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(54) A LINER FOR A MANHOLE

AUSKLEIDUNG FÜR EIN MANNLOCH

HABILLAGE D'UN REGARD DE CHAUSSÉE

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(73) Proprietor: **Northstone (NI) Limited**
Dunmurry, Belfast BT17 9NU (GB)

(72) Inventors:
- **PRINGLE, Graeme James**
  Wallasey
  Wirral CH45 6XL (GB)
- **CASSIDY, Lee**
  Kirkby
  Merseyside L33 4EX (GB)

(74) Representative: **Wilson Gunn**
Blackfriars House
The Parsonage
5th Floor
Manchester M3 2JA (GB)

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Description

[0001] The present invention relates to a liner. The liner is particularly, but not exclusively intended for use in manhole chambers and the like.

[0002] Liners are used to line a manhole chamber to provide a barrier between the space defined by the chamber and the surrounding earth. Liners of this general type are known. One such liner is disclosed in EP0787861 which describes a liner comprising a number of stackable sections moulded from synthetic plastics materials. Each section comprises inner and outer skins joined together by two series of webs extending between and at right angles to the skins in the stacking direction. The sections are adapted to be stacked upon one another to permit the assembly of a corrosion resistant load bearing, rigid and deformation resisting structure.

[0003] A problem with this arrangement is that its ability to withstand the external forces exerted by the surrounding earth is limited. It is therefore an object of the present invention to provide a stronger, improved liner.

[0004] According to a first aspect of the present invention, there is provided a piece according to claim 1. According to a second aspect of the invention there is provided a method according to claim 5. According to a third aspect of the invention there is provided a stackable section according to claim 7.

[0005] Advantageously, a liner comprising one or more stackable sections according to the present invention is stronger and more capable of withstanding the external forces applied by the surrounding earth.

[0006] At least a part of one web may extend from the inner skin to the outer skin. The stackable section may comprise an elongate member and at least two webs or a combination of webs may extend over a majority of the elongate member.

[0007] At least two webs may be substantially parallel and spaced apart. The section may comprise two or more pieces. At least a substantial portion of one piece may be substantially straight. At least one piece may be curved.

[0008] The section may define a perimeter which is substantially rectangular in shape. At least one straight piece may have two or more webs. The webs may extend substantially from one end of the piece to the other.

[0009] At least two webs may be arranged to define a channel through which may be inserted a reinforcing element. The channel may be adapted to support a reinforcing element. At least one curved piece may define a channel for receiving a reinforcing element. At least one straight piece may be made by pultrusion. The ends of the straight pieces may be adapted to be connected to the ends of the curved pieces. An end of a straight piece and an end of a curved piece may comprise mutually engageable formations.

[0010] The piece may be substantially straight. The inner and outer skins and at least one web may define a space and at least one other web may extend into the space. The piece may be made by pultrusion.

[0011] In order that the invention may be more clearly understood one embodiment thereof will now be described by way of example with reference to the accompanying drawings, in which:

Fig. 1 is a plan view of a section of a liner comprising a number of pieces;

Fig. 2 is an underside view of the section of the liner shown in Fig. 1;

Fig. 3 is a side view of the section of the liner shown in Fig. 1;

Fig. 4 is a plan view of a longitudinal piece of the section of the liner shown in Fig. 1;

Fig. 5 is a side view of the longitudinal piece shown in Fig. 4;

Fig. 6 is an underside view of the longitudinal piece shown in Fig. 4;

Fig. 7 is an enlarged cross-sectional view of the longitudinal piece shown in Fig. 4;

Fig. 8 is an enlarged perspective view of a corner piece of the section of the liner shown in Fig. 1;

Fig. 9 is an enlarged outer side view of the corner piece shown in Fig. 8;

Fig. 10 is an enlarged inner side view of the corner piece shown in Fig. 8;

Fig. 11 is an enlarged underside view of the corner piece shown in Fig. 8;

Fig. 12 is an enlarged plan view of the corner piece shown in Fig. 8;

Fig. 13 is an enlarged perspective view of the other type of corner piece of the section of the liner shown in Fig. 1;

Fig. 14 is an enlarged inner side view of the corner piece shown in Fig. 13;

Fig. 15 is an enlarged outer side view of the corner piece shown in Fig. 13;

Fig. 16 is an enlarged plan view of the corner piece shown in Fig. 13;

Fig. 17 is an enlarged underside view of the corner piece shown in Fig. 13;

Fig. 18 is a side view of a number of sections shown in Fig. 1 in an alternating stacking arrangement;

Fig. 19 is a perspective view of a longitudinal piece having two recesses for accommodating a seal;

Fig. 20 is an enlarged view of the lower corner of the piece shown in Fig. 19;

Fig. 21 is an enlarged view of the upper corner of the piece shown in Fig. 19;

Fig. 22 is an enlarged cross-sectional view of the piece shown in Fig. 19;

Fig. 23 is an enlarged perspective view of a corner piece having two recesses for accommodating a seal;

Fig. 24 is an enlarged view of the upper corner

of the corner piece shown in Fig. 23;

Fig. 25 is an enlarged view of the lower corner of the corner piece shown in Fig. 23;

Fig. 26 is an enlarged perspective view of another corner piece having two recesses for accommodating a seal; and

Figs 27 to 30 show various view of a stackable section comprising four longitudinal pieces shown in Fig. 19, two corner pieces shown in Fig. 23 and two corner pieces shown in Fig. 26;

[0012] In the following the terms upward, upper, lower, inner, outer and like terms are used for convenience and refer to the stackable section and liner as shown oriented in the drawings, the orientation in which it is intended to be used, and should not be taken as otherwise limiting.

[0013] Referring to the drawings the liner 200 may comprise one or more stackable sections 1. Each section 1 comprises four longitudinal pieces 3 of substantially equal length and dimension. Each section 1 also comprises two pairs of corner pieces made from moulded plastics material One pair of corners 7 has arms 8 that are greater in length than the arms 10 of the other pair of corners 9. The section 1 is assembled such that a corner 7, 9 of each pair is diagonally opposite its twin. Each longitudinal piece 3 is connected at either end to the arm 8, 10 of an adjacent corner 7, 9. Since, in each case, one end of each piece 3 is connected to a long arm 8 of a corner 7 and the other end is connected to a short arm 10 of a corner 9, the assembled section 1 forms a substantially square perimeter. Of course, other shapes are possible by varying the lengths of the longitudinal pieces 3. The longitudinal 3 and corner 7, 9 pieces of the section 1 are shaped and configured such that a number of assembled sections 1 can be superposed to form an assembled chamber liner 200 of a desired depth which extends in the upwards or stacking direction.

[0014] Each longitudinal piece 3 is made from fibreglass material impregnated with plastics material such as a polyester resin. The longitudinal piece 3 comprises an inner skin 11 and an outer skin 13 joined together by an upper web 15 that extends between and substantially at right angles to the inner and outer skins 11, 13 at their upper edges 17 and 19. The longitudinal piece 3 also comprises second and third webs 21 and 23 that extend between and substantially at right angles to the mid point region of the inner and outer skins 11, 13. The second and third webs 21, 23 together define a central chamber 25 running the length of the longitudinal piece 3 through which can be inserted a reinforcing steel bar (not shown). A lower web 27 extends between and substantially at right angles to the inner and outer skins 11, 13 toward their lower edges 29 and 31. The distance between the lower web 27 and the lower edges 29, 31 is chosen so as to provide a suitably sized recess 32 to receive the upper side 33 of a corresponding liner section 1.

[0015] Extending along the longitudinal piece 3 between the mid points of the upper and lower webs 15, 27 and the adjacent second and third webs 21, 23 are two central webs 35 and 37. The central webs 35, 37 are arranged to be substantially parallel to the inner and outer skins 11, 13. Each web 15, 21, 23, 27, 35, 37 extends substantially from one end of the longitudinal piece 3 to the other.

[0016] The upper edges 17 and 19 of each longitudinal piece 3 are rebated to produce a rectangular recess along the upper periphery of the piece 3. As discussed, the lower periphery of the piece 3 is formed in complementary manner to provide a recess 32 for receiving the upper side 33 of another piece 3 in an interference fit. One of the lower edges 31 of a longitudinal piece 3 has a projection 39 extending outwardly from the outer skin 13 and which runs along the entire length of the piece 3. The projection 39 acts as a further barrier to external contaminants including moisture at the interface between the upper part of one section and the lower part of another section when superposed.

[0017] The longitudinal piece 3 is manufactured using a pultrusion process in which fibreglass roving, matt or cloth is drawn through a resin bath where the material is impregnated with a liquid thermosetting resin such as polyester resin. The wet fibrous material is then formed into the desired geometric shape and pulled through a heated die where it solidifies in the exact shape of the heated die. The resulting longitudinal piece 3 is continuously drawn out from the die and cut off at desired lengths. Since the pultruded article passes continuously through the heated die, the longitudinal piece 3 is of substantially constant cross section. The mechanical properties of the longitudinal piece 3 formed by the process of pultrusion are generally superior to those of an injection moulded article made from synthetic plastics material.

[0018] The two different corner pieces 7 and 9 share the same approximate height and depth as the longitudinal piece 3 and are both adapted to receive an end of a longitudinal piece 3 on their respective arms 8 and 10. The arms 8, 10 each comprise four projections 40 and 42 which extend outwardly from the body 44, 46 of the respective corner pieces 7, 9. Each projection 40, 42 is shaped and configured to extend into a correspondingly positioned hollow chamber formed in a longitudinal piece 3 by the webs 15, 21, 23, 27, 35, 37 and inner and outer skins 11, 13. Each projection 40, 42 is formed with a V-shaped cut-out 41, 43 which enables the projections to flex and be compressed when inserted into a corresponding chamber of a longitudinal piece 3 thus improving the interference fit between the corresponding pieces.

[0019] A region of each arm 8, 10 extends beyond the corner body 44, 46 such that the inner and outer skins 11, 13 of a longitudinal piece 3 lie between the inner wall of the arms 8,10 and adjacent projections 40, 42. The surface 50, 52 of the inner wall of the arms 8, 10 has a series of V-shaped grooves to aid bonding of the end of a longitudinal piece 3 to a corresponding corner piece 7, 9 using an adhesive. The arm extensions also comprise

holes 60, 62 which extend from the inner side of the corner piece 7, 9 to the outer side through adjacent projections 40, 42. Dowels (not shown) may be inserted through the holes 60, 62 to help hold the longitudinal and corner pieces 3, 7, 9 together.

[0020] The arms 8, 10 of the two types of corner pieces 7, 9 are different in length so as to permit the sections 1 to be stacked in an alternating arrangement as shown in Fig. 18. The sections 1 are arranged so that a short arm corner 9 is placed on top of a long arm corner 7 and vice versa so as to offset the joint between the longitudinal pieces 3 and the corners 7, 9. This pattern is repeated to provide a strong, stable structure. If the corners each had arms of equivalent length, the joint between the longitudinal pieces 3 and the corners 7, 9 would align and extend up the wall of the liner 200 thereby compromising its strength and stability.

[0021] As with the longitudinal pieces 3, the corners 7, 9 comprise inner and outer skins 80 and 82 joined at their upper edges 68, 69 by a web 70. The upper edges 68, 69 of each corner piece 7, 9 are rebated to provide a recess along the upper periphery of the corners 7, 9. The lower periphery of the corners 7, 9 is formed in complementary manner to so as to receive the upper side of another corner piece. The form of the rebated region of the upper edges 68, 69 and the lower periphery of the corner pieces 7, 9 correspond to that of the longitudinal pieces 3 so that the upper and lower sides of an assembled section 1 have a continuous profile. Thus, an assembled section 1 can be superposed with another assembled section 1 and held in place by interference fit.

