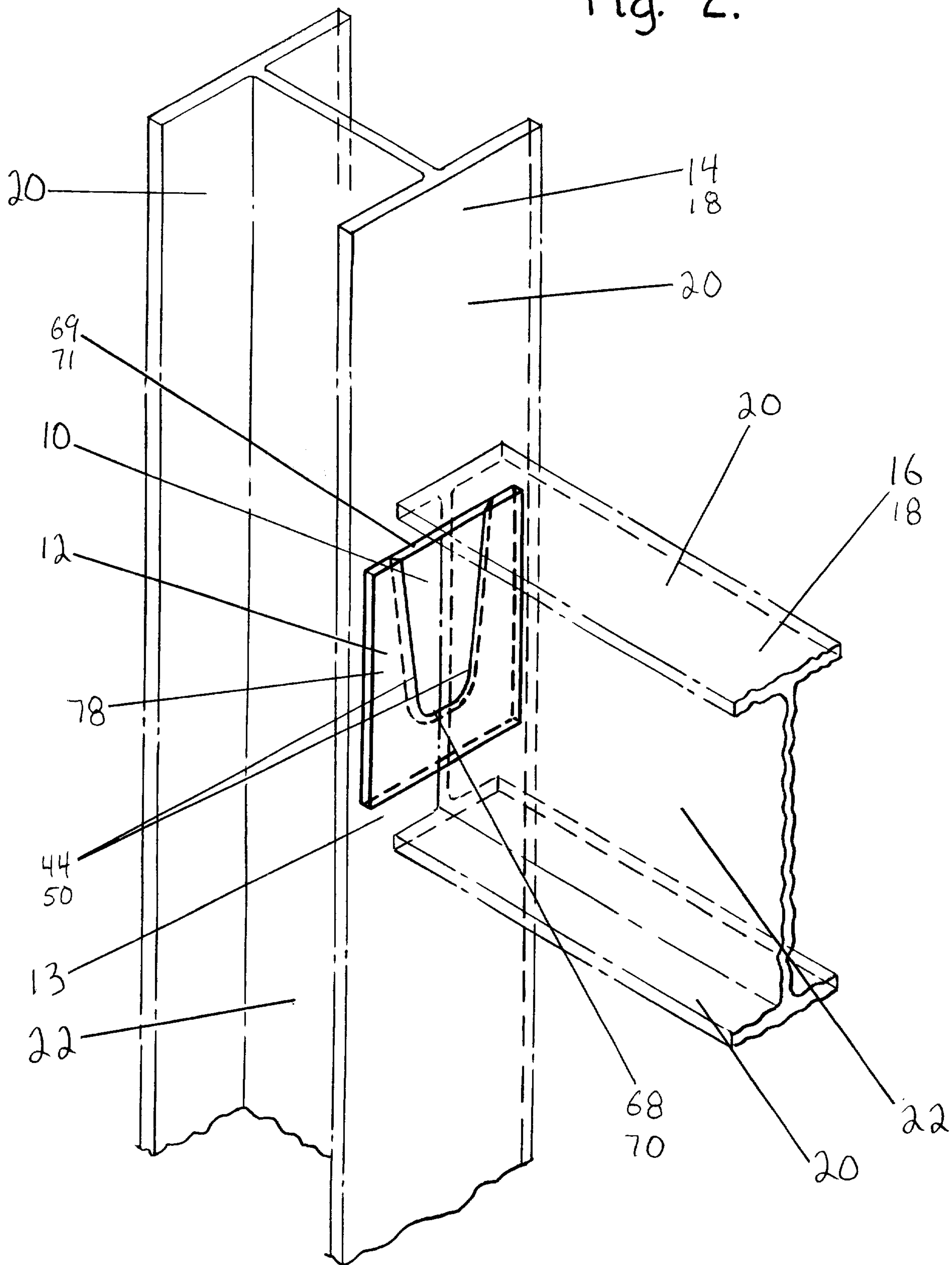


Fig. 3.

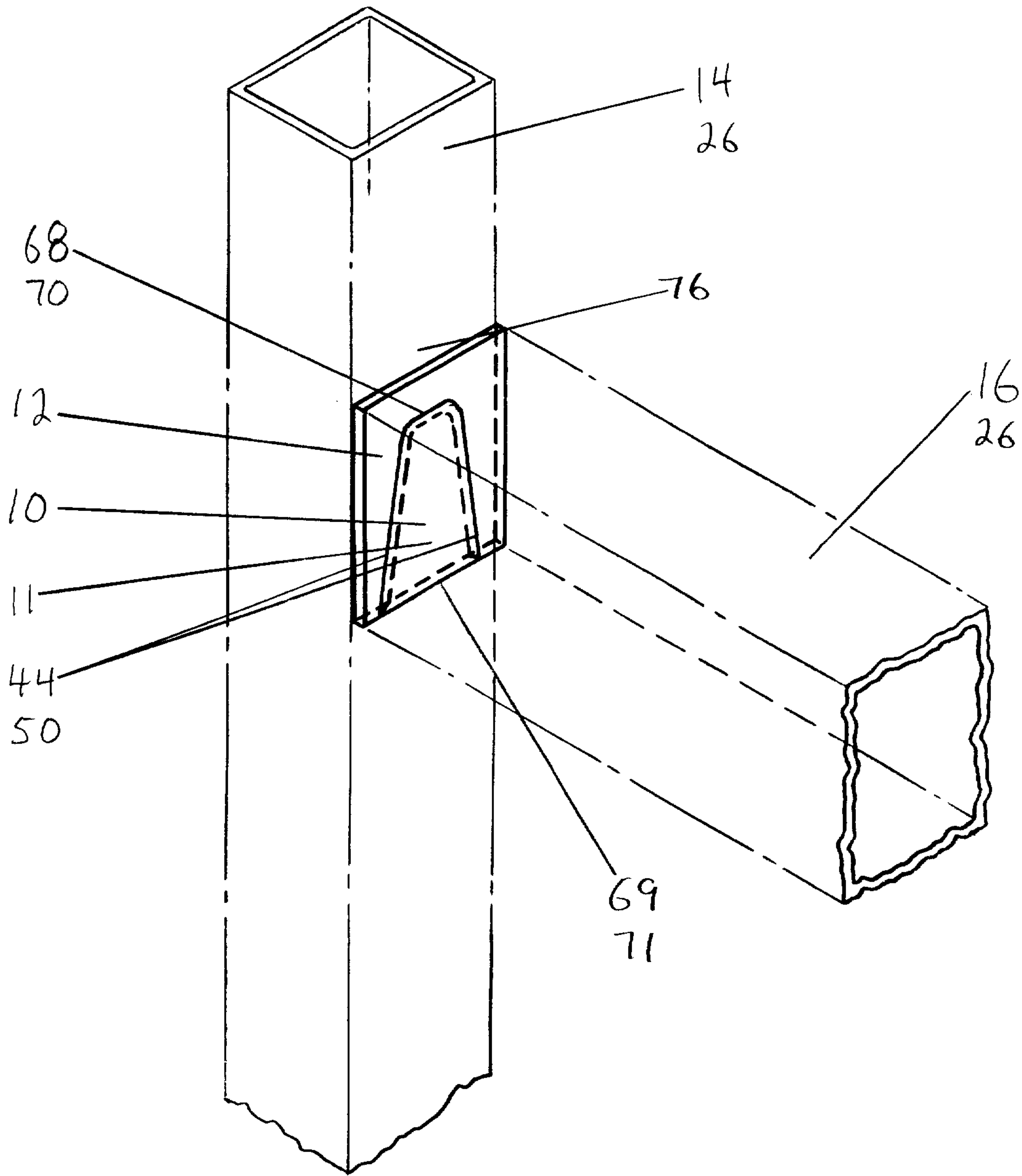


Fig. 4.

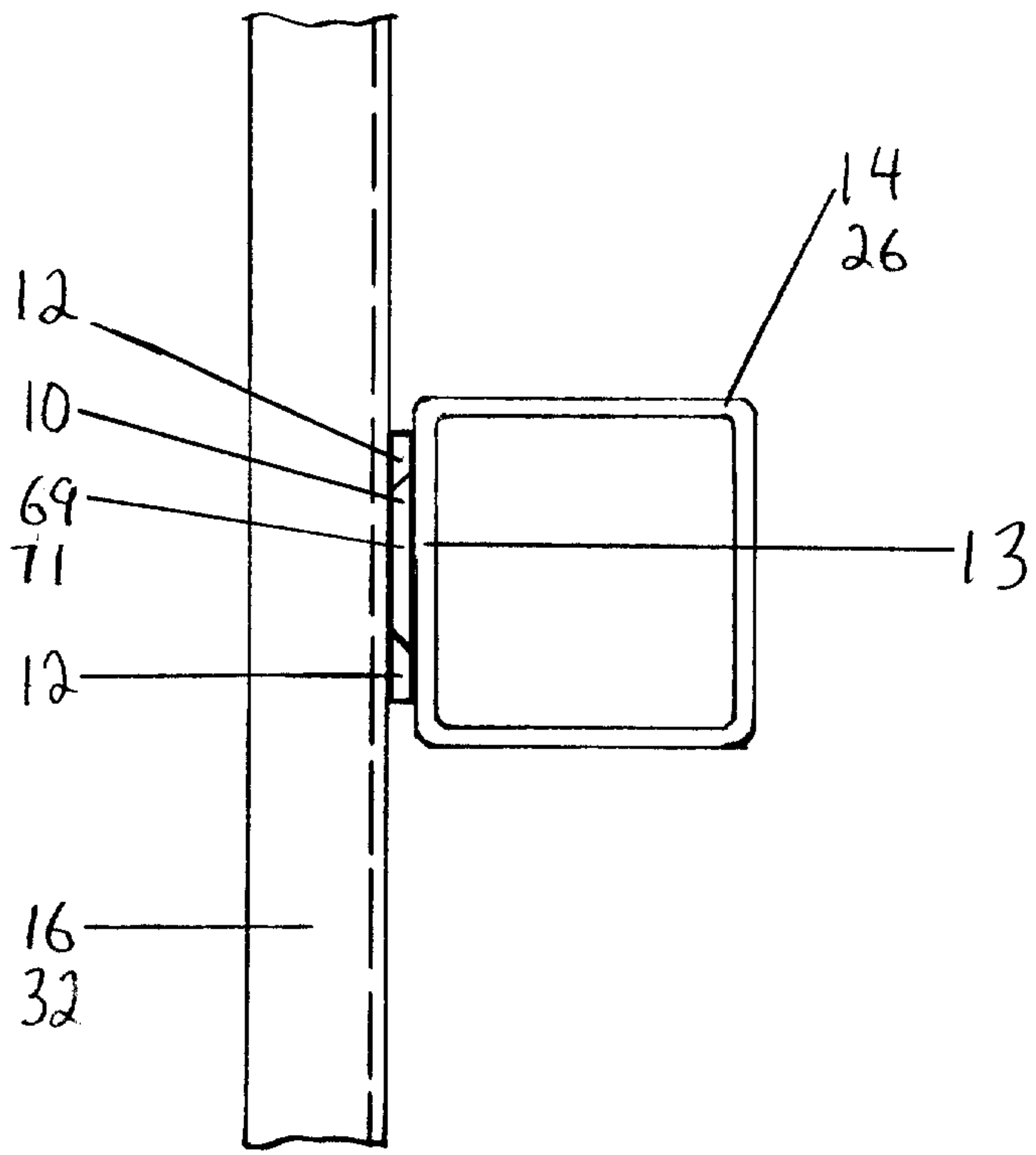


Fig. 5.

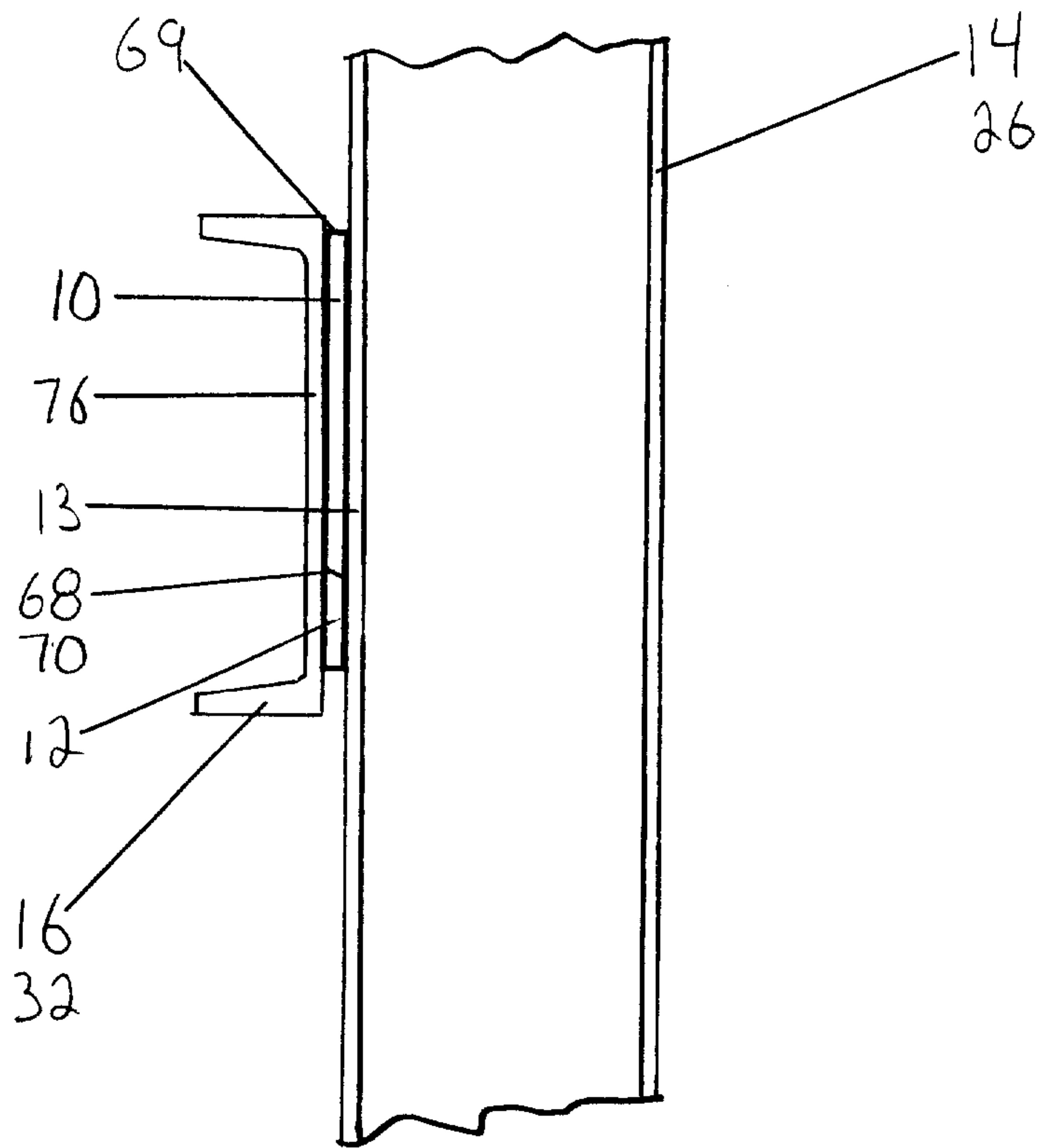


Fig. 6.