[0022] The inner and outer skins 80, 82 of each corner 7, 9 are also held together by supporting webs 90, 92. One supporting web 94 extends between the midpoints of the inner and outer skins 80, 82 which tends to be the region of the corner 7, 9 under the greatest amount of stress. A plurality of other supporting webs 96 extend between the inner and outer skins 80, 82 either side of the central supporting web 94 in a criss-cross arrangement. The supporting webs 90, 92 together form a rib structure that holds the inner and outer skins 80, 82 together thereby improving the strength of the corners 7, 9.

[0023] Each web support 90, 92 comprises a cut-out region 100 that together form a channel along the length of the corner piece 7, 9. The channel bisects the midpoint between the inner and outer skins 80, 82 and is aligned with the channel between the corner projections 40, 42. This permits a strengthening steel bar (not shown) to be inserted into the corner 7, 9 thereby increasing the comer's ability to withstand the forces exerted on the outer skin 82.

[0024] In use, after digging a hole in the ground and preparing a base (usually concrete), a number of sections 1 sufficient to line the hole are assembled. The assembly procedure comprises the steps of coating the corner arms 8, 10 and corner projections 40, 42 with adhesive and inserting them into corresponding chambers in the end of a longitudinal piece 3. The corners 7, 9 are alternated so that a long armed corner 7 is inserted in one end of a longitudinal piece 3 and a short armed corner 9 is inserted in the other end of the longitudinal piece 3. The assembled section 1 therefore comprises two short arm corner pieces 9, two long arm corner pieces 7 and four longitudinal pieces 3. Steel rods may optionally be inserted into the central chamber 25 of the longitudinal pieces 3 and the central channel 100 of the corner pieces 7, 9 to improve the stiffness of the section 1. Dowels may also optionally be inserted through the holes 60 of the corner pieces 7, 9 to hold the corresponding pieces firmly together.

[0025] The assembled sections 1 are introduced into the hole to build up a liner. Each new section 1 is arranged so that the corner positions are alternated to ensure an overlapping joint arrangement. When the liner 200 is stacked to the desired height, a lid (not shown), which is adapted to cooperate with the upper side of a stackable section 1, may be placed on top of the liner. This arrangement provides a strong, stable liner capable of withstanding the external forces from the surrounding earth.

[0026] Referring to Figs 19 to 30, in an alternative embodiment, the straight, longitudinal piece 300 comprises a recess 320 formed in its outer facing upper edge 19. The recess 320 runs along the length of the longitudinal piece 300 and is shaped and configured to receive a suitably sized and shaped rubber seal (not shown) in an interference fit and/or with the aid of an adhesive. The recess 320 comprises a lip 322 that extends in an upward direction so as to capture the seal and hold it in place within the recess 320 even with the application of an external force in a downward direction.

[0027] A second recess 324 is formed in the inner corner of the lower outer edge of the longitudinal piece 300 and is positioned such that, when one piece 300 is stacked on top of another, the second recess 324 of the upper piece sits adjacent the first recess 320 of the lower piece 300 thereby forming a substantially circular enclosure that runs along the length of the two pieces. When the seal is seated within the enclosure formed by the first 320 and second 324 recesses of the stacked pieces 300, a substantially water impermeable seal is formed between the stacked pieces so that water and other contaminants cannot easily breach the interface between the upper and lower sides of the stacked pieces and enter the liner interior.

[0028] A recess 340 is also formed in the rebated region of the upper outer edge 68 of the corner pieces 307, 309 of the stackable section. The recess 340 is substantially semi-circular in form and runs around the perimeter of the corner piece from one end to the other. The recess 340 is positioned such that, when a corner piece 307, 309 is connected to a longitudinal piece 300, the recess 340 of the corner piece 307, 309 is substantially aligned with the recess 320 of the longitudinal piece so that an unbroken seal can be securely seated around the entire perimeter of the assembled stackable section 1 without any kinks. A second recess 342 is cut into the inner corner

of the lower outer edge of the corner piece 307, 309 and shaped and positioned such that, when a corner piece 307 is stacked on top of another corner piece 309, the second recess 342 of the top corner piece 307 sits adjacent the upper recess 340 of the lower corner piece 307 thereby forming an enclosure that is substantially aligned with the enclosure of the longitudinal pieces 300 when in an assembled form.

[0029] When stacked, the inner 344 and bottom 346 faces of the lower periphery of the corner piece 309 interface with the adjacent faces of the rebated region of the upper outer edge 68 of the lower corner piece 307 in the stacked arrangement. As with the stacked longitudinal pieces 300, the seal (not shown) seated within the enclosure formed by the two recesses 340, 342 provides a substantially water impermeable seal between the two corner pieces 307, 309 so that water cannot easily pass into the liner interior.

[0030] A liner comprising a number of stackable sections 1 according to this second embodiment can therefore better restrict the passage of water and other contaminants from the liner exterior to the interior than a liner without the seal seating arrangement. In all other aspects, the second embodiment is substantially equal in construction and method of operation as the first described embodiment.

Claims

1. A piece (3) for a stackable section (1) used in a liner (200) for a manhole chamber comprising an inner skin (11) and an outer skin (13) and two or more webs (15, 21, 23, 27); **characterised by** the webs (15, 21, 23, 27) extending in a direction generally perpendicular to the stacking direction substantially from one end of the piece (3) to the other.

2. A piece (3) as claimed in claim 1, wherein the piece (3) is substantially straight.

3. A piece (3) as claimed in claim 1 or 2, wherein the inner and outer skins (11, 13) and at least one web (15, 27) define a space and at least one other web (21, 23) extends into the space.

4. A piece (3) as claimed in any of claims 1 to 3, wherein the piece (3) is made by pultrusion.

5. A method of forming a piece (3) for a stackable section (1) for use in a liner (200) for a manhole chamber, the method **characterised by** comprising pultruding a piece (3) comprising an inner skin (11) and an outer skin (13) and two or more webs (15, 21, 23, 27), the webs (15, 21, 23, 27) extending in a direction generally perpendicular to the stacking direction.

6. A method according to claim 5 wherein the webs (15, 21, 23, 27) extend substantially from one end of the piece (3) to the other.

7. A stackable section (1) which may be stacked with other sections to form a liner (200) for a manhole chamber, the stackable section (1) comprising an inner and outer skin (11, 13) and at least a part of the stackable section (1) comprising at least two webs (15, 21, 23, 27) extending in a direction generally perpendicular to the stacking direction, wherein the section (1) comprises four pieces (3) that are substantially straight and four pieces (7, 9) that are curved, **characterised in that** one curved piece (7) extends in a direction generally perpendicular to the stacking direction a distance greater than another curved piece (9) and **in that** at least one of the straight pieces (3) is a piece (3) according to any of claims 1-4.

8. A stackable section (1) as claimed in claim 7, wherein at least a part of one web (15, 21, 23, 27) extends from the inner skin (11) to the outer skin (13).

9. A stackable section (1) as claimed in claim 7 or claim 8, wherein the stackable section 91) defines a perimeter having two ends and at least one web (15, 21, 23, 27) or a combination of webs (15, 21, 23, 27) extends over a majority of the distance between the two ends.

10. A stackable section (1) as claimed in claim 9, wherein at least one web (15, 21, 23, 27) or a combination of webs (15, 21, 23, 27) extends around a majority of the perimeter.

11. A stackable section (1) as claimed in any of claims 7 to 10, wherein at least two webs (15, 21, 23, 27) are substantially parallel and spaced apart.

12. A stackable section (1) as claimed in any of claims 7 to 11, wherein the section (1) defines a perimeter which is substantially rectangular in shape.

13. A stackable section (1) as claimed in any of claims 7 to 12, wherein at least one straight piece (3) is made by pultrusion.

14. A liner (200) for a manhole chamber comprising two or more stackable sections (1) according to any of claims 7 to 13.

Patentansprüche

1. Teil (3) für einen stapelbaren Abschnitt (1), der in einer Auskleidung (200) für eine Kammer eines Einstiegsschachts verwendet wird, mit einer inneren Haut (11) und einer äußeren Haut (13) und zwei oder

mehr Stegen (15, 21, 23, 27), **dadurch gekennzeichnet, dass** die Stege (15, 21, 23, 27) in einer Richtung allgemein senkrecht zu der Stapelrichtung im Wesentlichen von einem Ende des Teils (3) zum anderen verlaufen.

2. Teil (3) wie Anspruch 1 beansprucht, wobei das Teil (3) im Wesentlichen gerade ist.

3. Teil (3) wie in Anspruch 1 oder 2 beansprucht, wobei die innere und äußere Haut (11, 13) und wenigstens ein Steg (15, 27) einen Raum definieren und wenigstens ein Steg 821, 23) in den Raum verläuft.

4. Teil (3) wie in einem der Ansprüche 1 bis 3 beansprucht, wobei das Teil (3) durch Pultrusion hergestellt ist.

5. Verfahren zum Herstellen eines Teils (3) für einen stapelbaren Abschnitt (1), der zur Verwendung in einer Auskleidung (200) für eine Kammer eines Einstiegsschachts vorgesehen ist, **dadurch gekennzeichnet, dass** bei dem Verfahren durch Pultrusion ein Teil (3) mit einer inneren Haut (11) und einer äußeren Haut (13) und mit zwei oder mehr Stegen (15, 21, 23, 27) gebildet wird, wobei die Stege (15, 21, 23, 27) in einer Richtung im Allgemeinen senkrecht zu der Stapelrichtung verlaufen.

6. Verfahren nach Anspruch 5, wobei die Stege (15, 21, 23, 27) im Wesentlichen von einem Ende des Teils (3) zum anderen verlaufen.

7. Stapelbarer Abschnitt (1), der mit anderen Abschnitten übereinander gestapelt werden kann, um eine Auskleidung (200) für eine Kammer eines Einstiegsschachts zu bilden, wobei der stapelbare Abschnitt (1) eine innere und eine äußere Haut (11, 13) aufweist und wenigstens ein Teil des stapelbaren Abschnitts (1) wenigstens zwei Stege (15, 21, 23, 27) aufweist, die sich in eine Richtung im Allgemeinen senkrecht zu der Stapelrichtung erstrecken, wobei der Abschnitt (1) vier Teile (3), die im Wesentlichen geradlinig sind, und vier Teile (7, 9) hat, die bogenförmig sind, **dadurch gekennzeichnet, dass** ein bogenförmiges Teil (7) sich in einer Richtung allgemein senkrecht zu der Stapelrichtung über eine Distanz erstreckt, die größer als ein anderes bogenförmiges Teil (9) ist, und dass wenigstens eines der geradlinigen Teile (3) ein Teil (3) gemäß einem der Ansprüche 1 bis 4 ist.

8. Stapelbarer Abschnitt (1) wie in Anspruch 7 beansprucht, wobei wenigstens ein Teil eines Steges (15, 21, 23, 27) von der inneren Haut (11) zu der äußeren Haut (13) verläuft.

9. Stapelbarer Abschnitt (1) wie in Anspruch 7 oder Anspruch 8 beansprucht, wobei der stapelbare Abschnitt einen Umfang mit zwei Enden definiert und wenigstens ein Steg (15, 21, 23, 27) oder eine Kombination von Stegen (15, 21, 23, 27) sich über einen Großteil des Abstands zwischen den beiden Enden erstreckt.