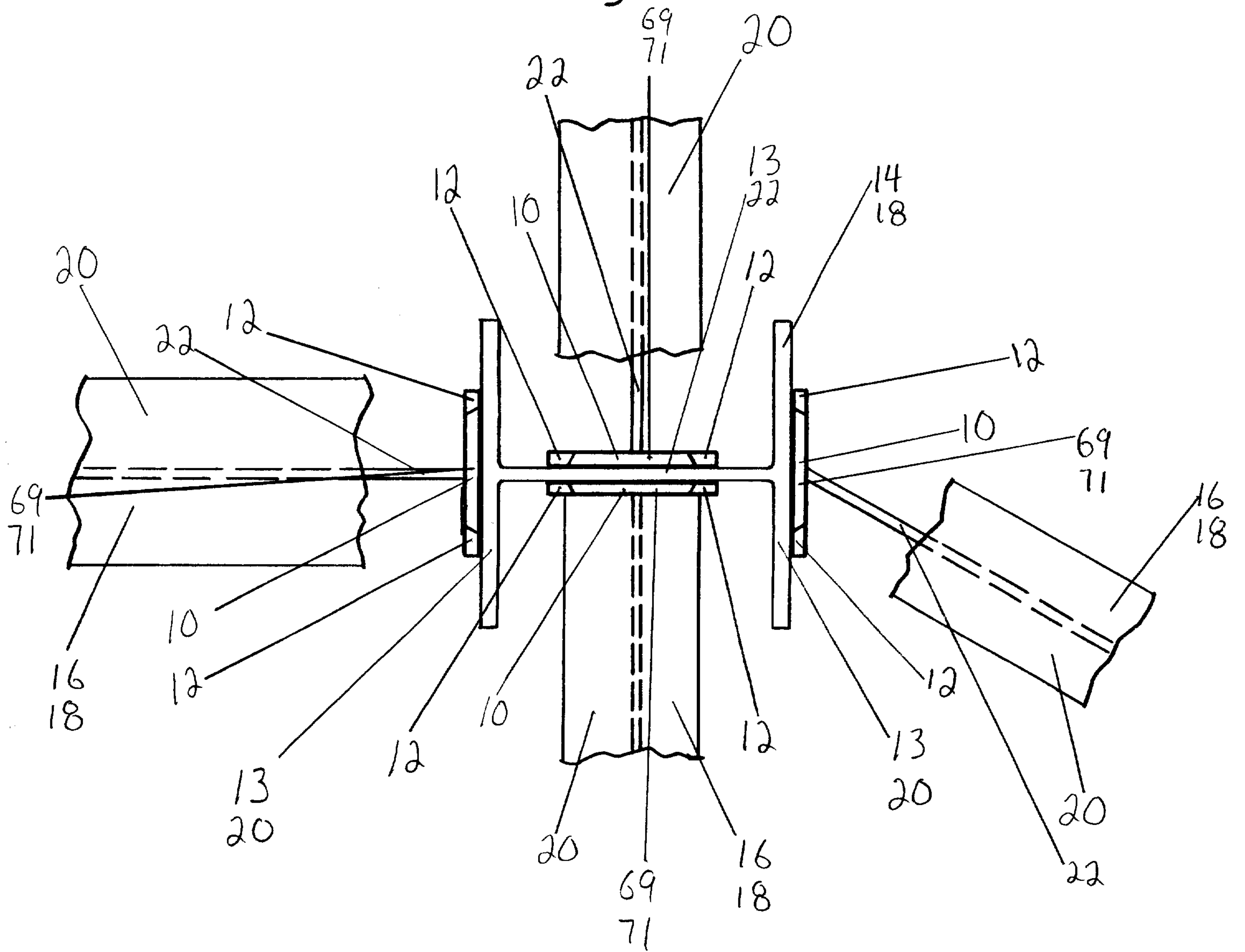


Fig. 7.

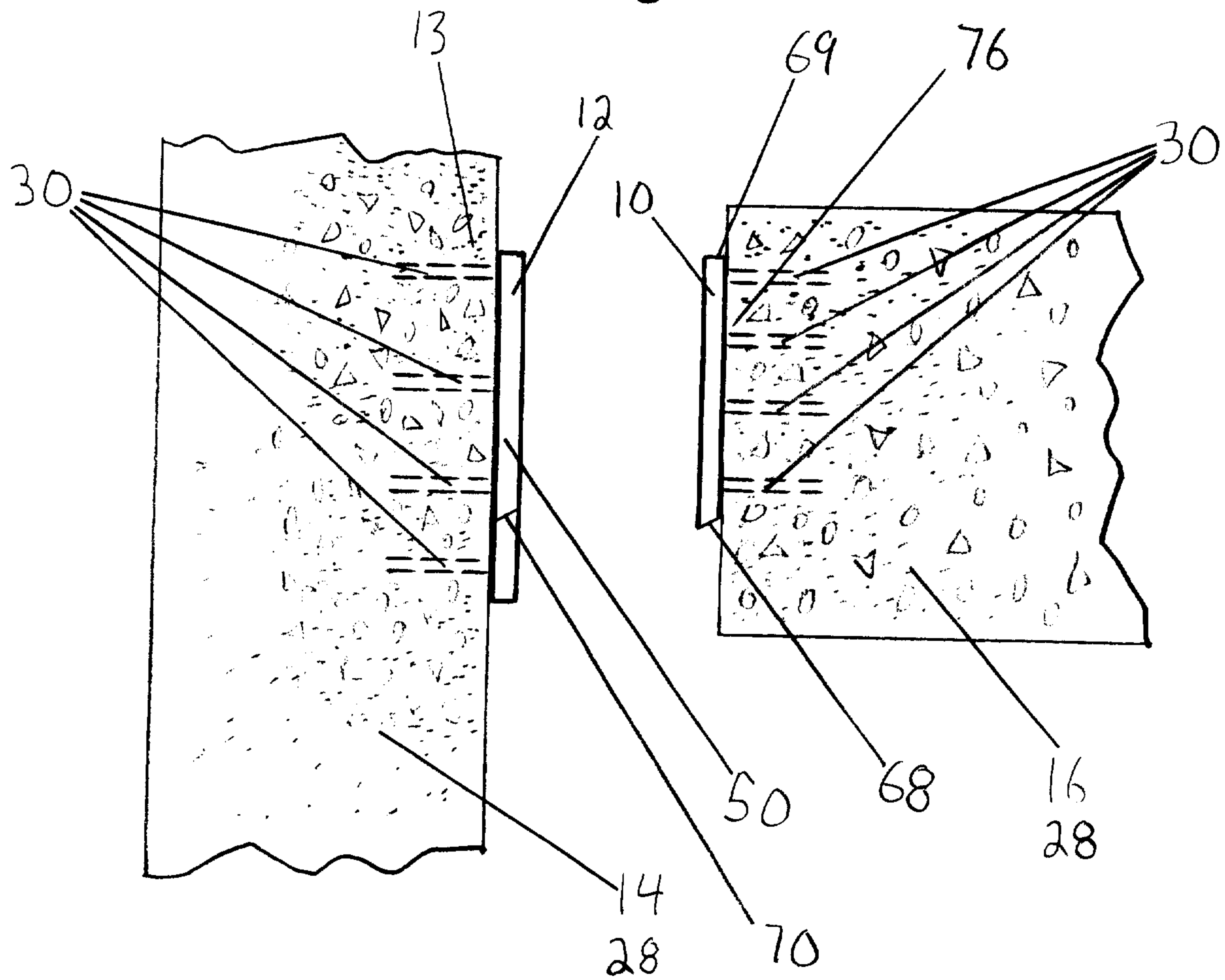


Fig. 8.

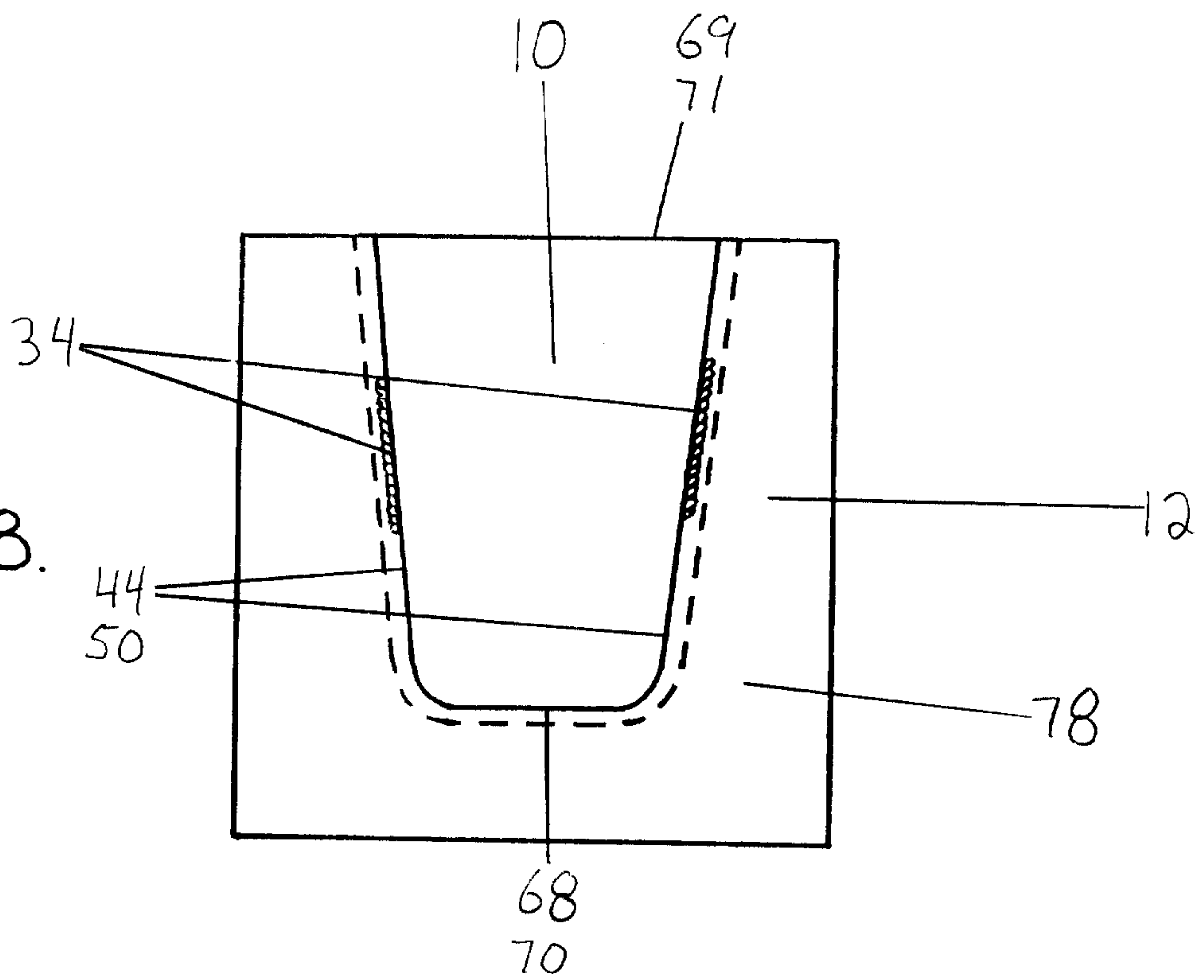


Fig. 9.