10. Stapelbarer Abschnitt (1) nach Anspruch 9 wobei wenigstens ein Steg (15, 21, 23, 27) oder eine Kombination von Stegen (15, 21, 23, 27) sich um einen Großteil des Umfangs herum erstreckt.

11. Stapelbarer Abschnitt (1) wie in einem der Ansprüche 7 bis 10 beansprucht, wobei wenigstens zwei Stege (15, 21, 23, 27) im Wesentlichen parallel und auf Abstand zueinander liegen.

12. Stapelbarer Abschnitt (1) wie in einem der Ansprüche 7 bis 11 beansprucht, wobei der Abschnitt (1) einen Umfang definiert, der eine im Wesentlichen rechteckige Form hat.

13. Stapelbarer Abschnitt (1) wie in einem der Ansprüche 7 bis 12 beansprucht, wobei wenigstens ein gradliniges Teil (3) durch Pultrusion hergestellt ist.

14. Auskleidung (200) für eine Einstiegsschachtkammer mit zwei oder mehr stapelbaren Abschnitten (1) nach einem der Ansprüche 7 bis 13.

Revendications

1. Pièce (3) pour une partie (1) empilable utilisée dans un habillage (200) d'une chambre de regard, comprenant une peau (11) intérieure et une peau (13) extérieure et deux ou plusieurs nappes (15, 21, 23, 27), **caractérisée en ce que** les nappes (15, 21, 23, 27) s'étendent dans une direction d'une manière générale perpendiculaire à la direction d'empilage sensiblement d'une extrémité de la pièce (3) à l'autre.

2. Pièce (3) suivant la revendication 1, dans laquelle le pièce (3) est sensiblement droite.

3. Pièce (3) suivant la revendication 1 ou 2, dans laquelle les peaux (11, 13) intérieures et extérieures et au moins une nappe (15, 27) définissent un espace et au moins une autre nappe (21, 23) s'étend dans l'espace.

4. Pièce (3) suivant l'une quelconque des revendications 1 à 3, dans laquelle la pièce (3) est faite par pultrusion.

5. Procédé de formation d'une pièce (3) pour une partie (1) empilable à utiliser dans un habillage (200) d'une chambre de regard, le procédé étant **caractérisé en**

ce qu'il comprend la pultrusion d'une pièce (3) comprenant une peau (11) intérieure et une peau (13) extérieure et deux ou plusieurs nappes (15, 21, 23, 27), les nappes (15, 21, 23, 27) s'étendant dans une direction d'une manière générale perpendiculaire à la direction d'empilage.

6. Procédé suivant la revendication 5, dans lequel les nappes (15, 21, 23, 27) s'étendent sensiblement d'une extrémité de la pièce (3) à l'autre.

7. Partie (1) empilable, qui peut être empilée avec d'autres parties pour former un habillage (200) d'une chambre de regard, la partie (1) empilable comprenant une peau (11, 13) intérieure et extérieure et au moins une partie de la partie (1) empilable comprenant au moins deux nappes (15, 21, 23, 27) s'étendant dans une direction d'une manière générale perpendiculaire à la direction d'empilage, la partie (1) comprenant quatre pièces (3), qui sont sensiblement droites et quatre pièces (7, 9), qui sont incurvées, **caractérisée en ce qu'**une pièce (7) incurvée s'étend dans une direction d'une manière générale perpendiculaire à la direction d'empilage à une distance plus grande qu'une autre pièce (9) incurvée et **en ce qu'**au moins l'une des pièces (3) droites est une pièce (3) suivant l'une quelconque des revendications 1 à 4.

8. Partie (1) empilable suivant la revendication 7, dans laquelle au moins une partie d'une nappe (15, 21, 23, 27) s'étend de la peau (11) intérieure à la peau (13) extérieure.

9. Partie (1) empilable suivant la revendication 7 ou la revendication 8, dans laquelle la partie (91) empilable définit un périmètre ayant deux extrémités et au moins une nappe (15, 21, 23, 27) ou une combinaison de nappes (15, 21, 23, 27) s'étend sur une majorité de la distance entre les deux extrémités.

10. Partie (1) empilable suivant la revendication 9, dans laquelle au moins une nappe (15, 21, 23, 27) ou une combinaison de nappes (15, 21, 23, 27) s'étend autour d'une majorité du périmètre.

11. Partie (1) empilable suivant l'une quelconque des revendications 7 à 10, dans laquelle au moins deux nappes (15, 21, 23, 27) sont sensiblement parallèles et à distance.

12. Partie (1) empilable suivant l'une quelconque des revendications 7 à 11, dans laquelle la partie (1) définit un périmètre, qui est sensiblement de forme rectangulaire.

13. Partie (1) empilable suivant l'une quelconque des revendications 7 à 12, dans laquelle au moins une pièce (3) droite est faite par pultrusion.

14. Habillage (200) pour une chambre de regard, comprenant deux ou plusieurs parties (1) empilables suivant l'une quelconque des revendications 7 à 13.

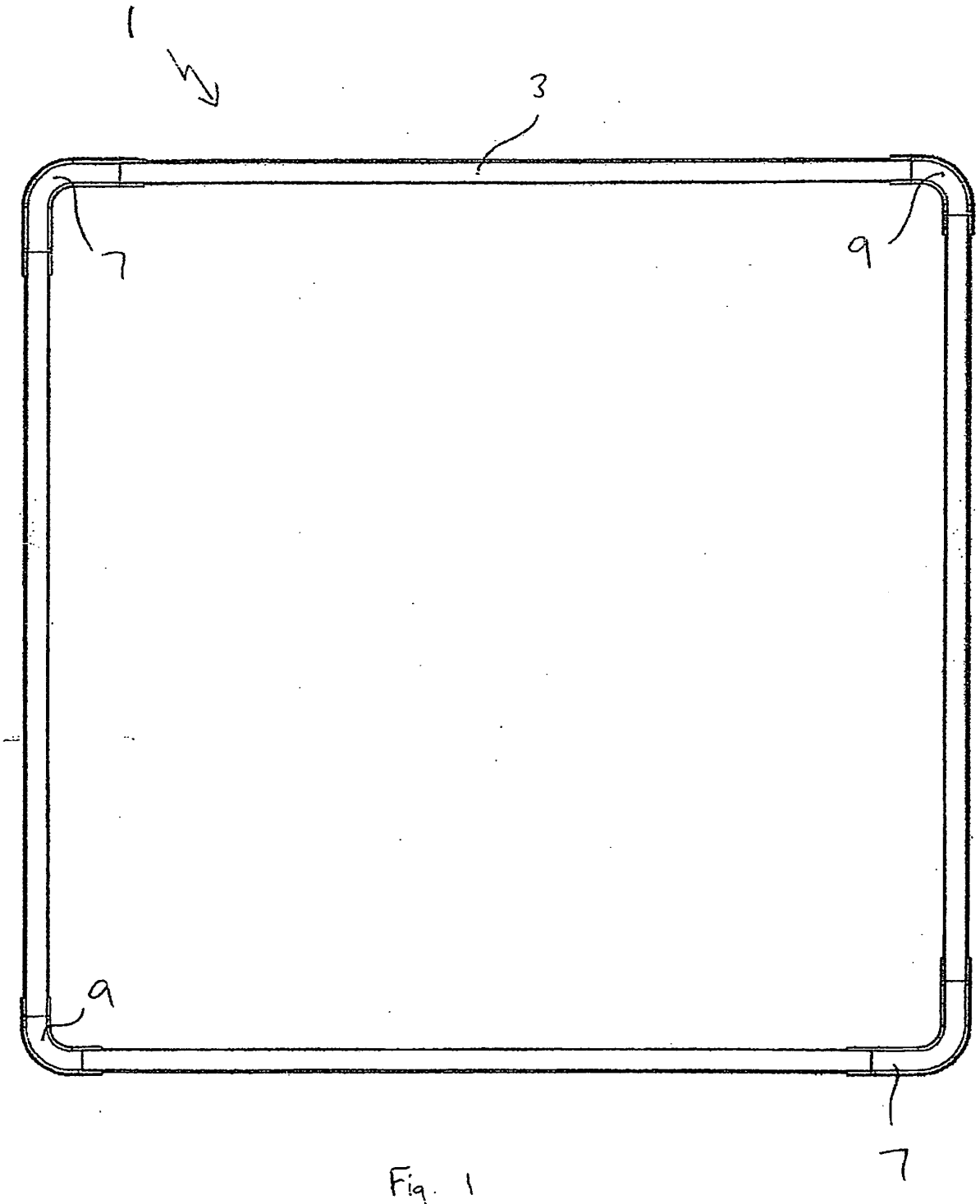


Fig. 1

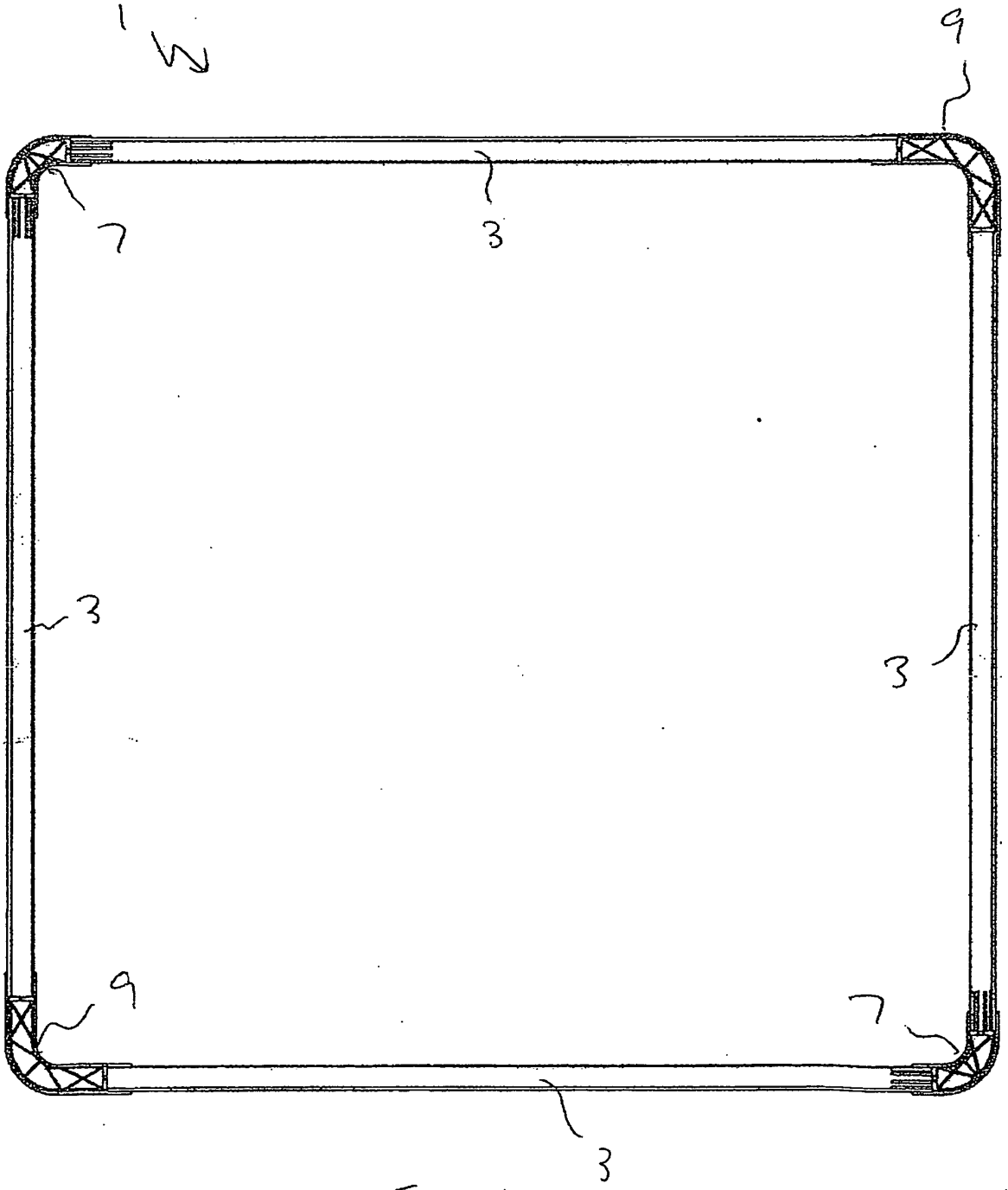


Fig. 2

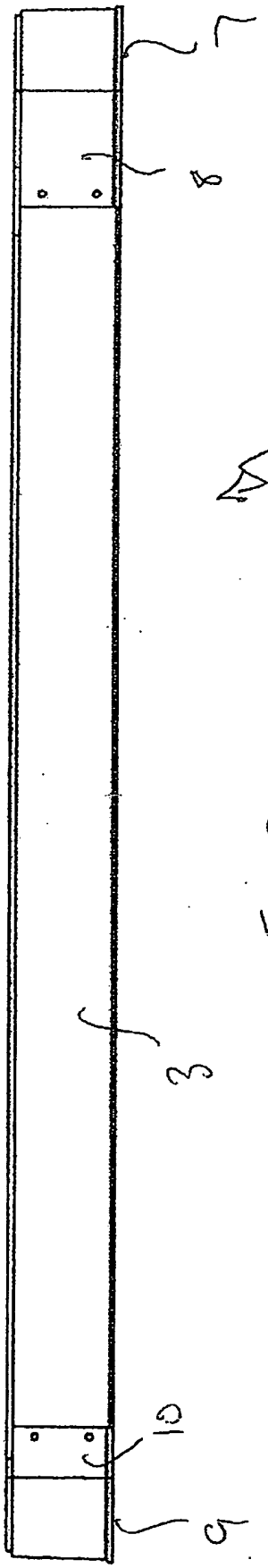


Fig. 3



Fig. 4

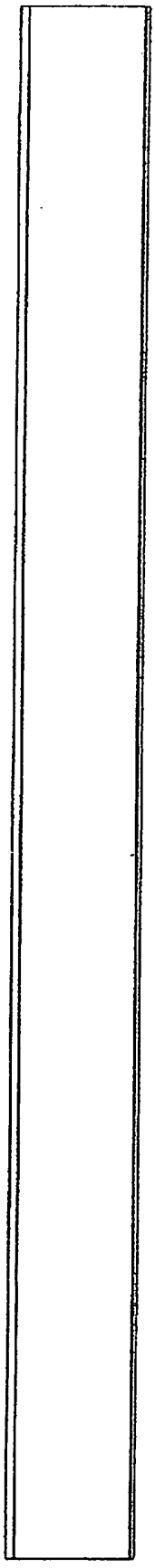


Fig. 5



Fig. 6

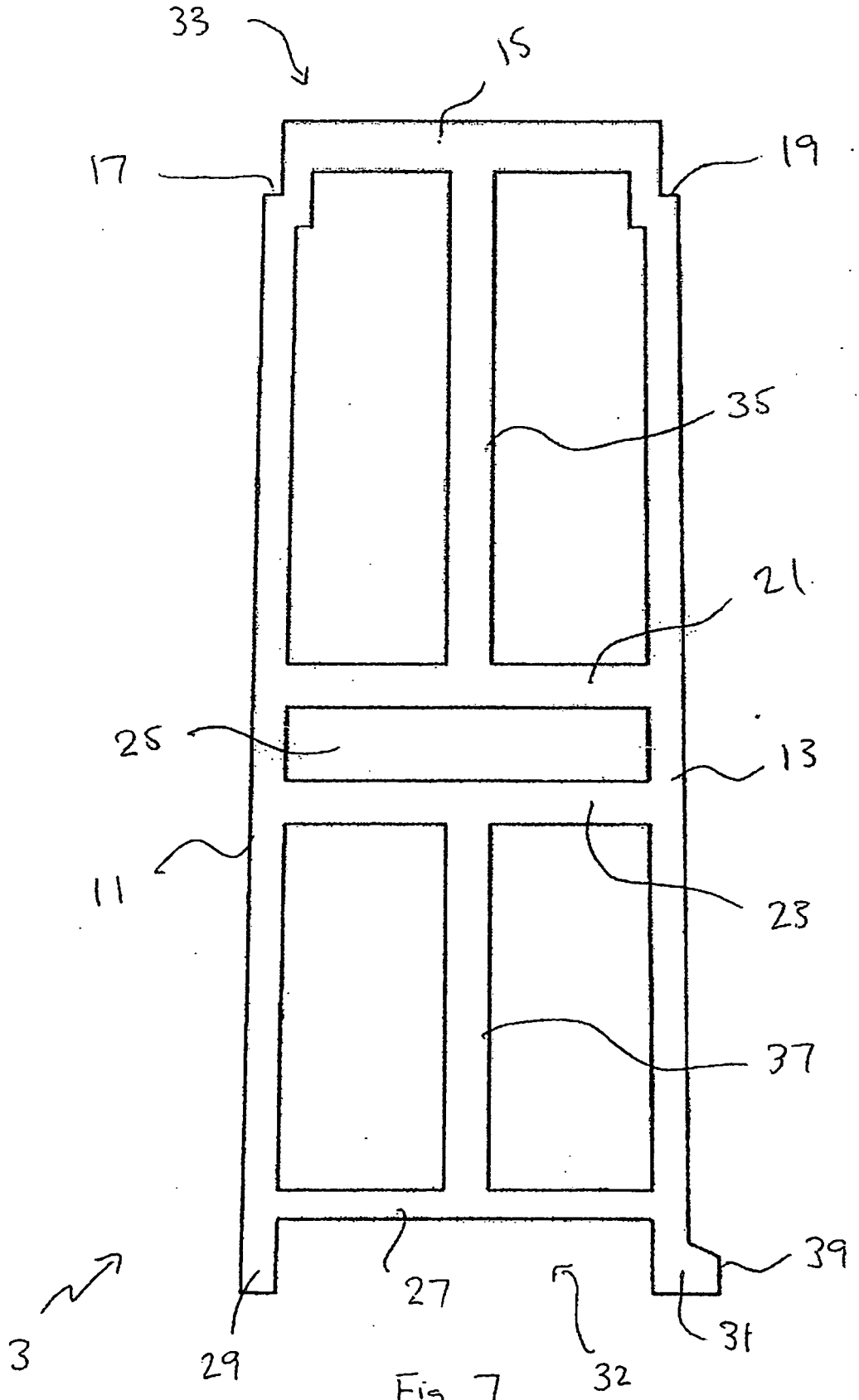


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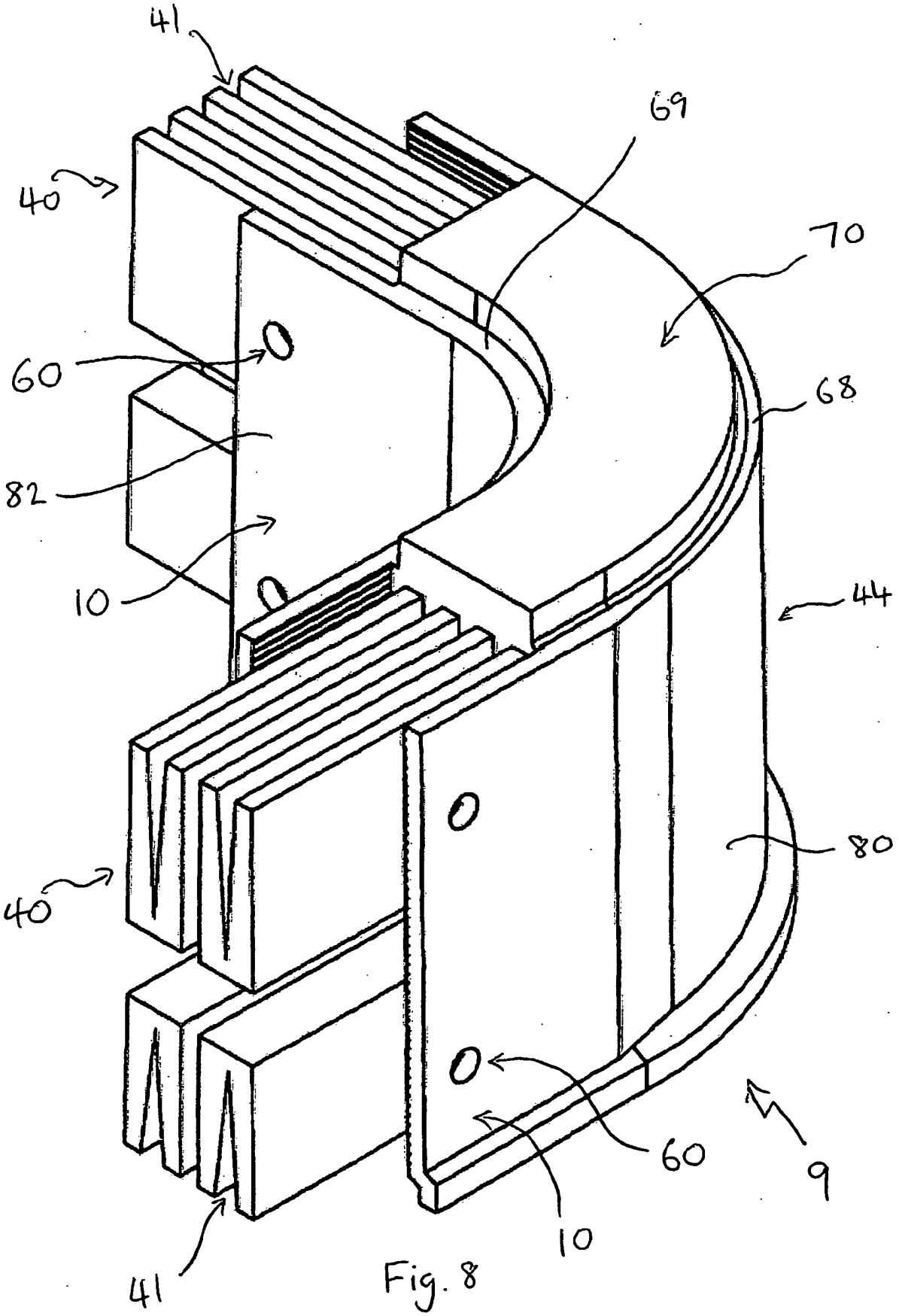