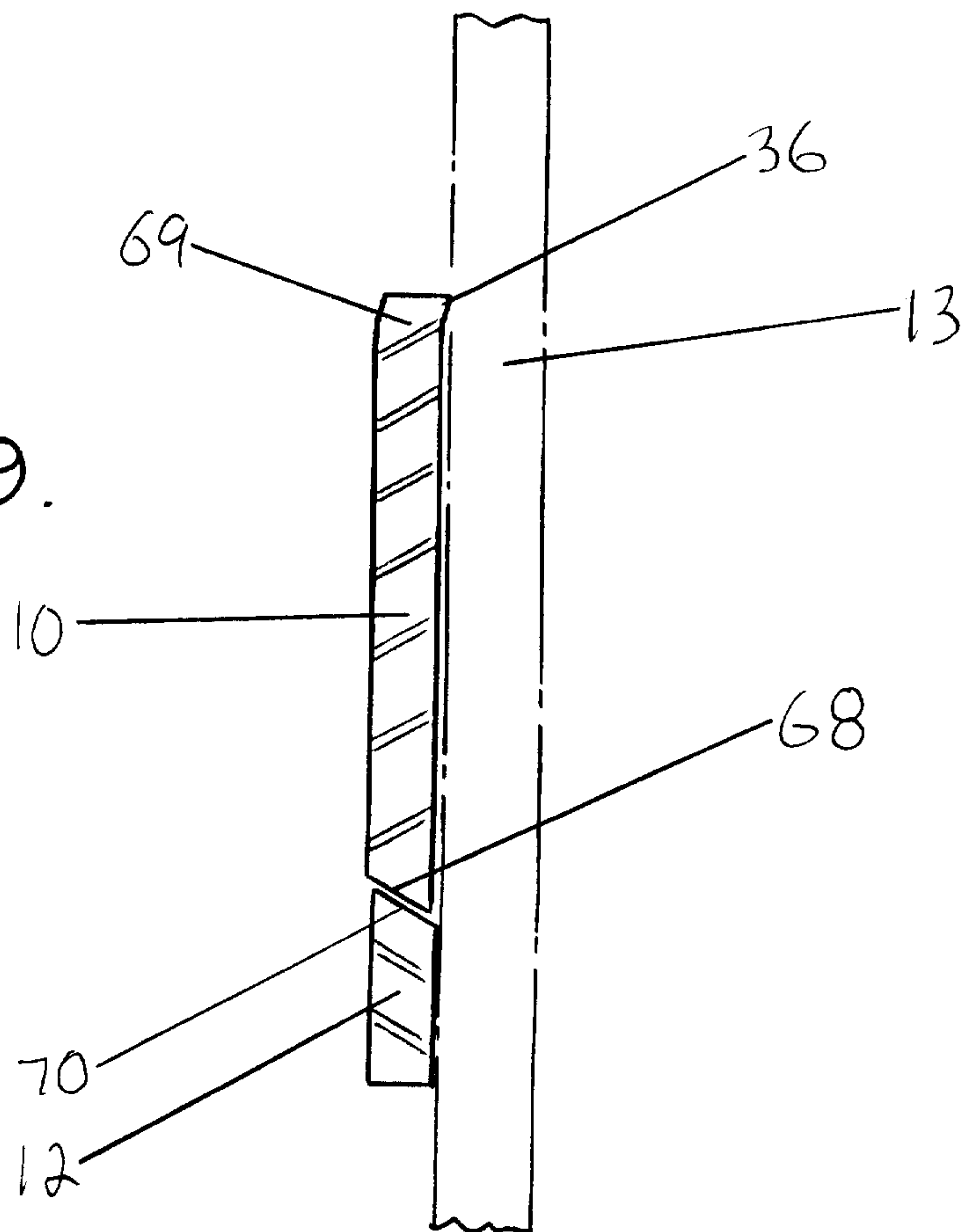


Fig. 10.

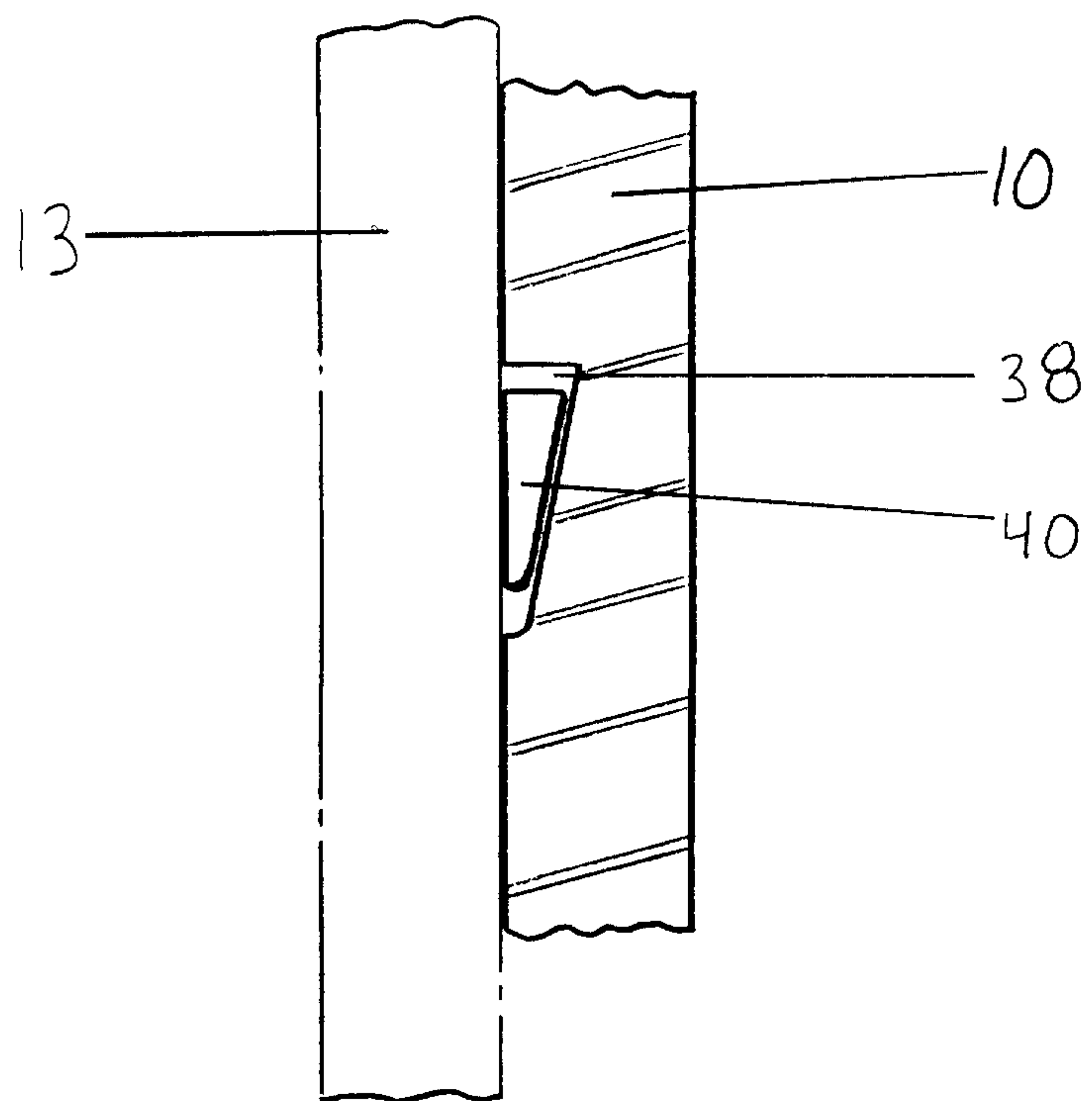


Fig. 11.

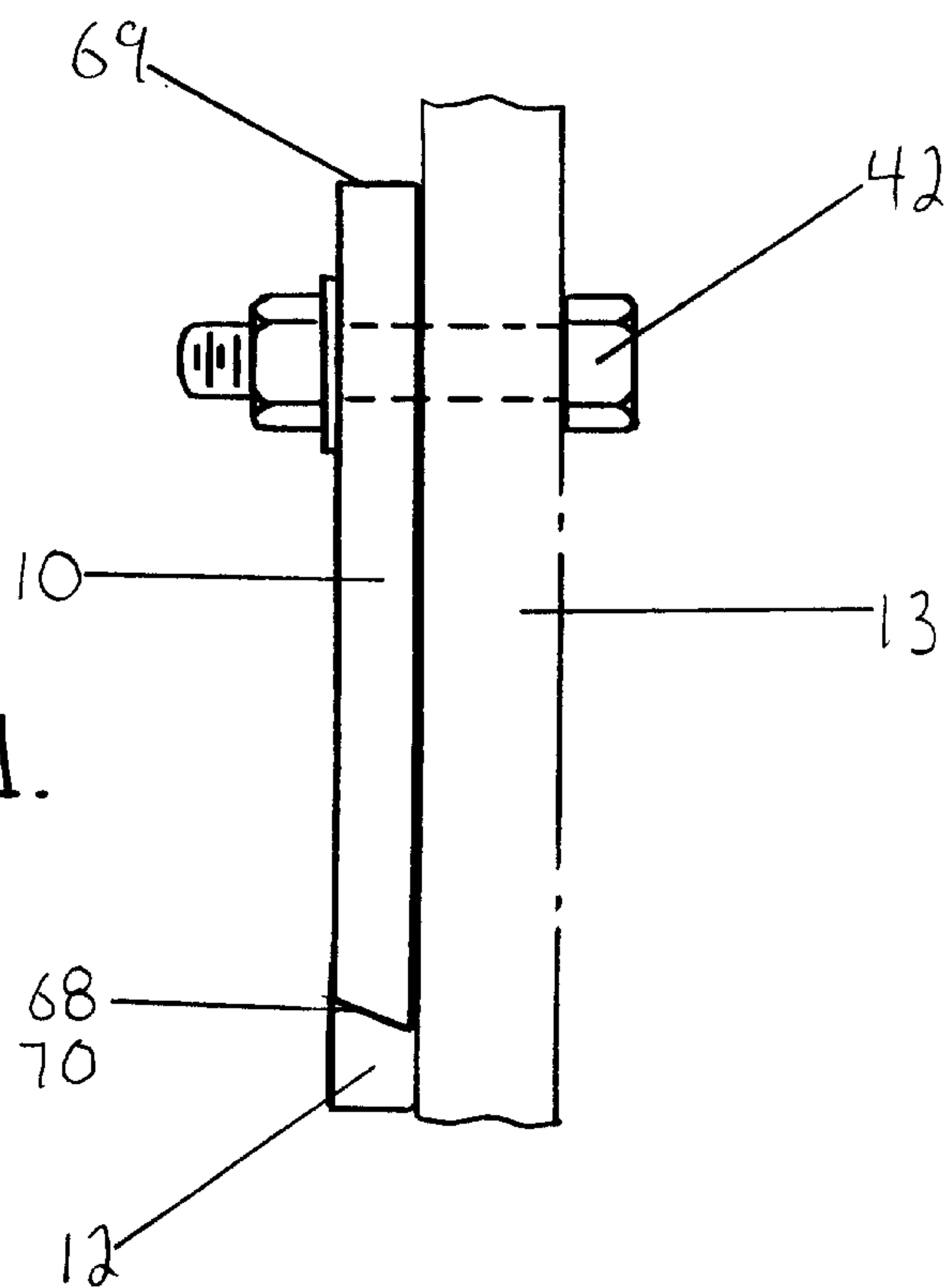


Fig. 12.

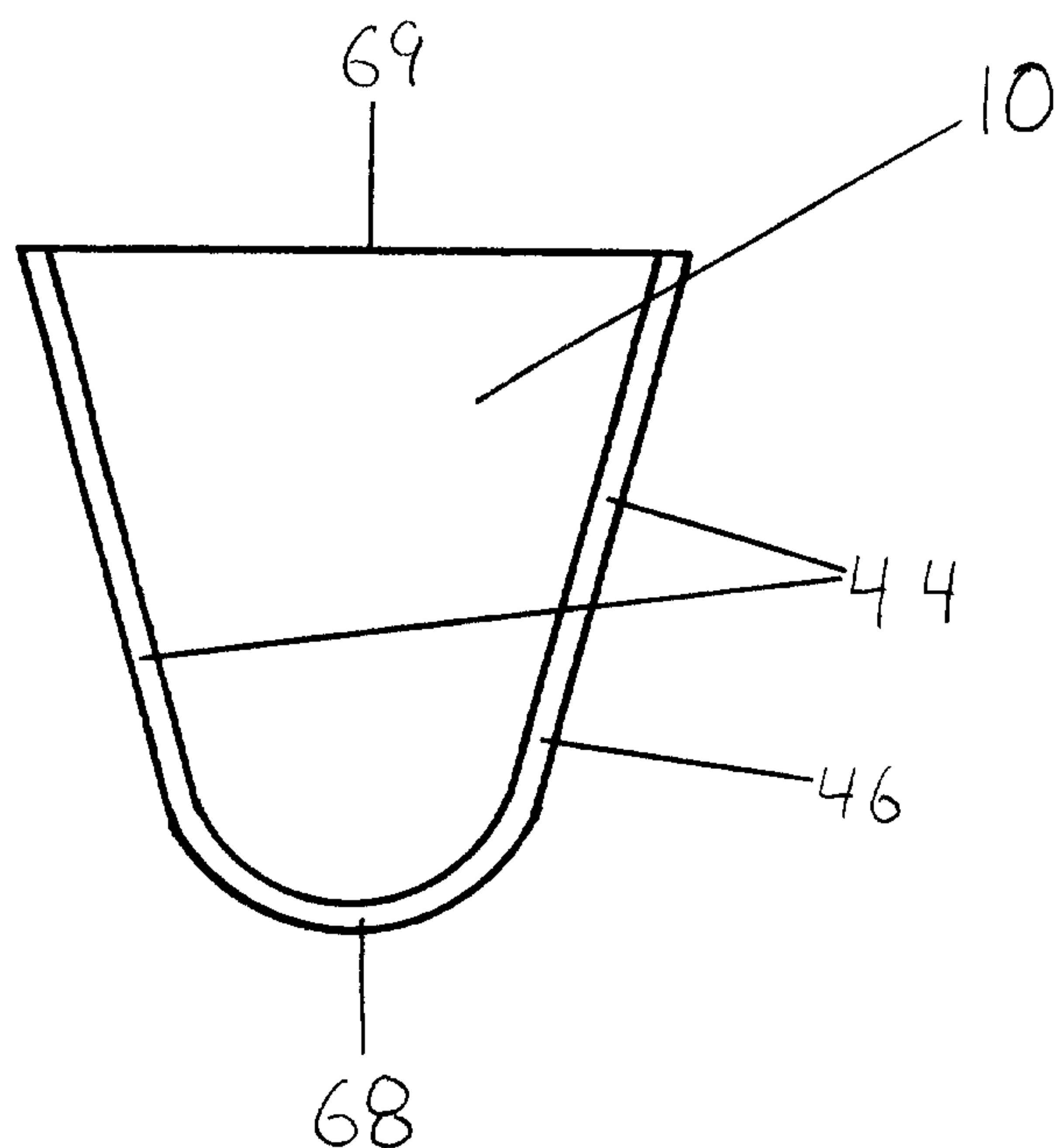


Fig. 13.