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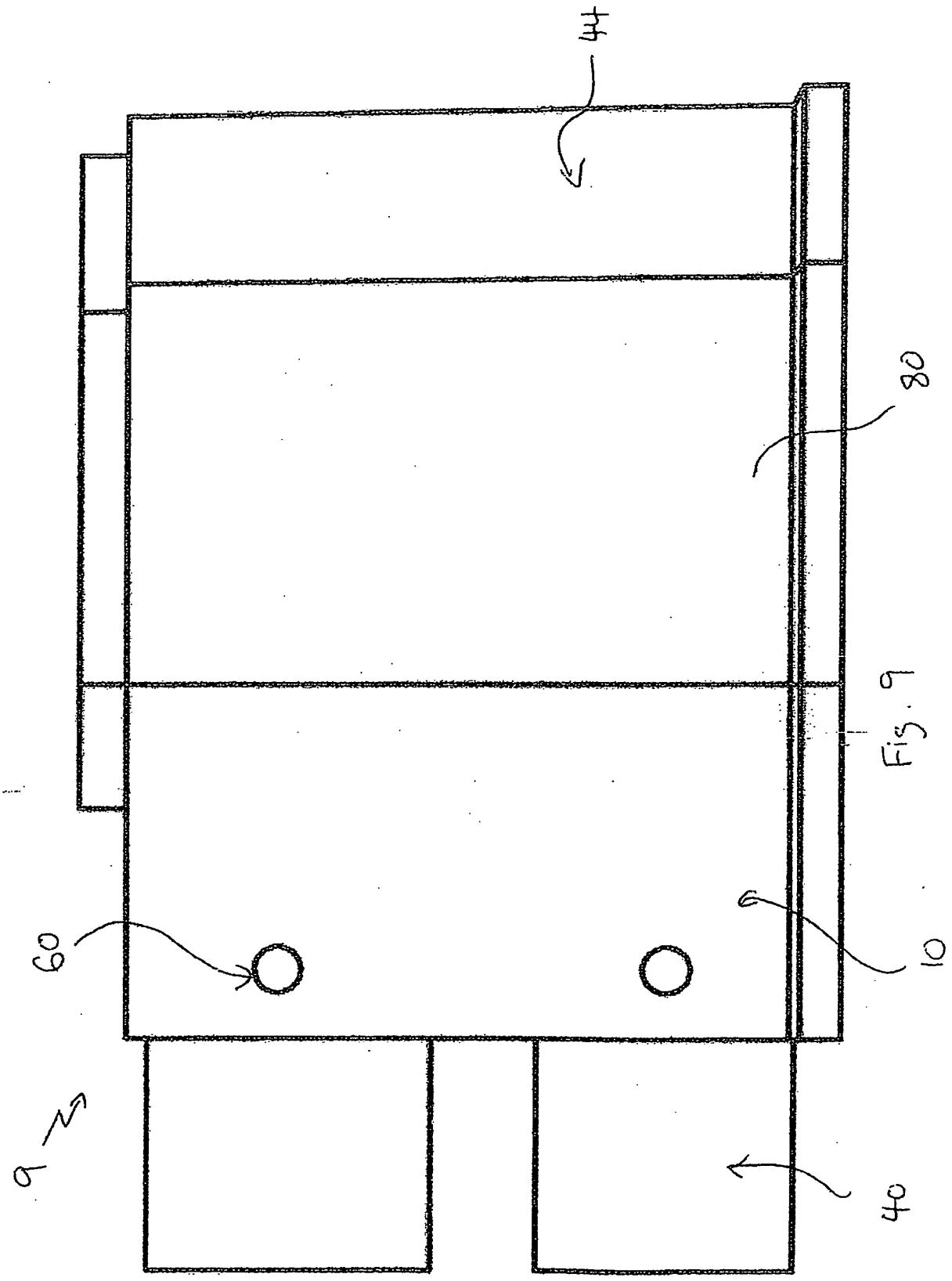


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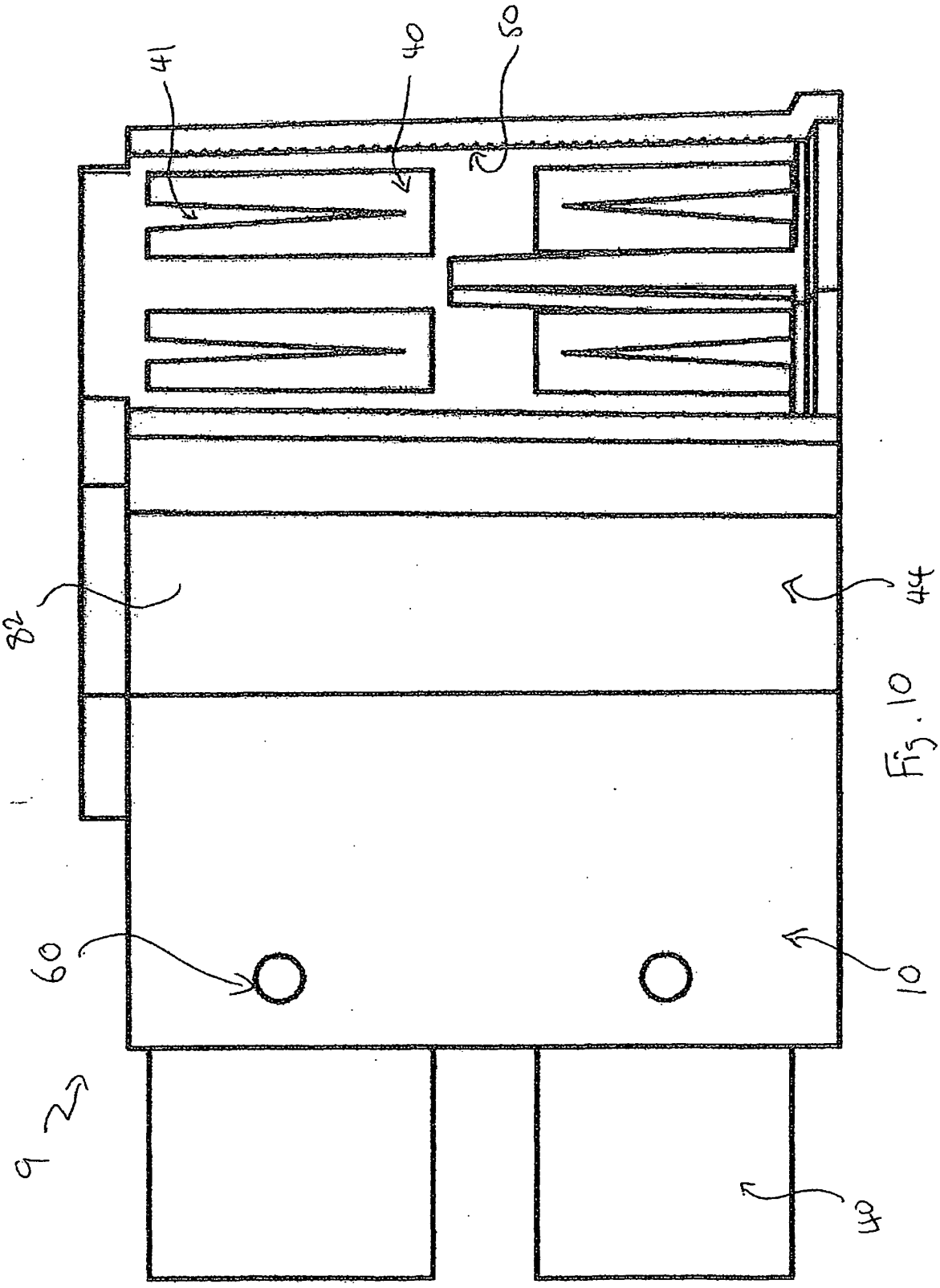


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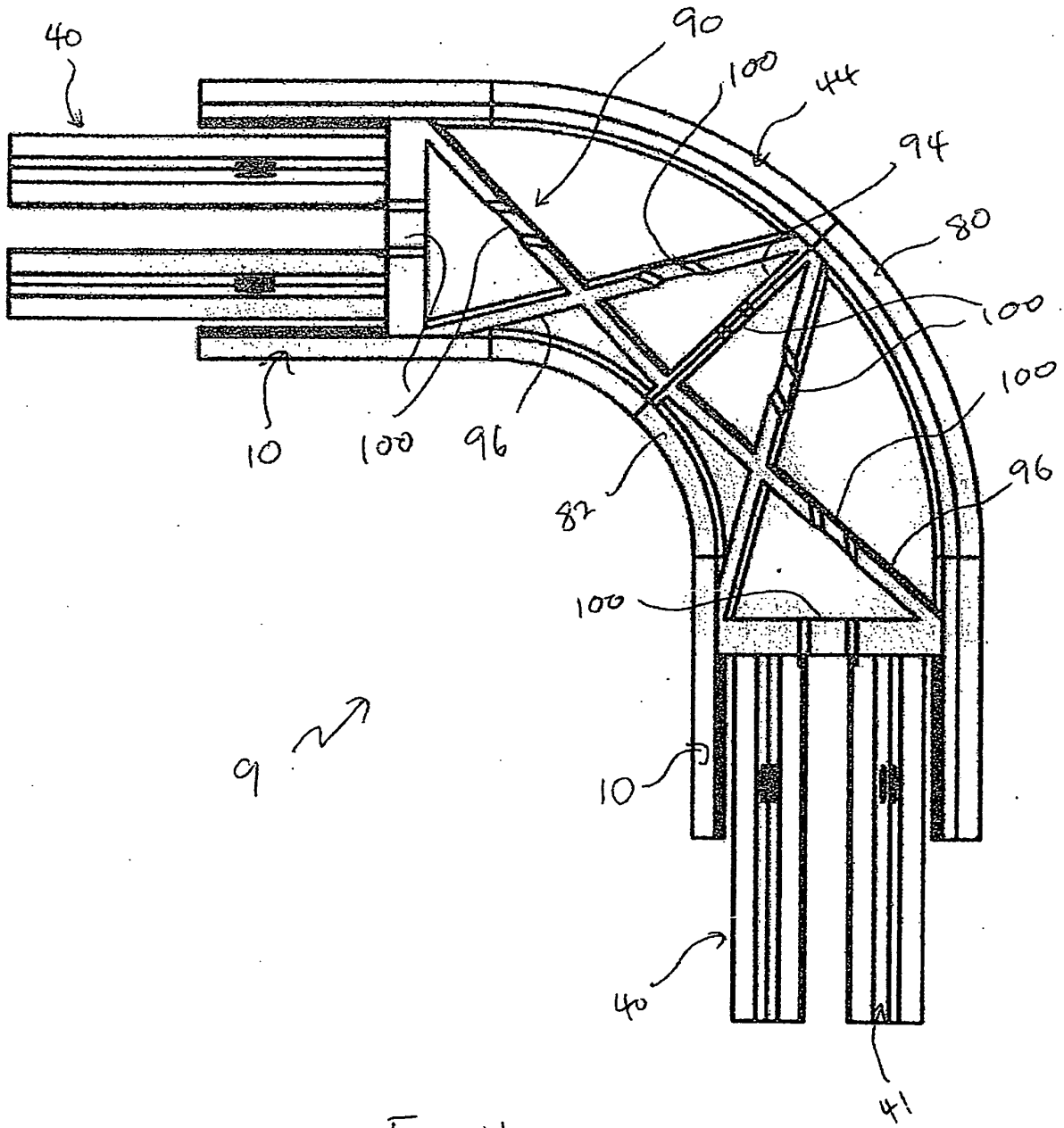