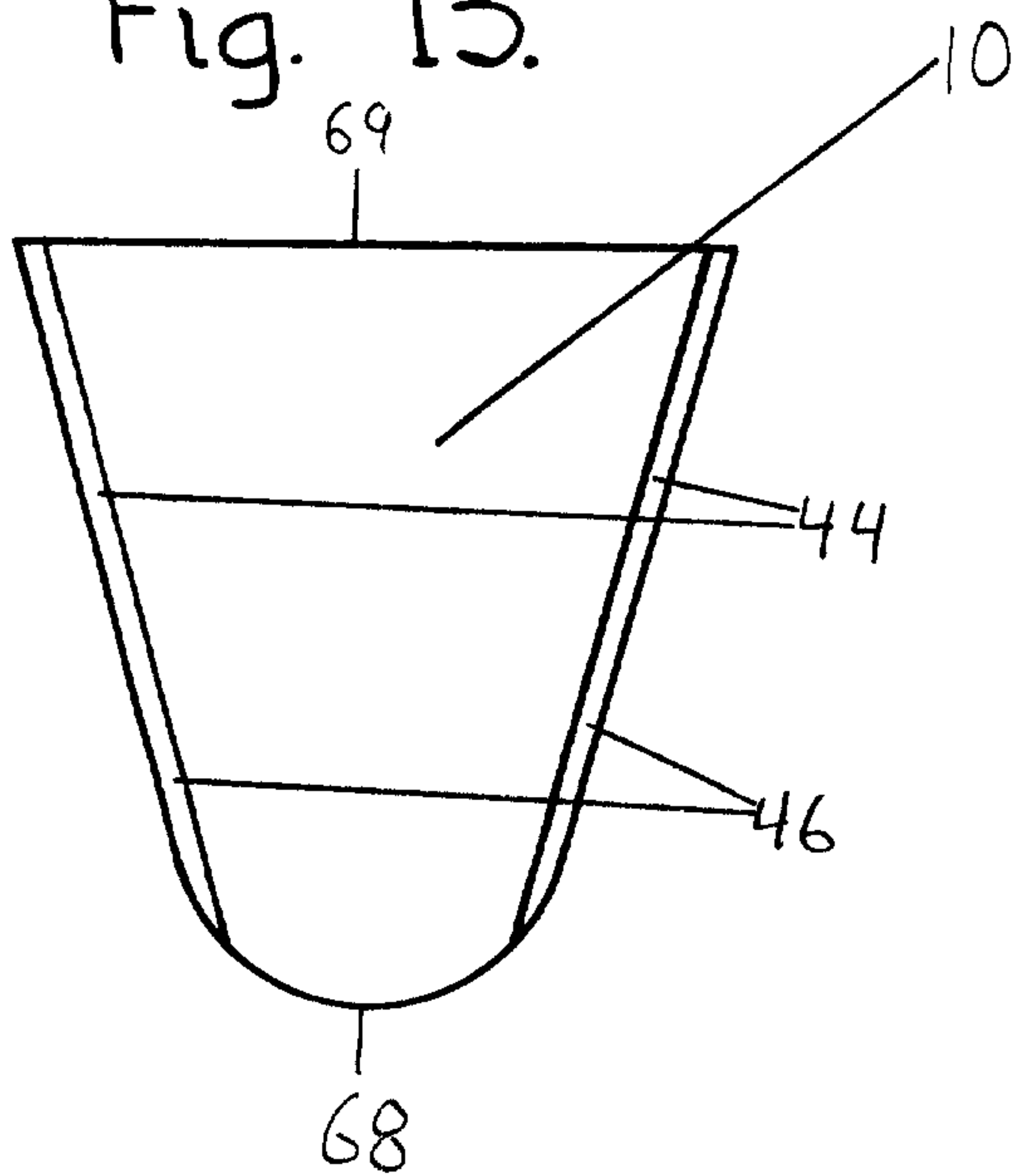


Fig. 13A

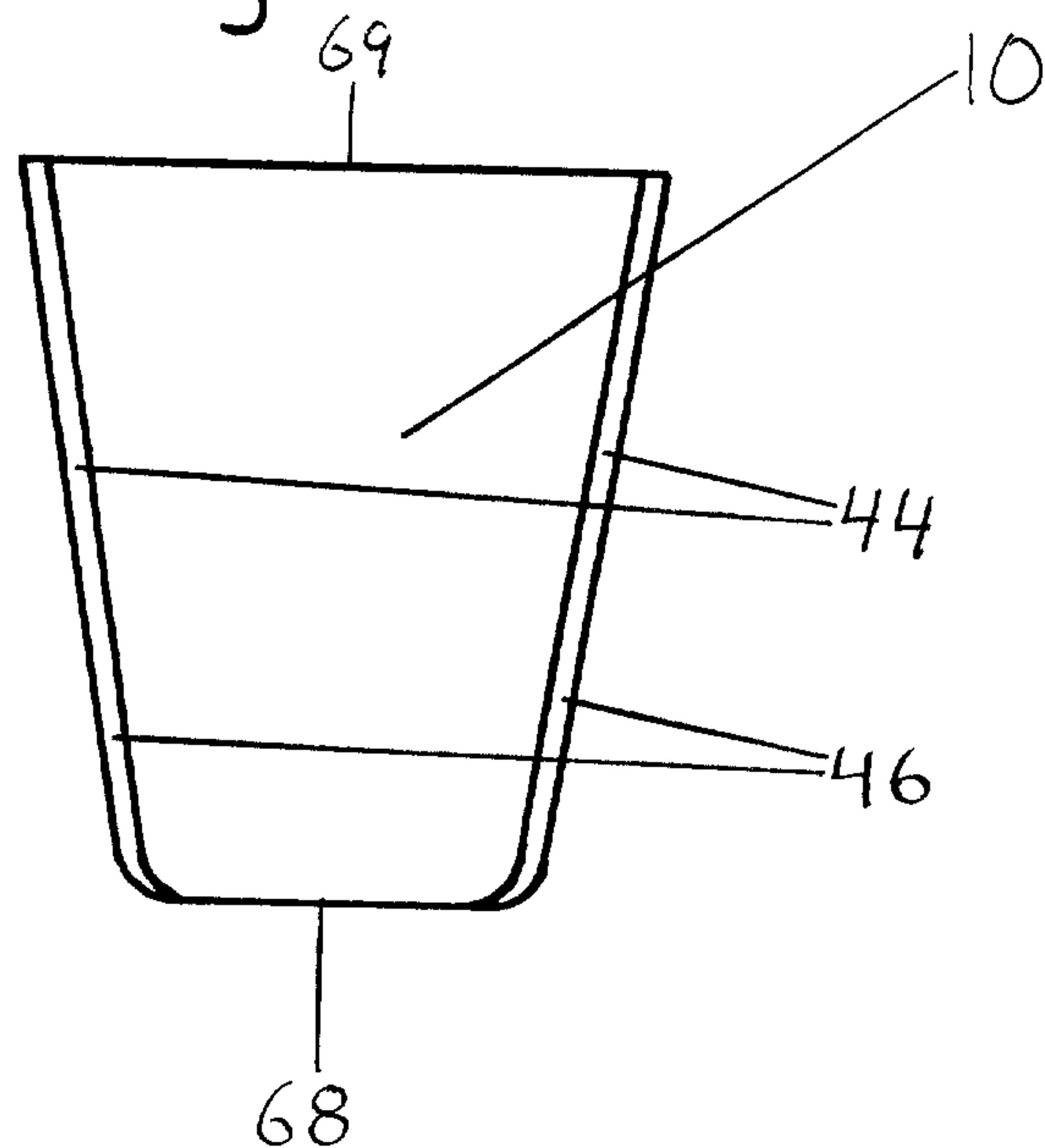


Fig. 14.

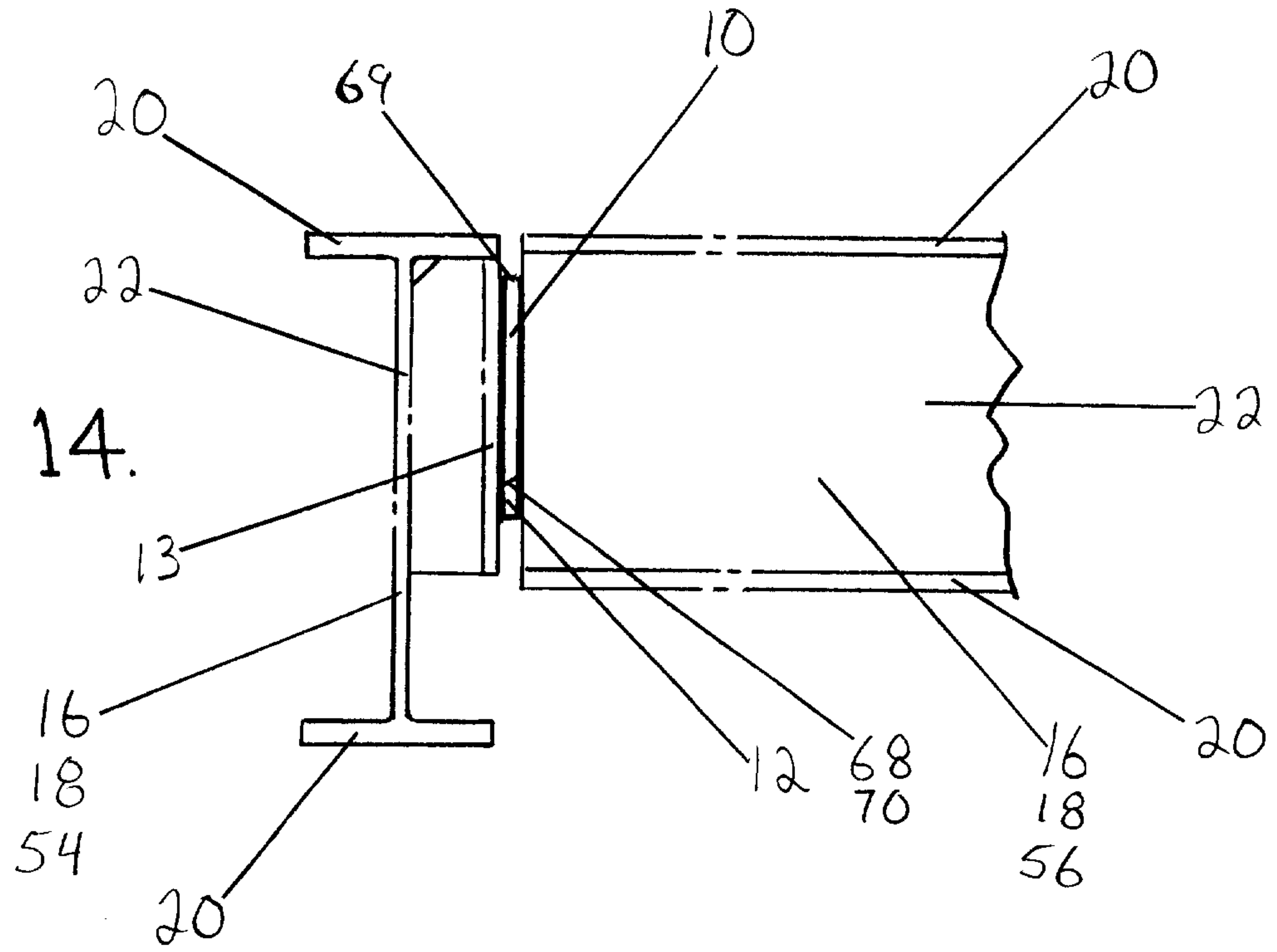


Fig. 15.

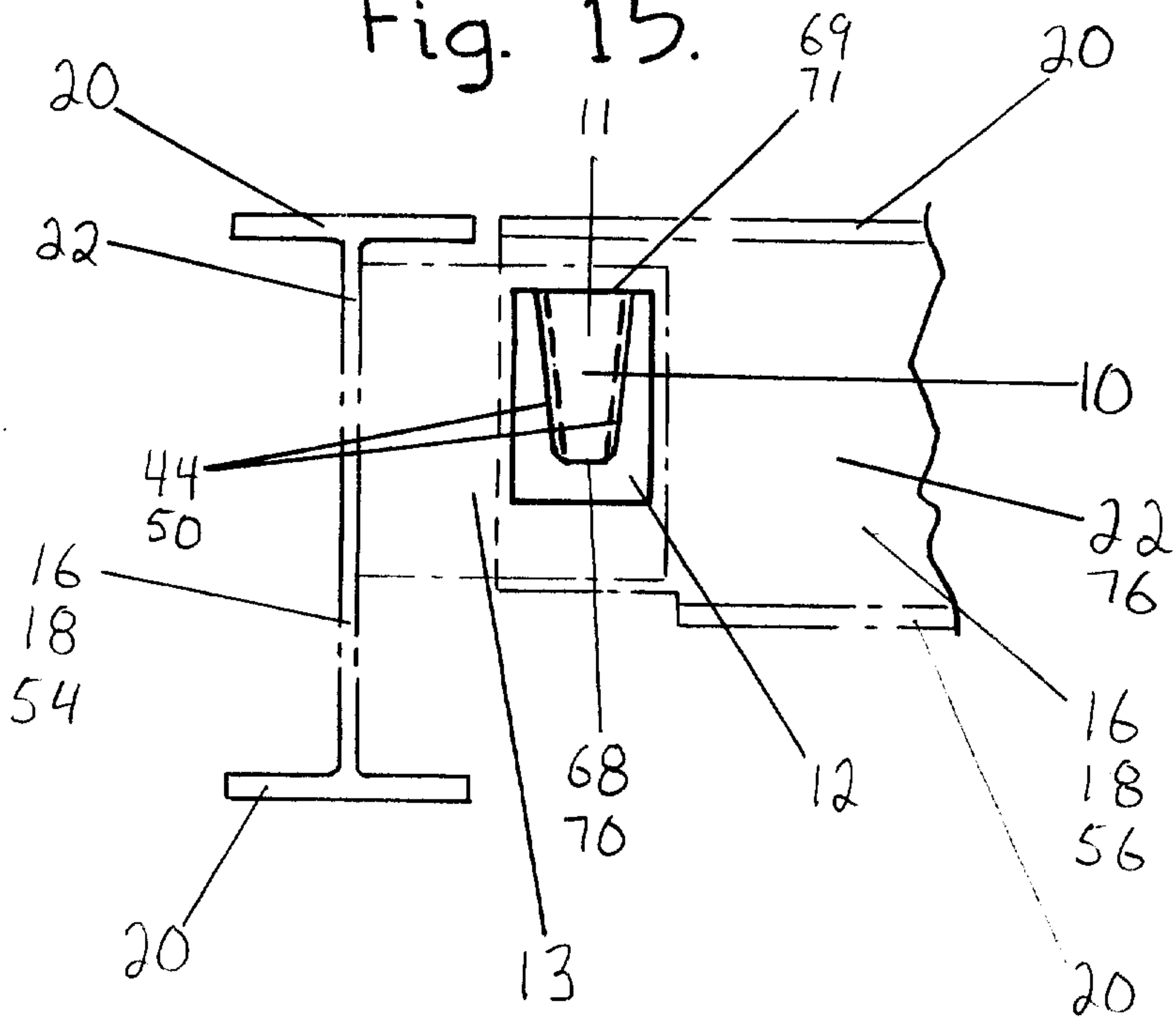


Fig. 16.