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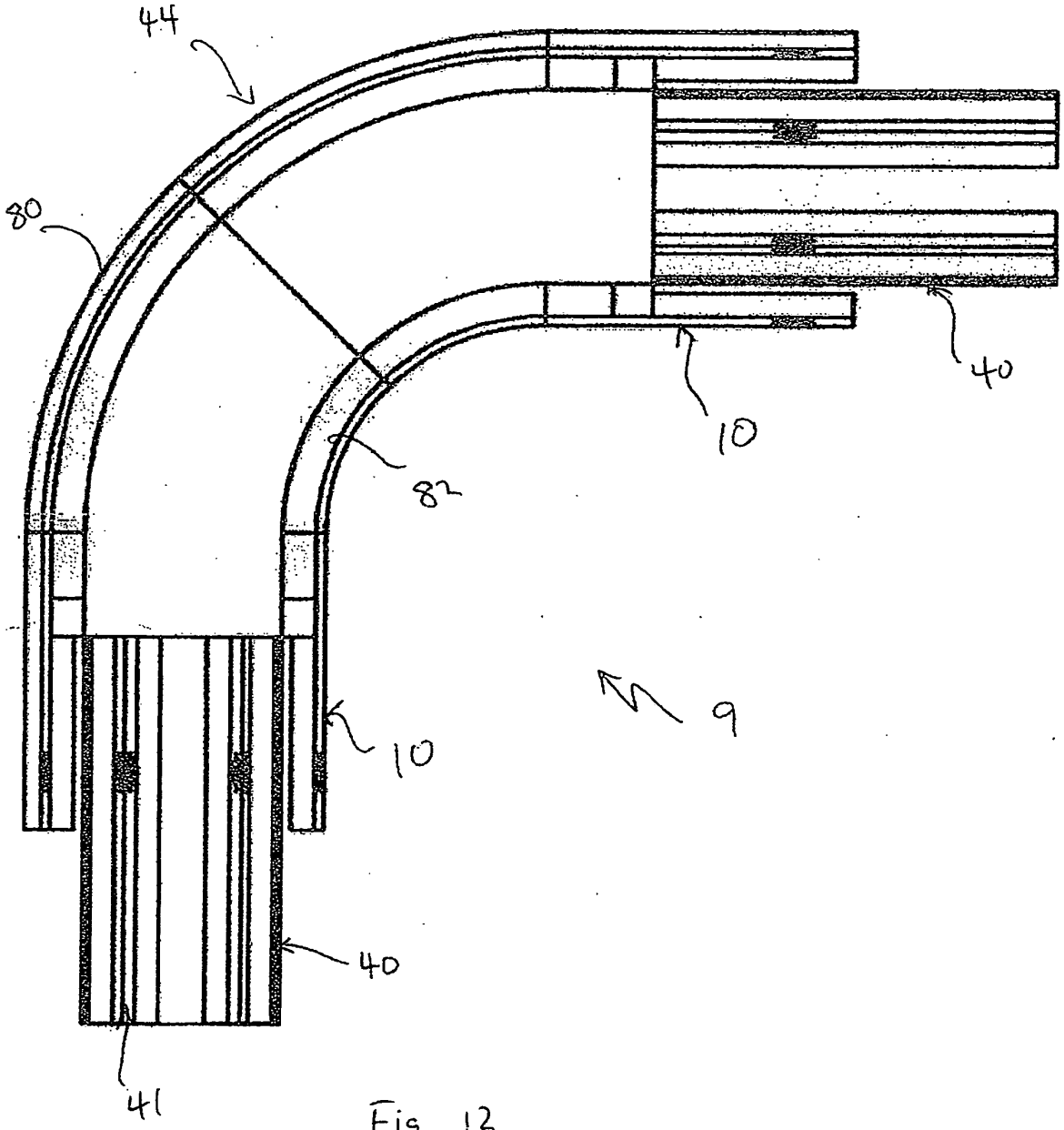


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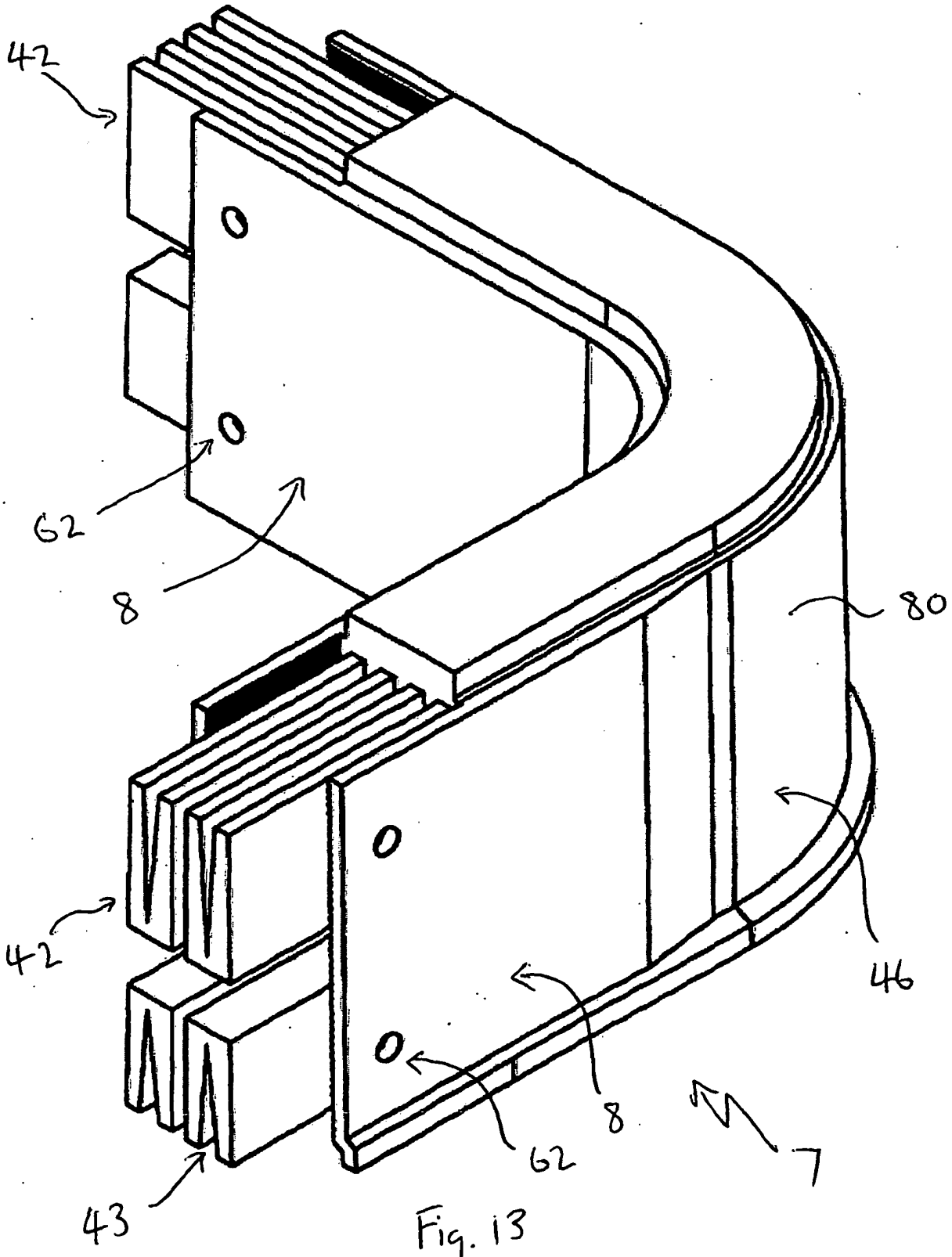


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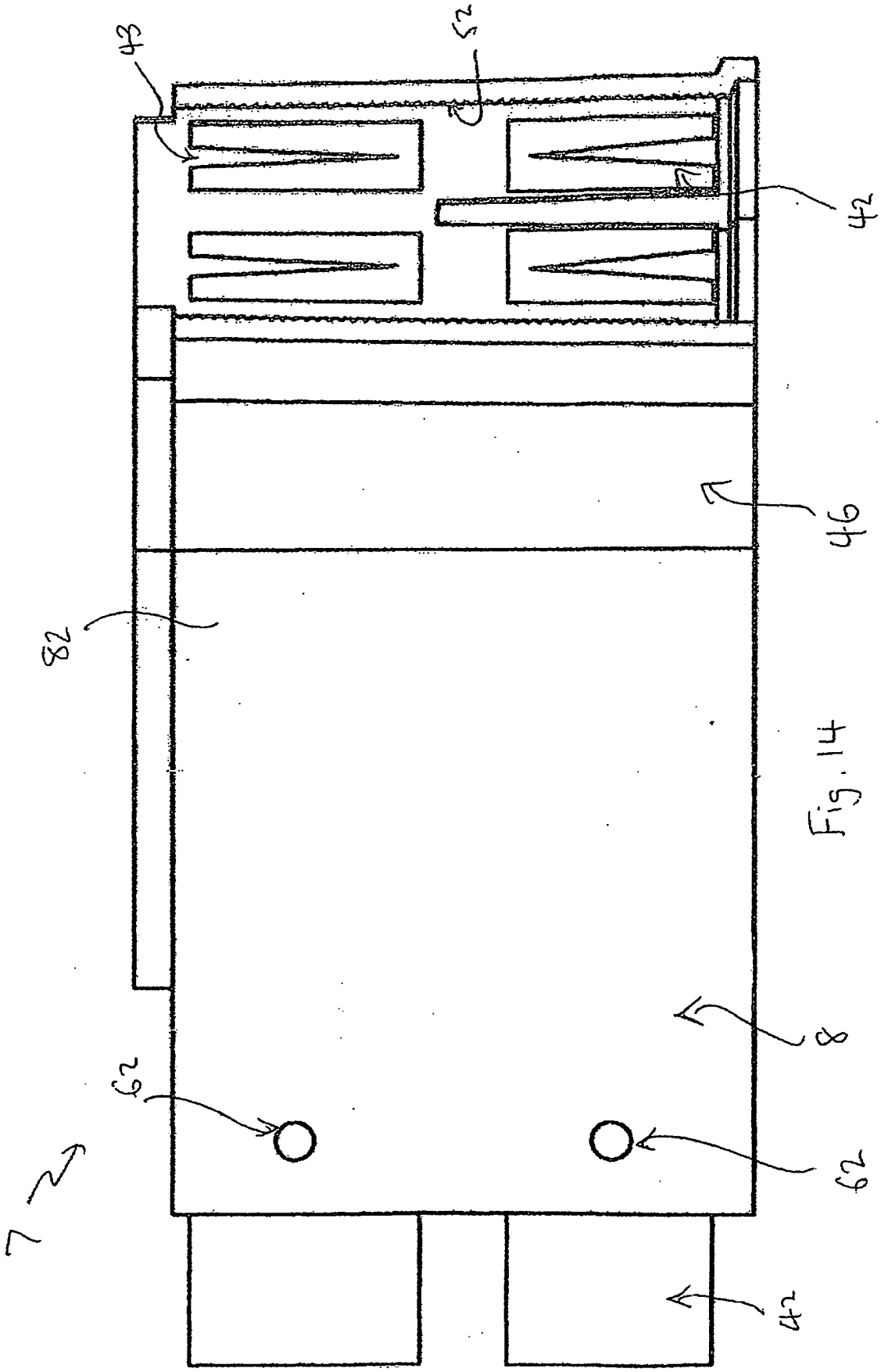