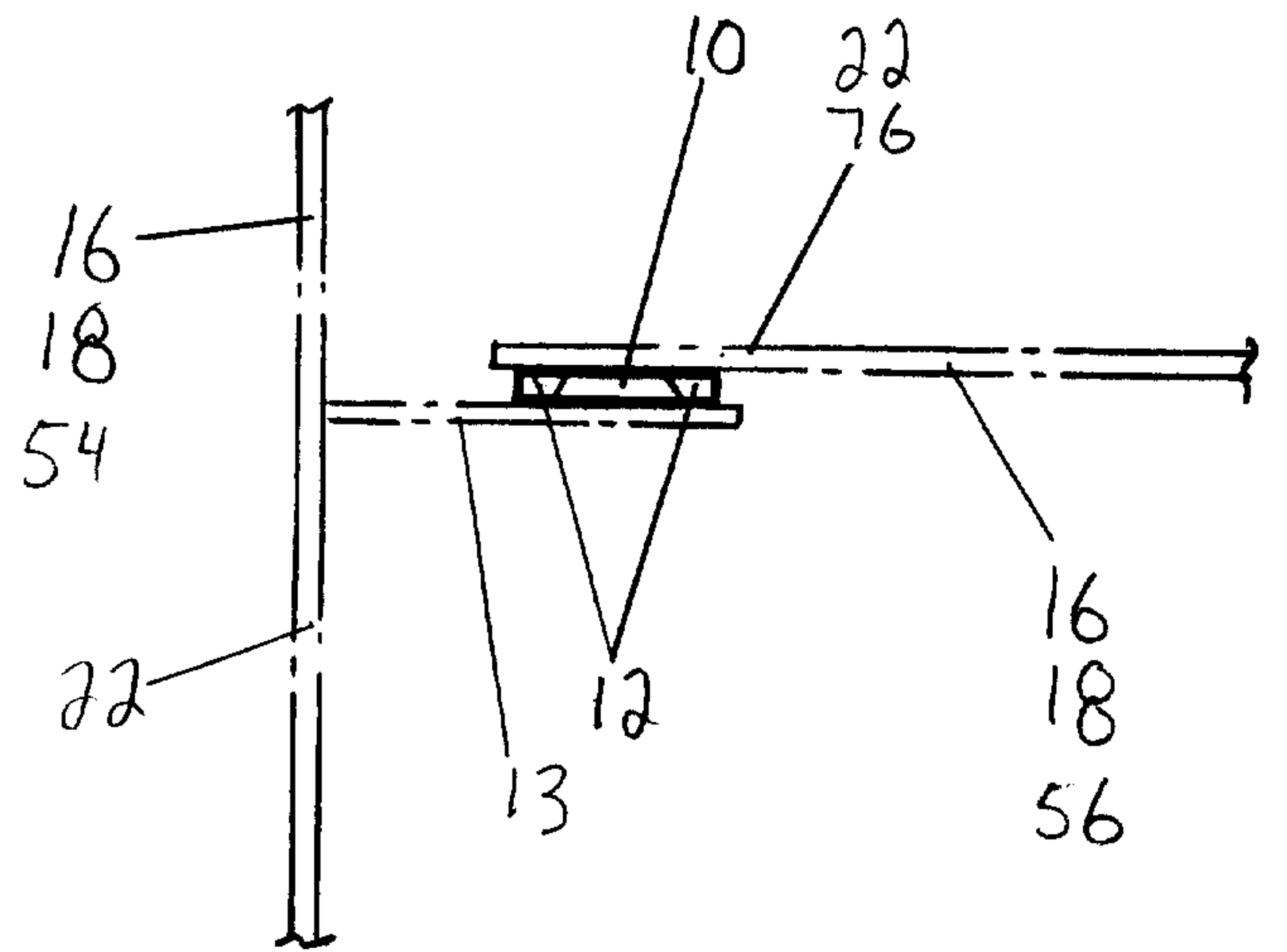


Fig. 17.

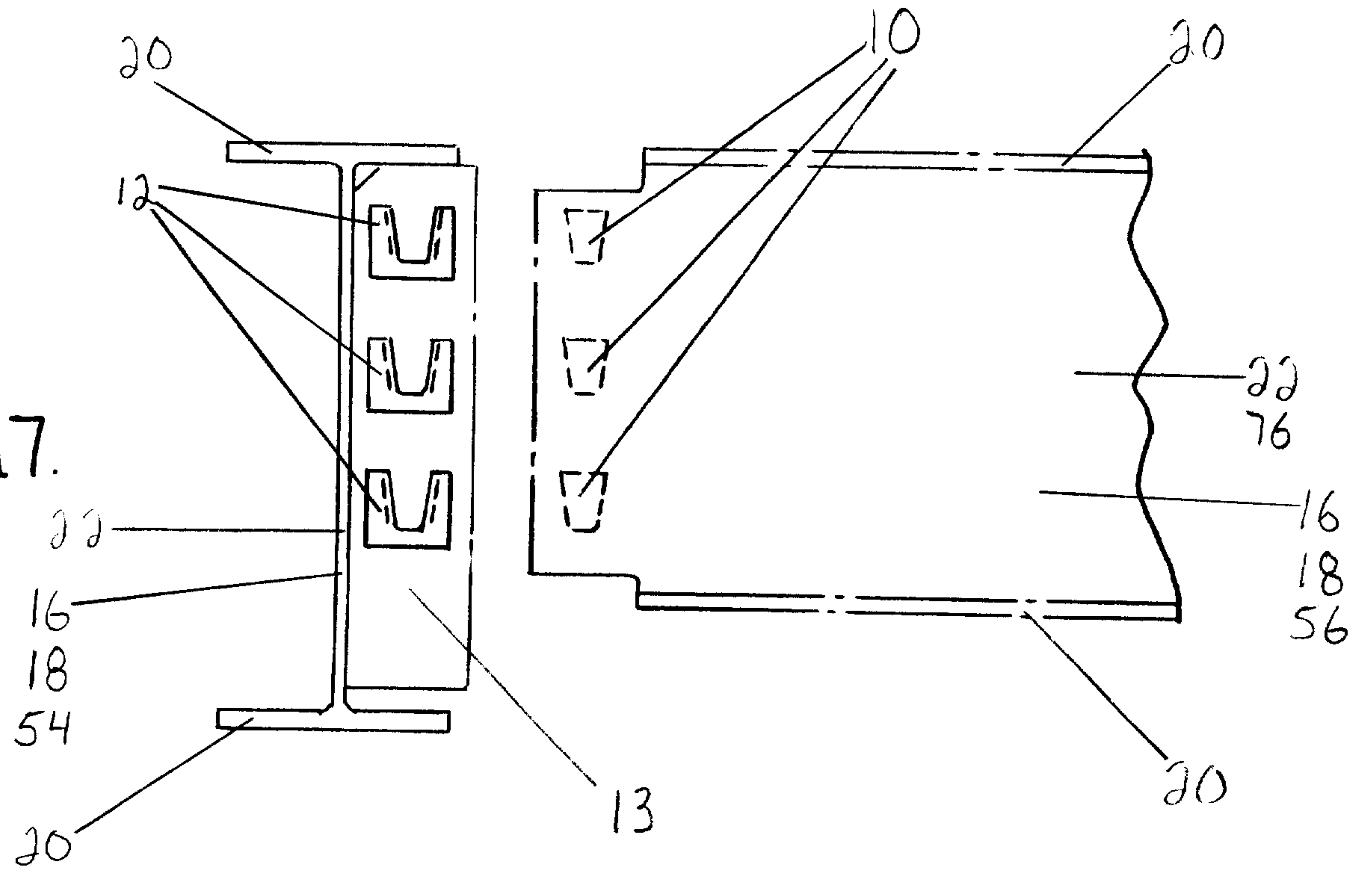


Fig. 17A

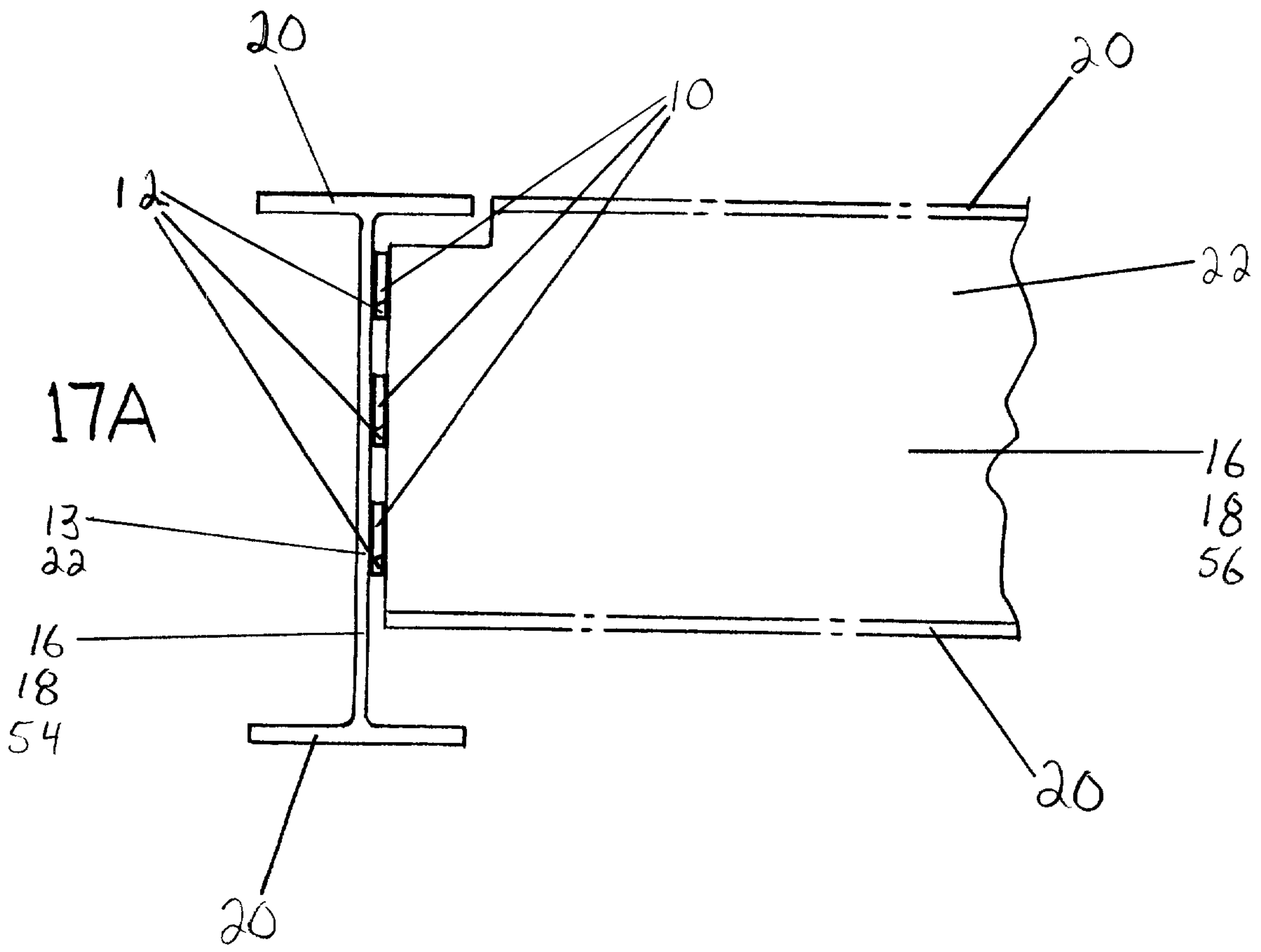


Fig. 18.

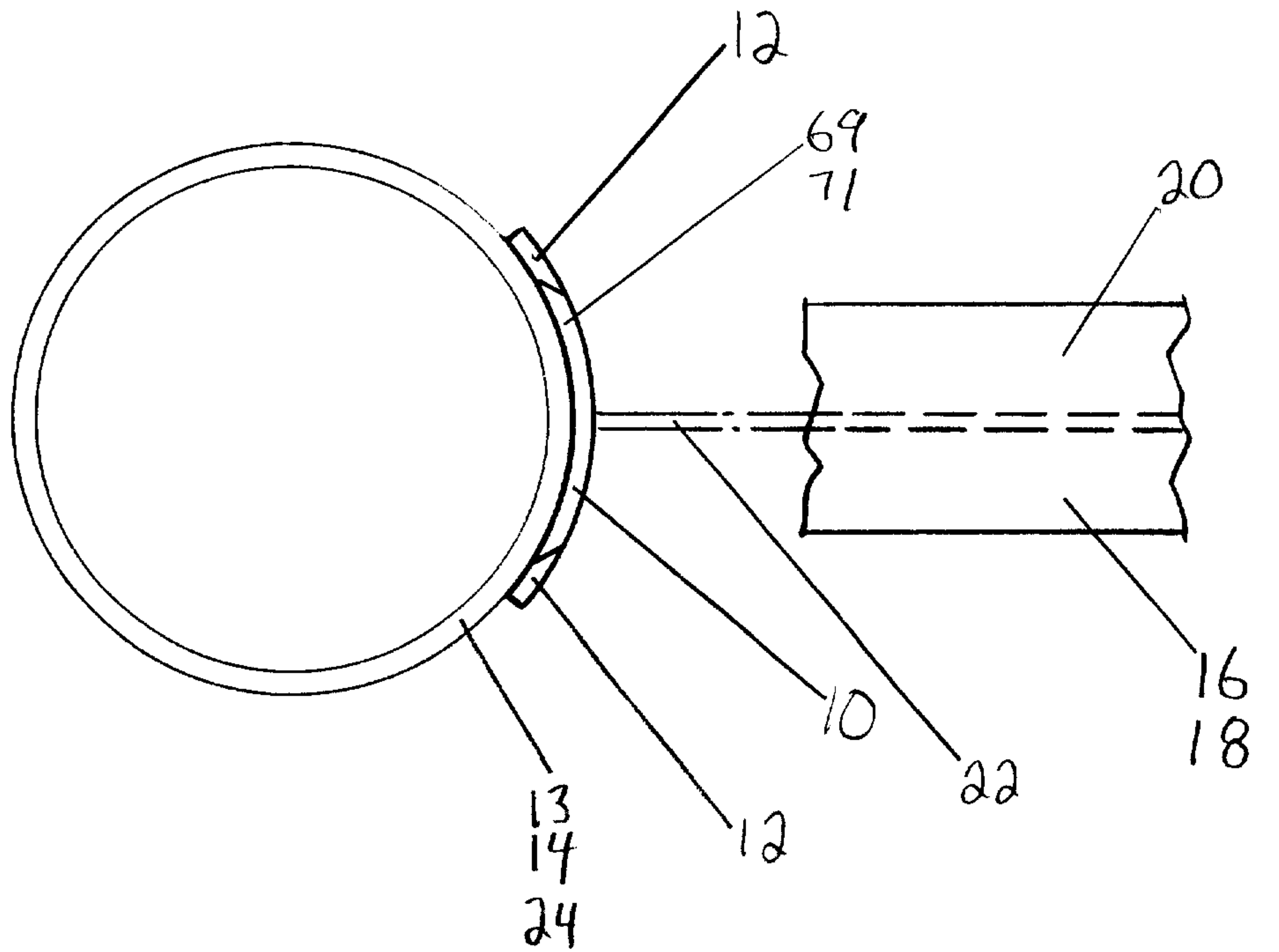
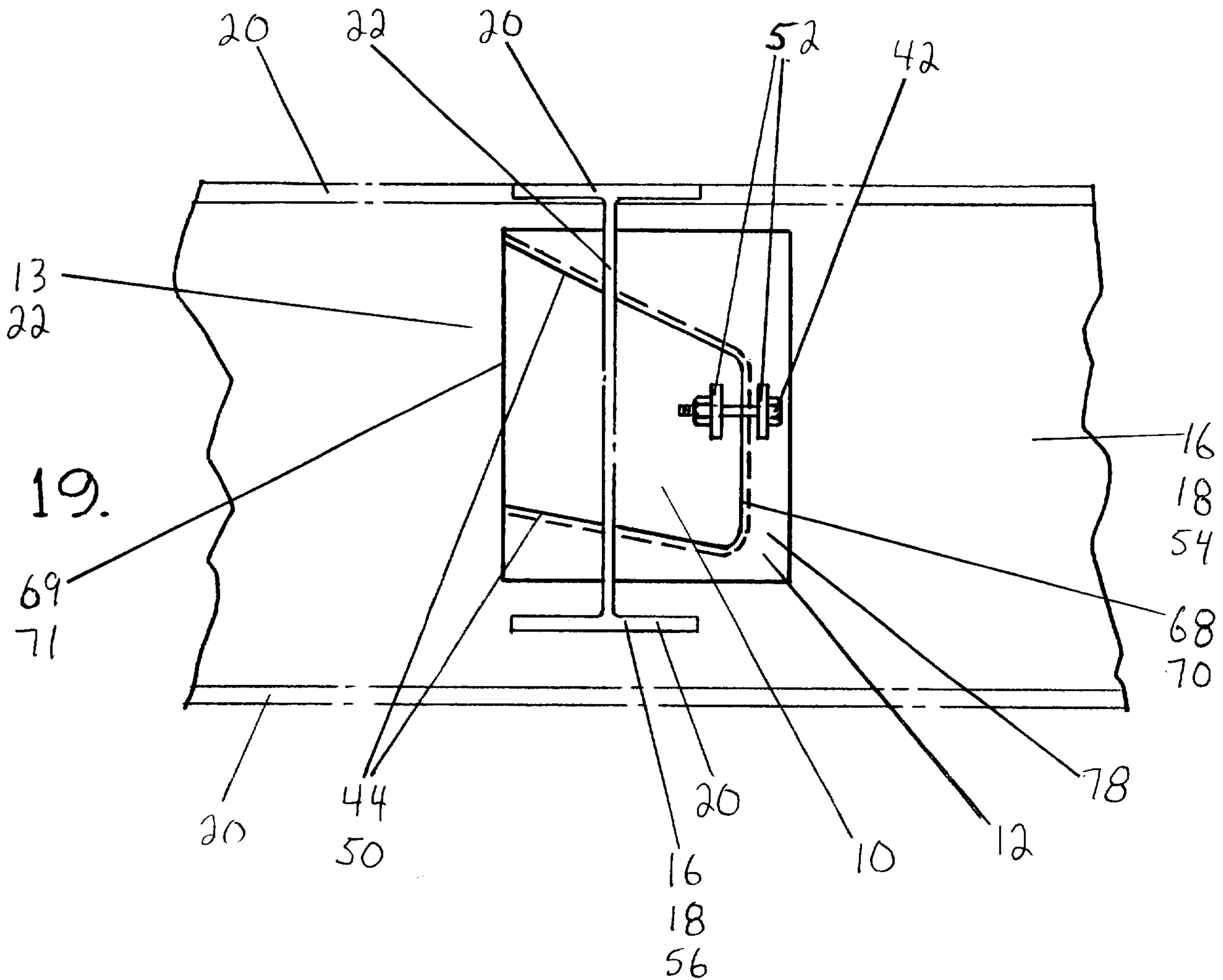


Fig. 19.



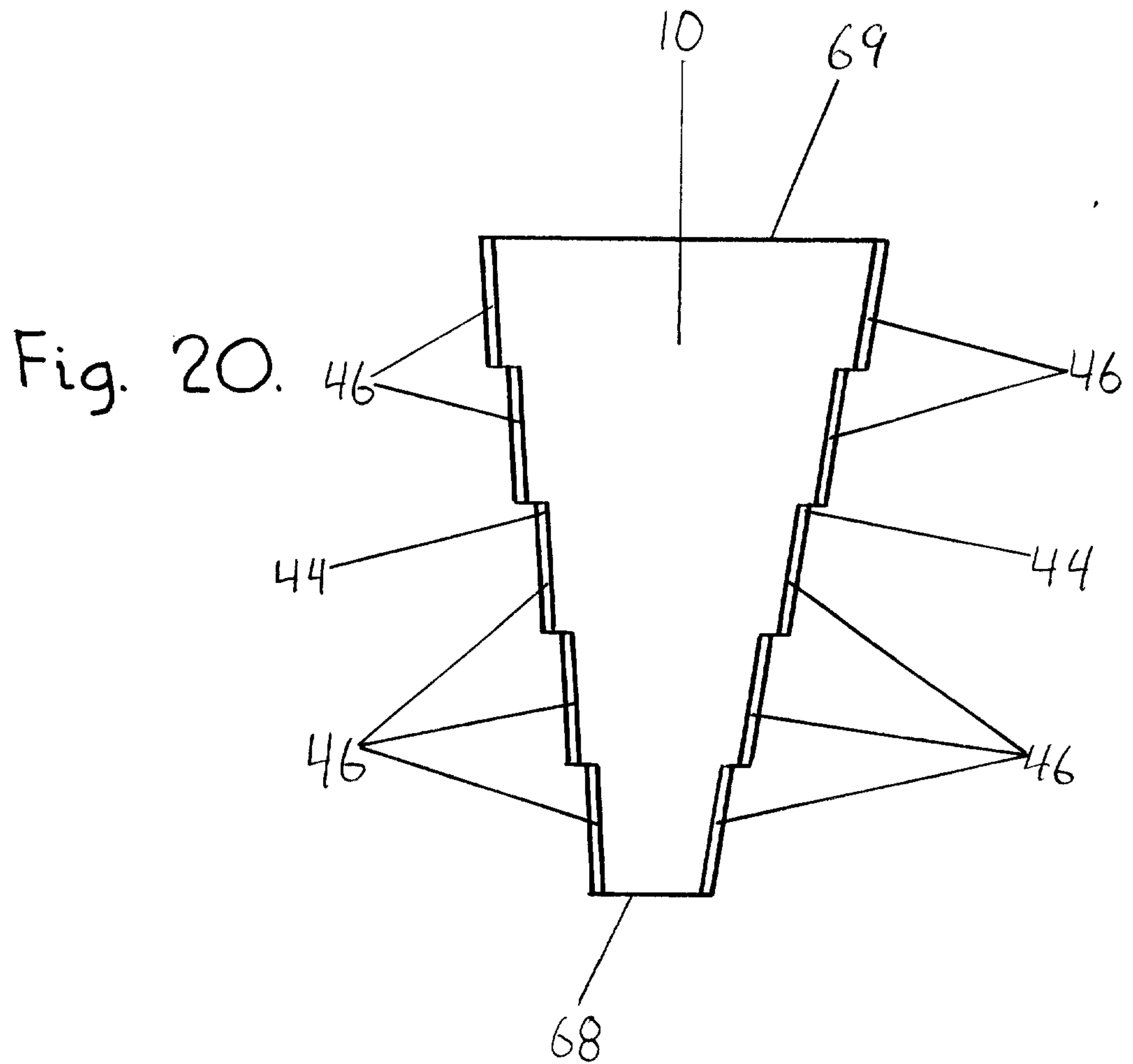


Fig. 21.