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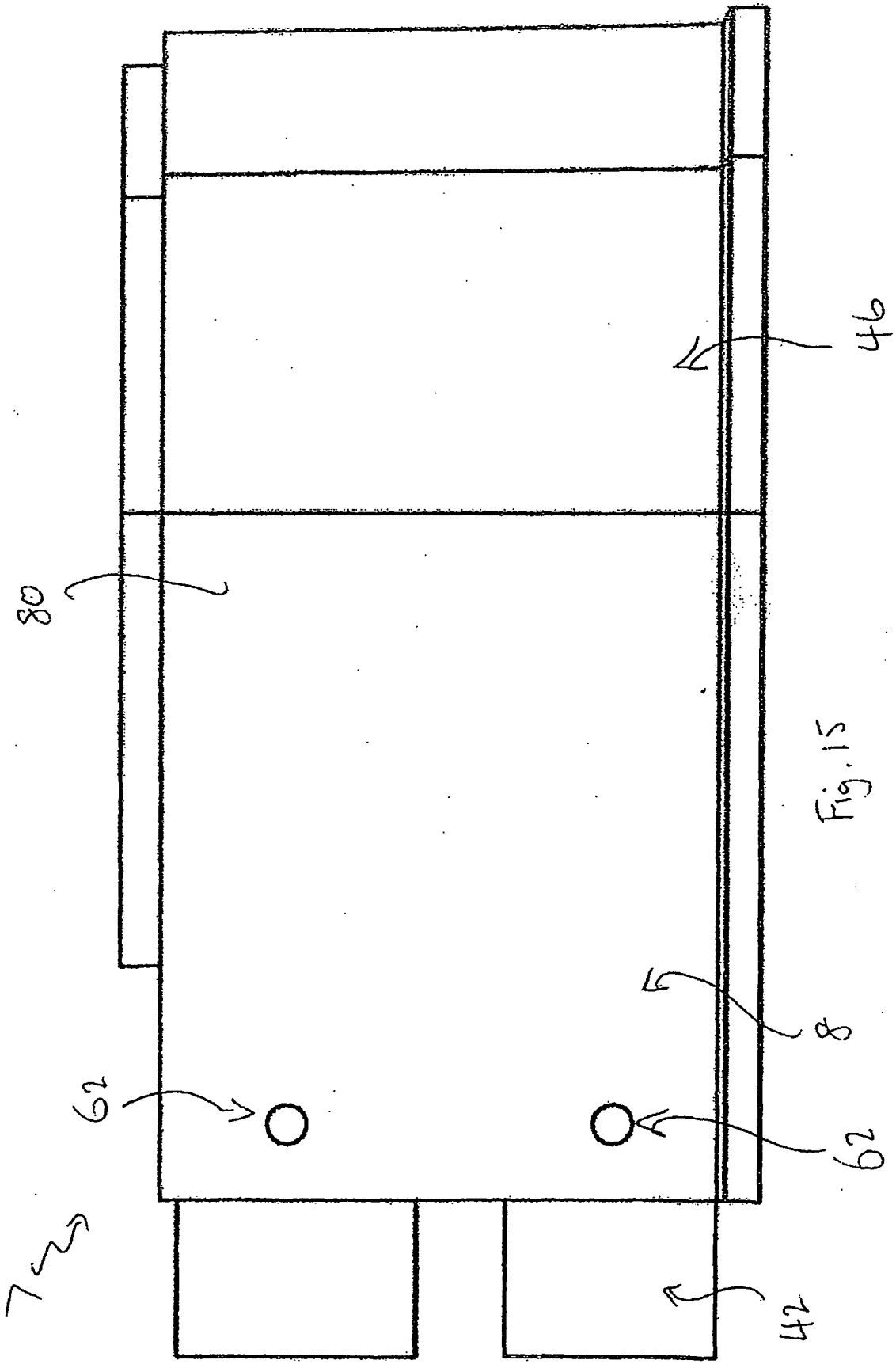


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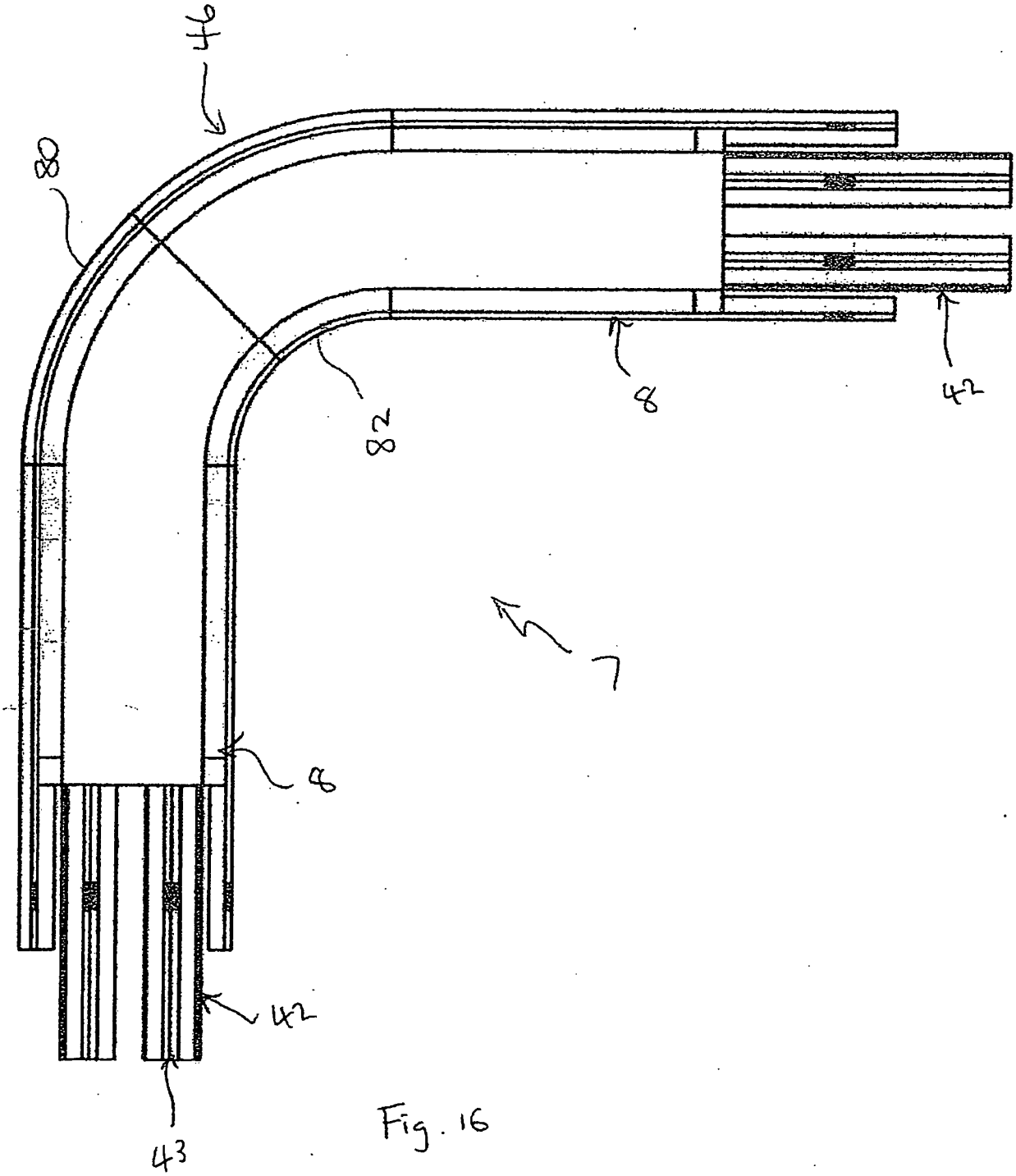


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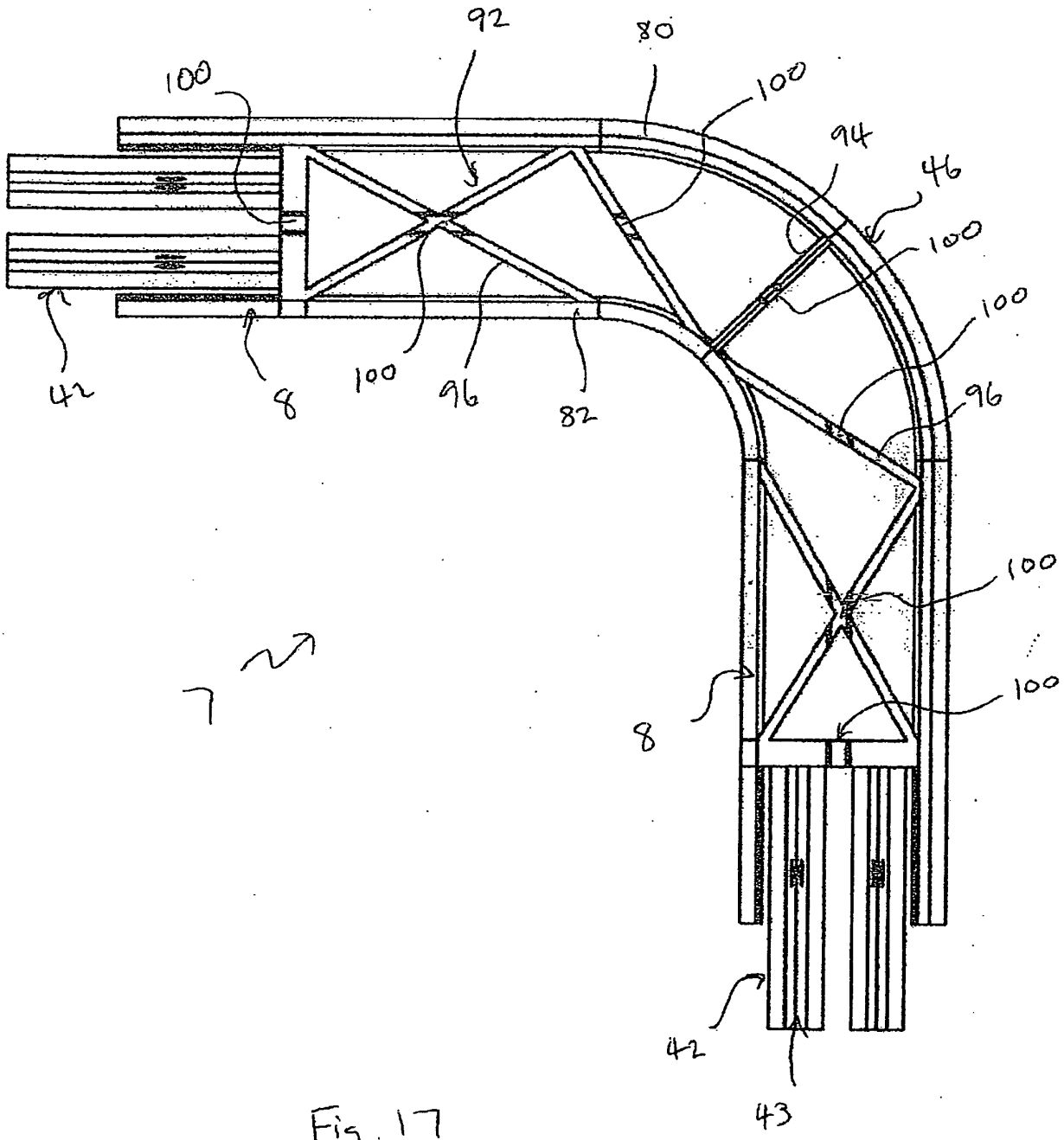