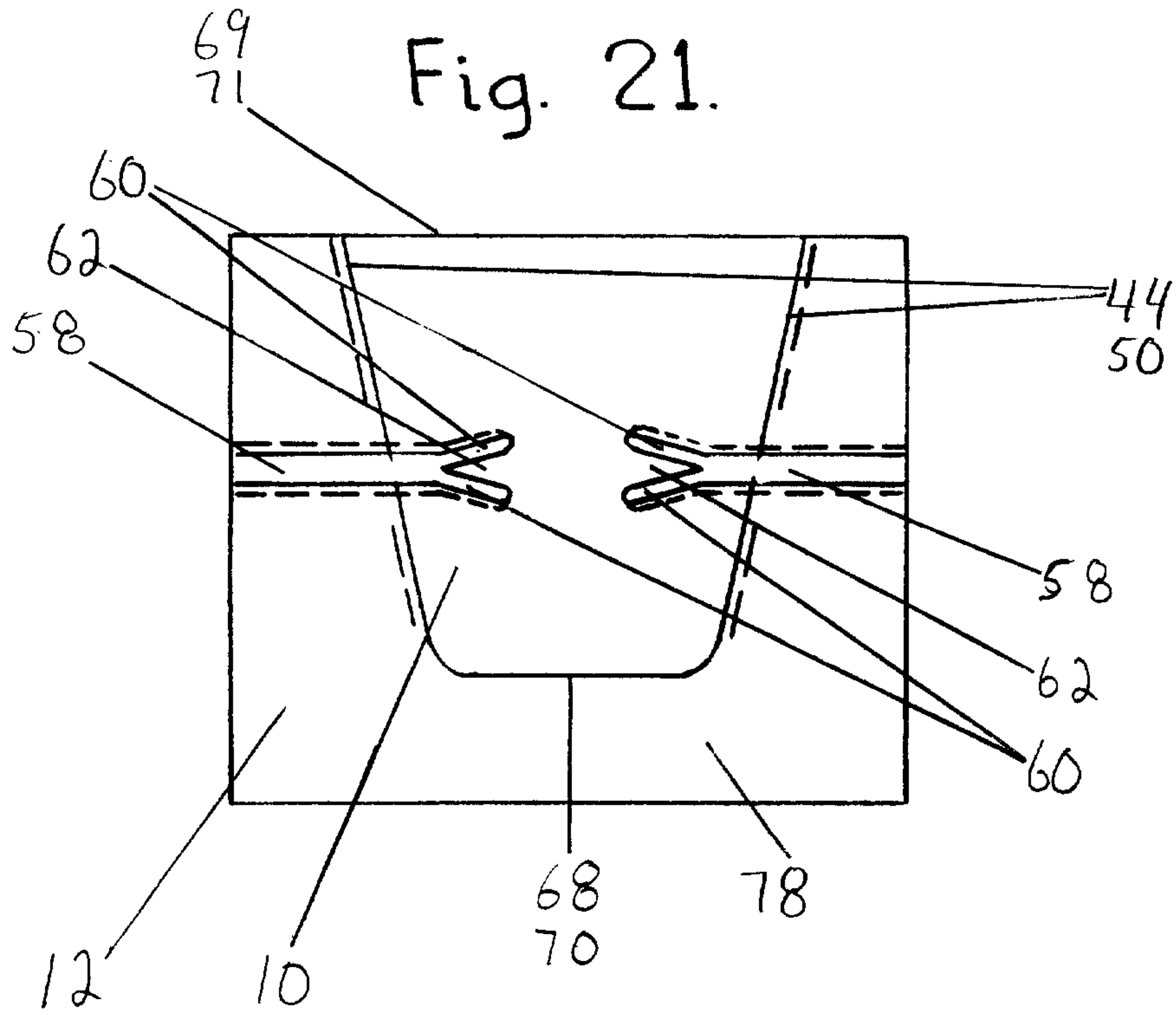


Fig. 21A

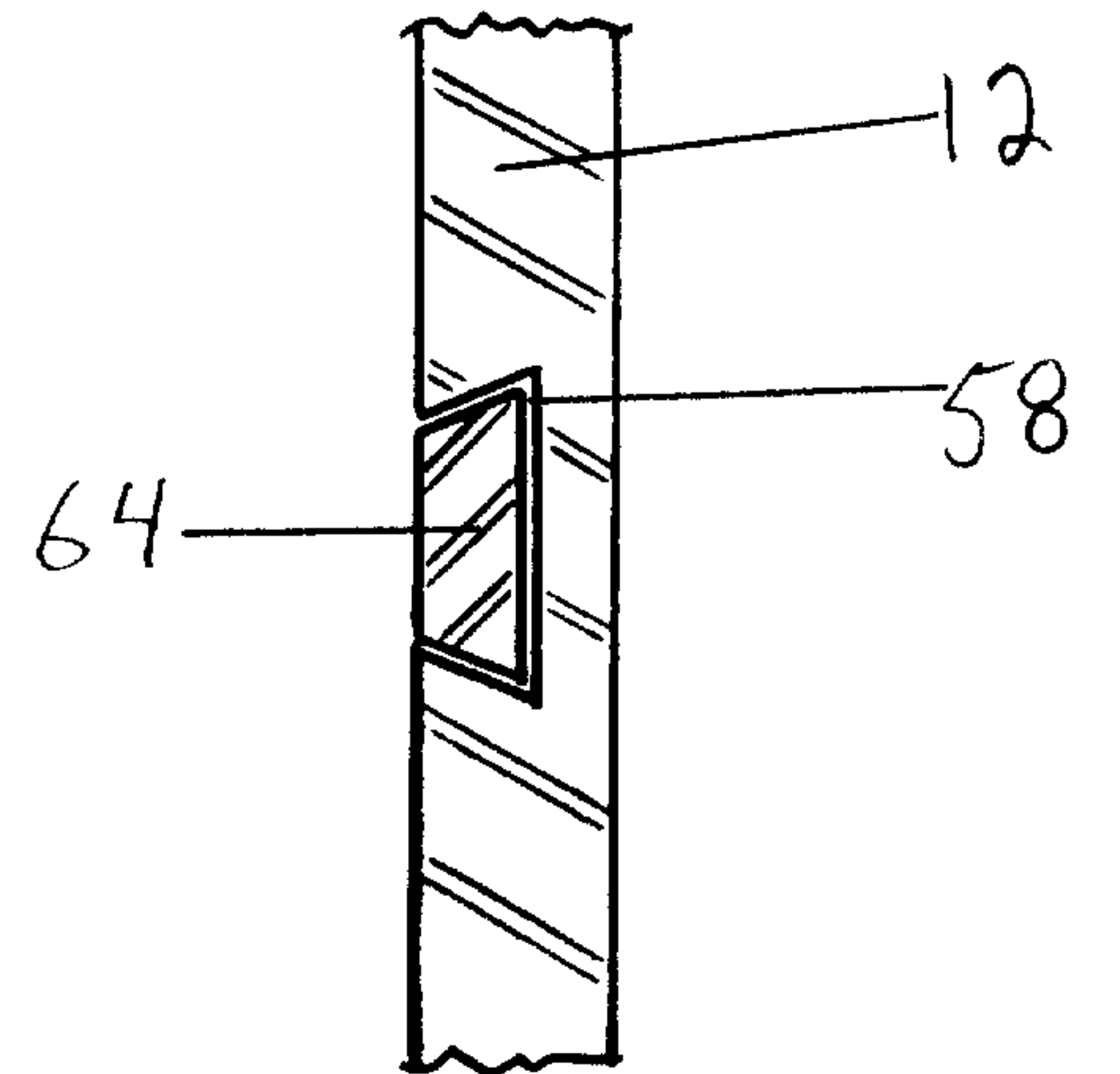


Fig. 22.

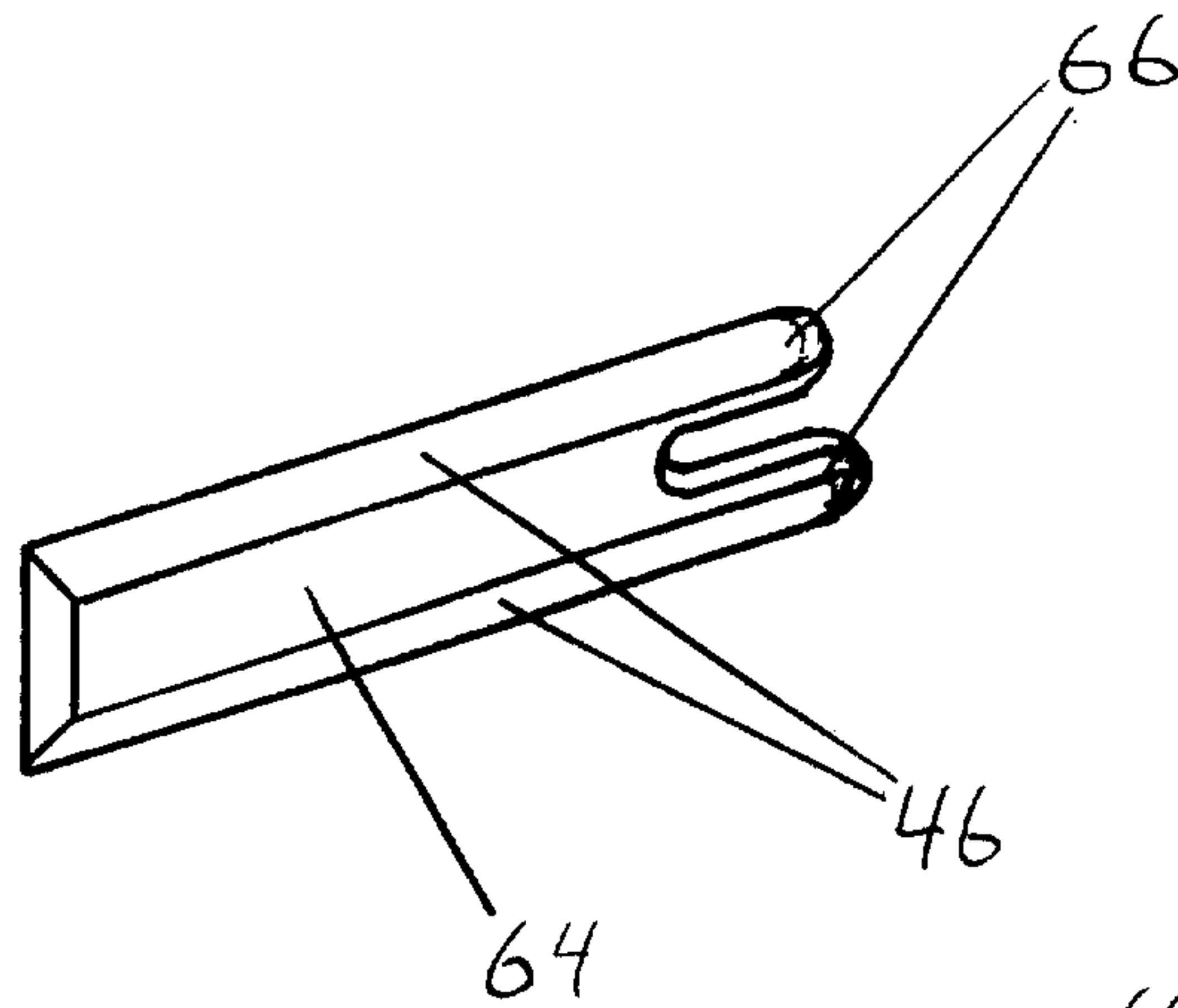


Fig. 23

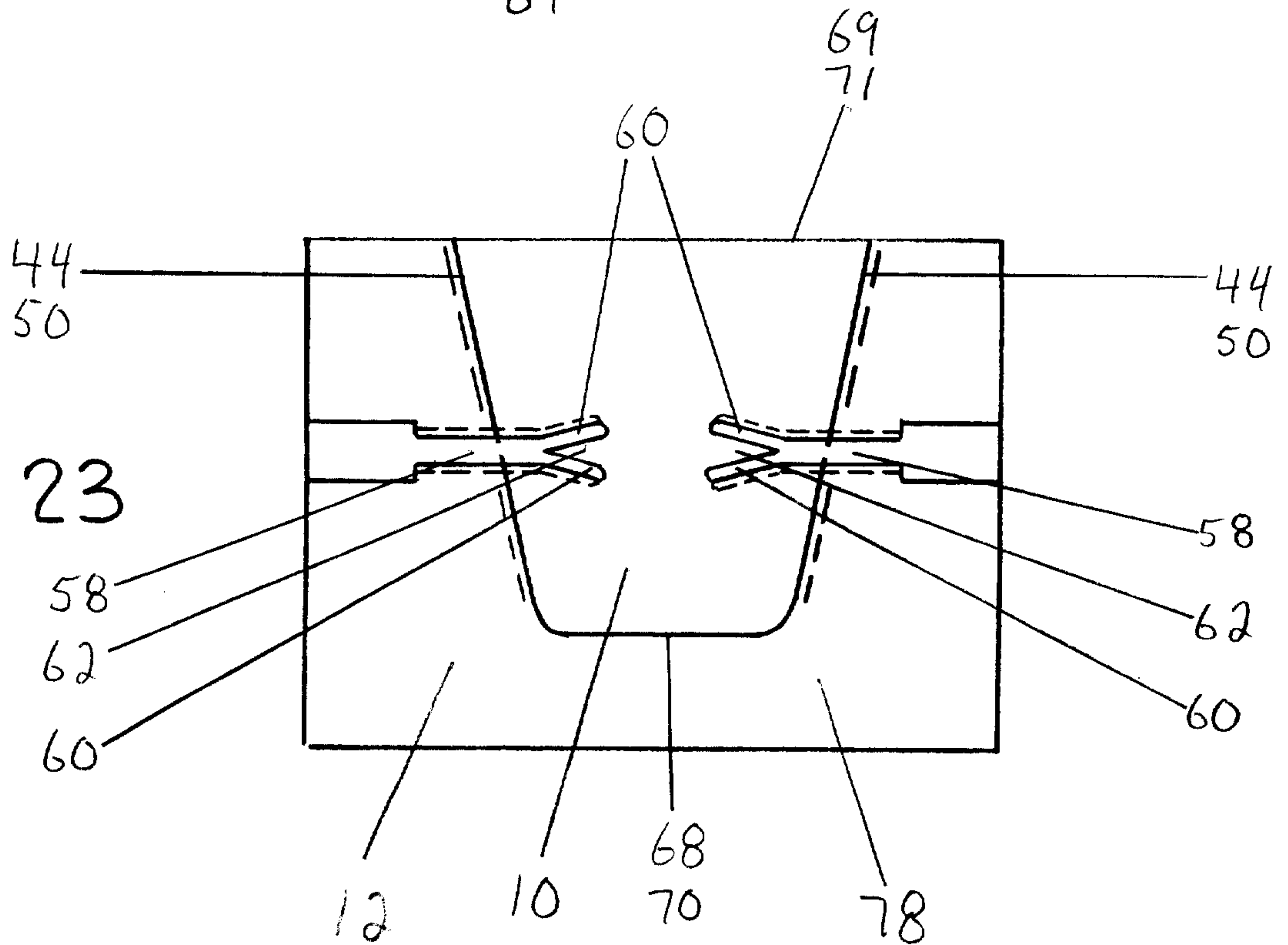


Fig. 24.

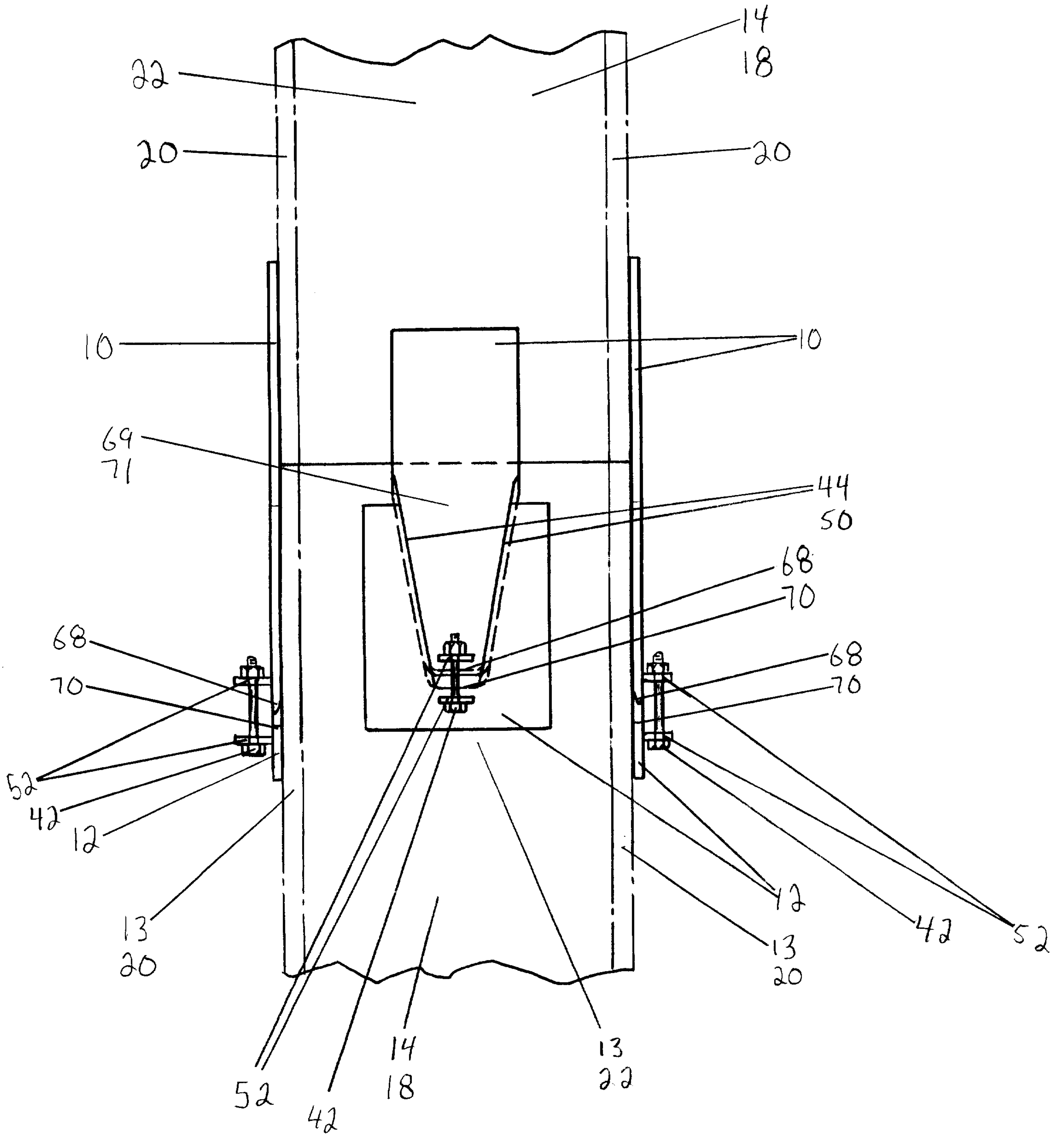


Fig. 25.

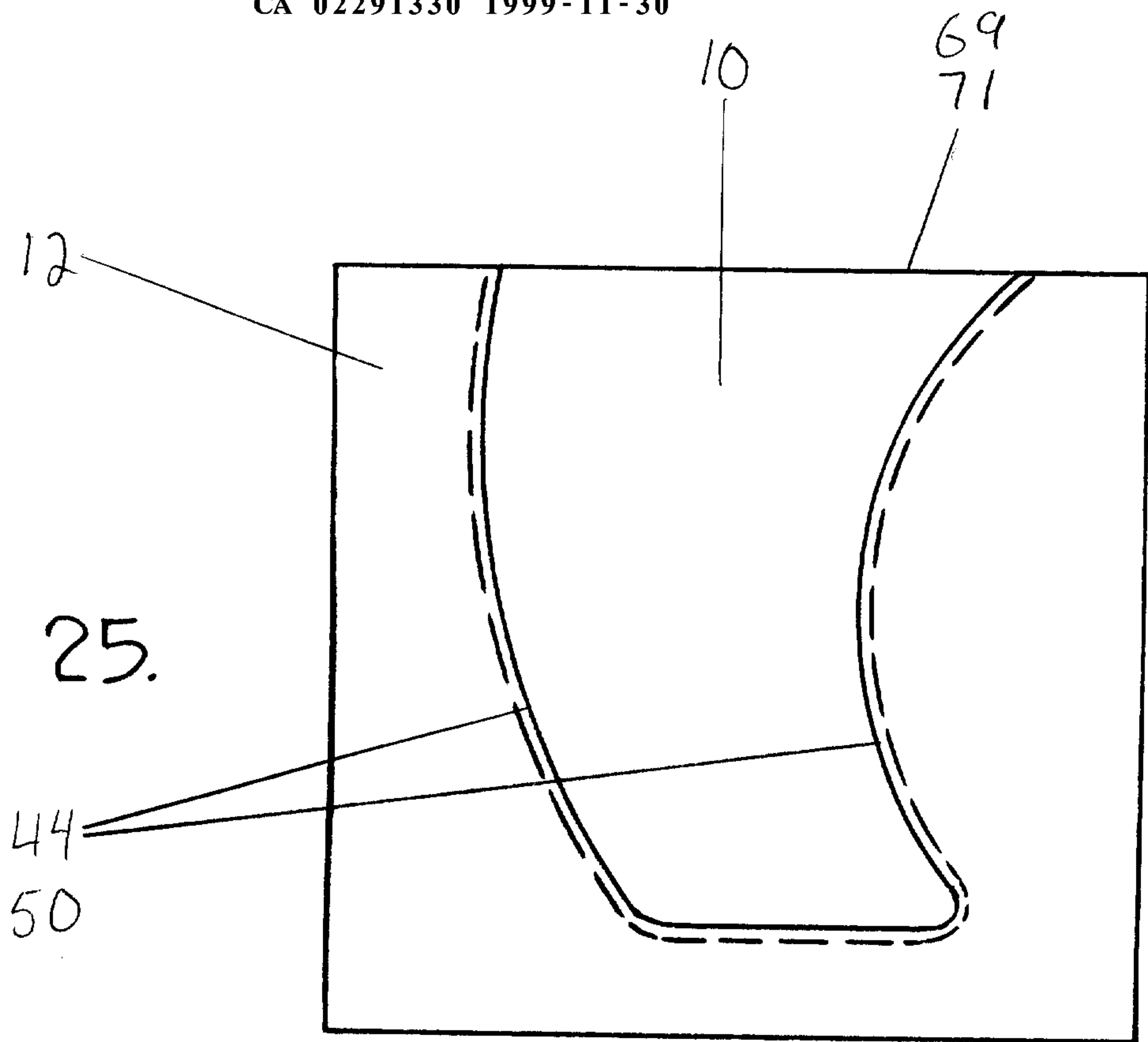


Fig. 25A.

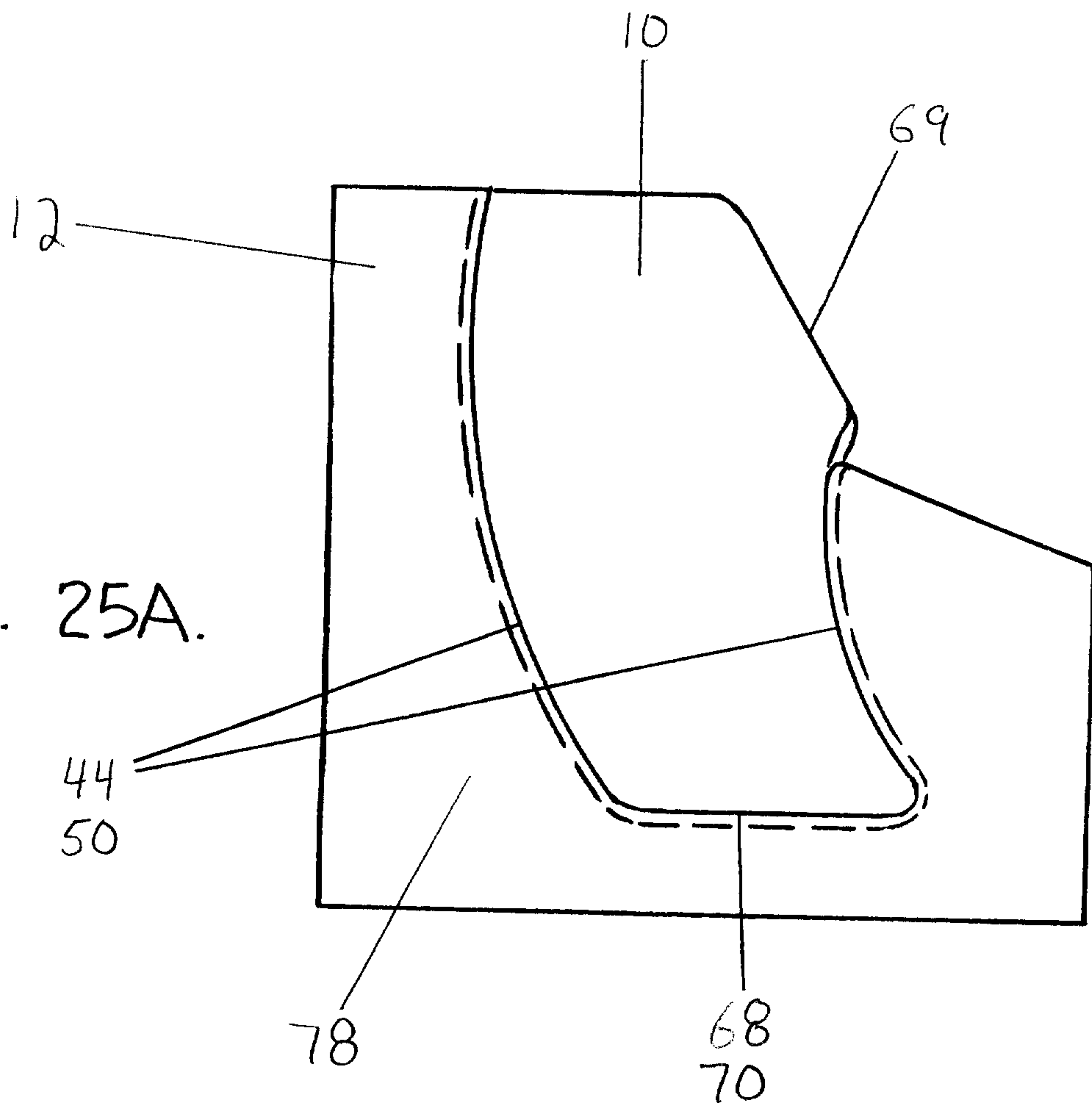


Fig. 26.

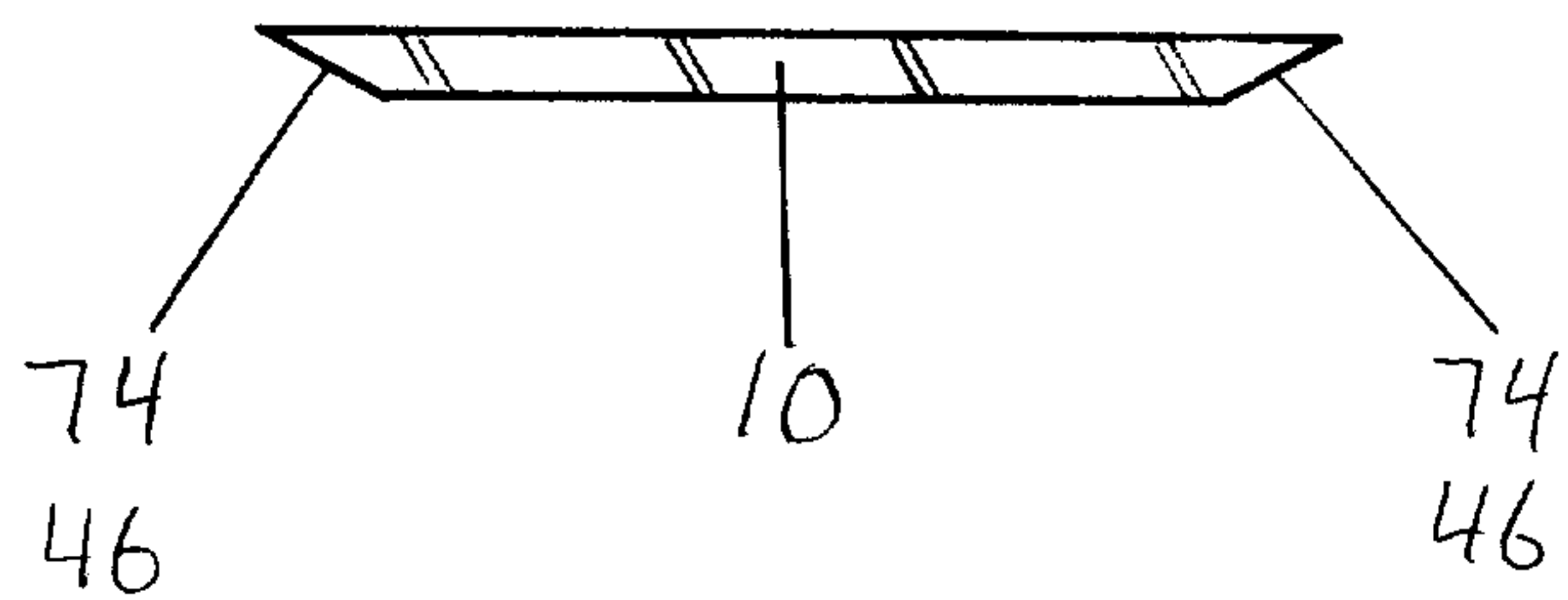


Fig. 27.

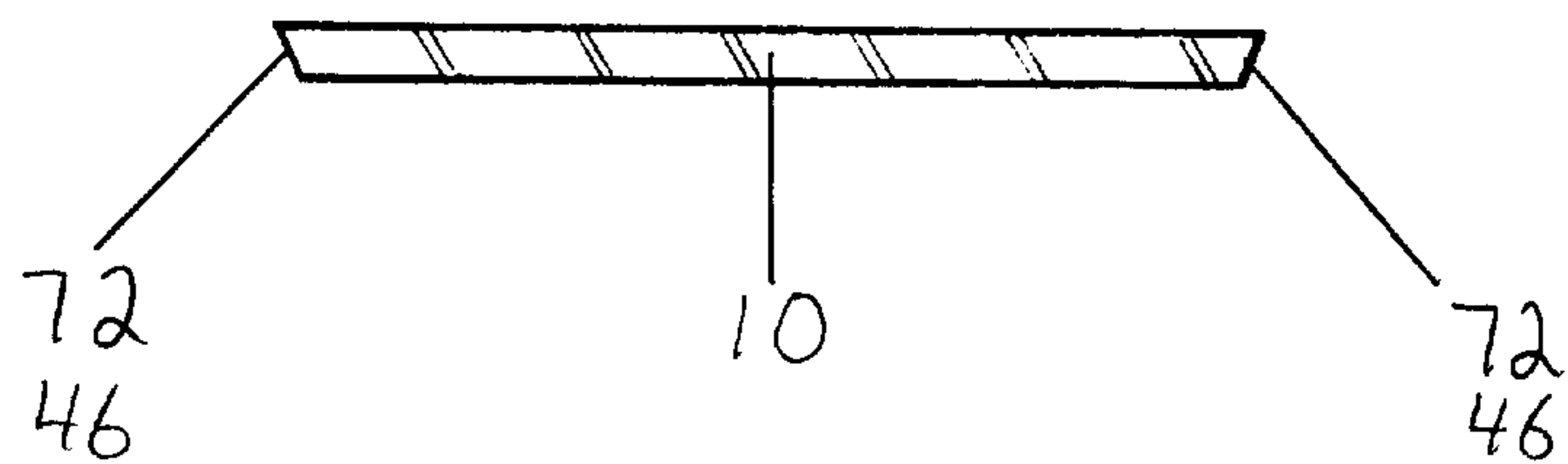


Fig. 28.