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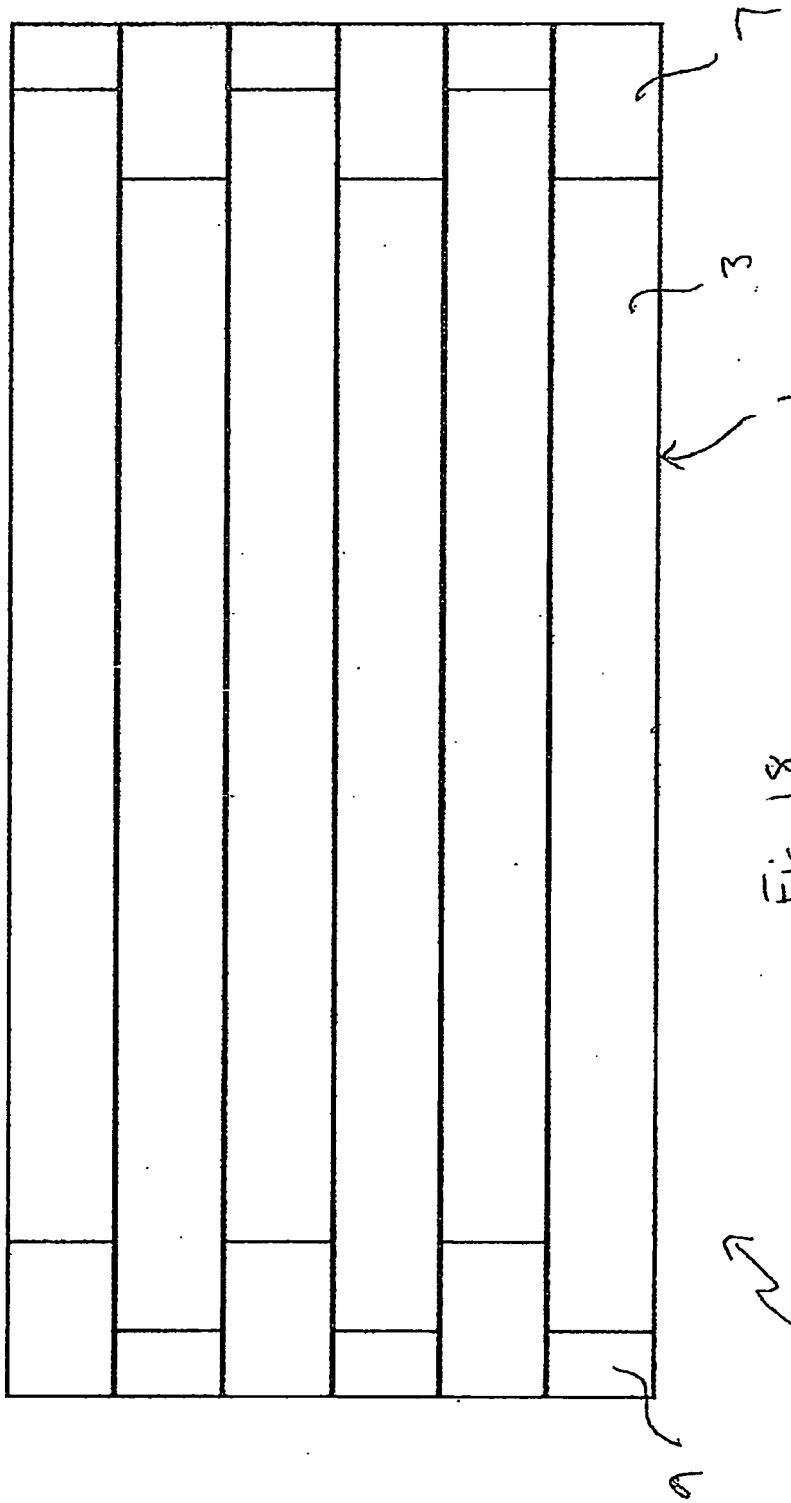


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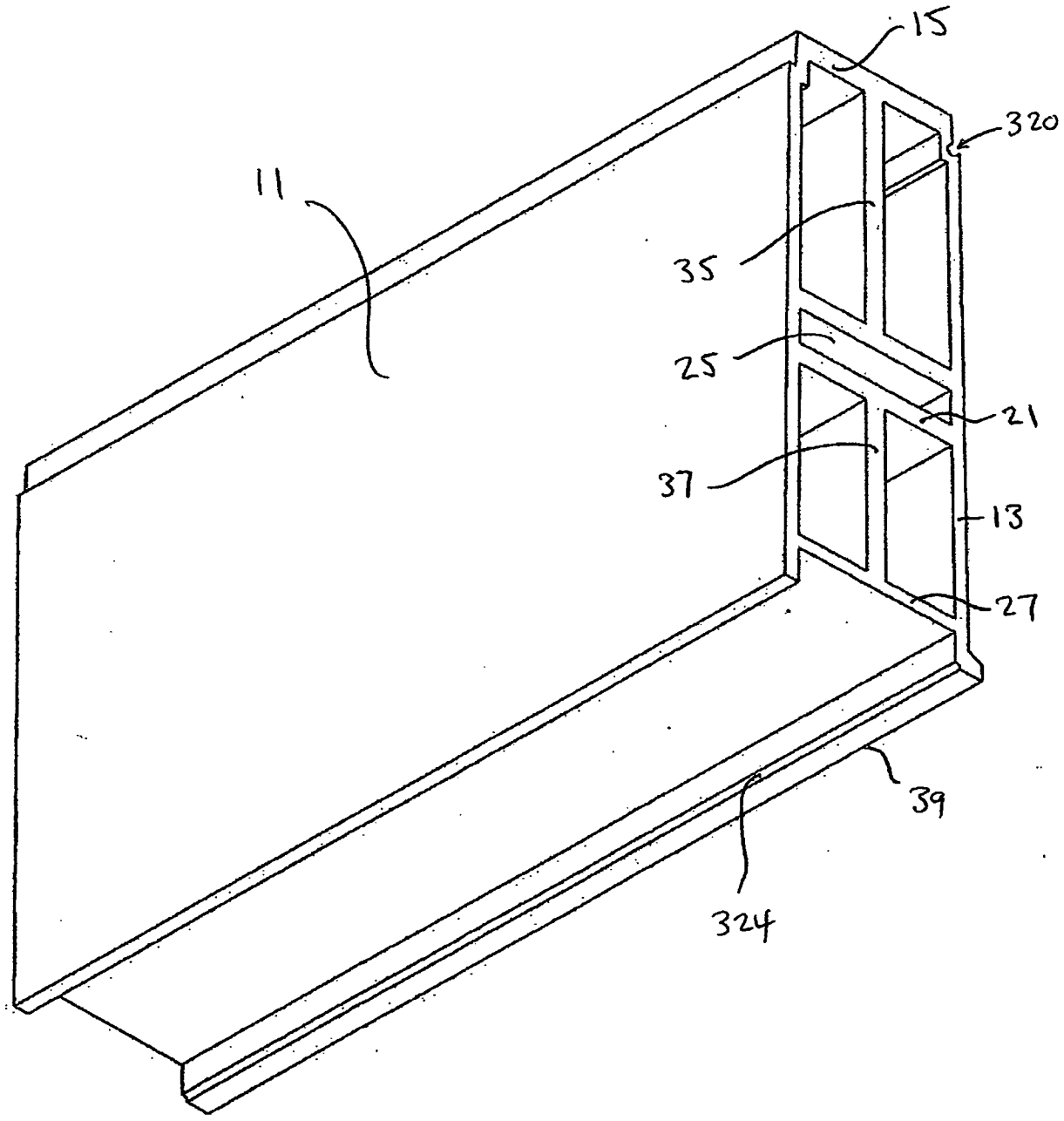


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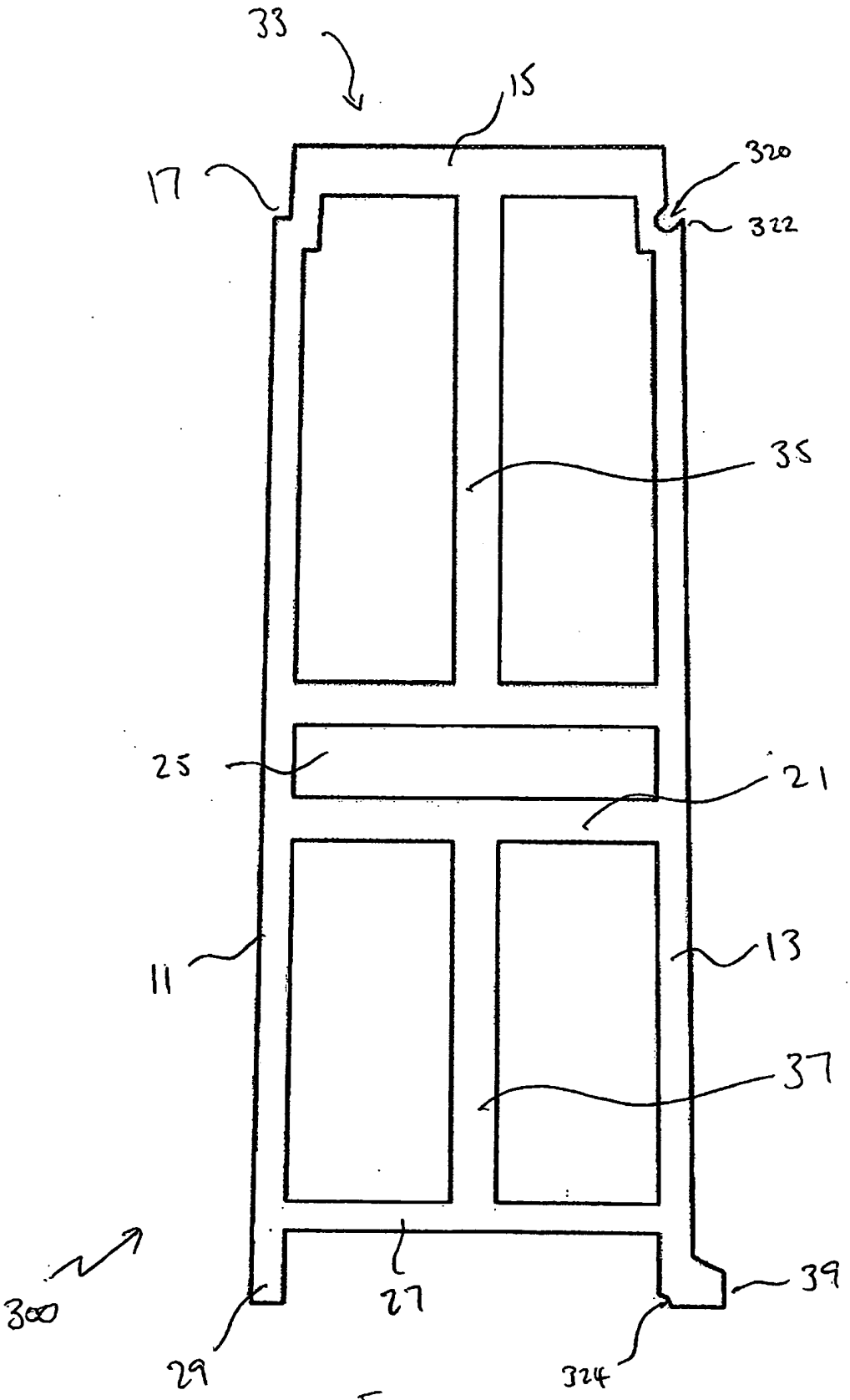


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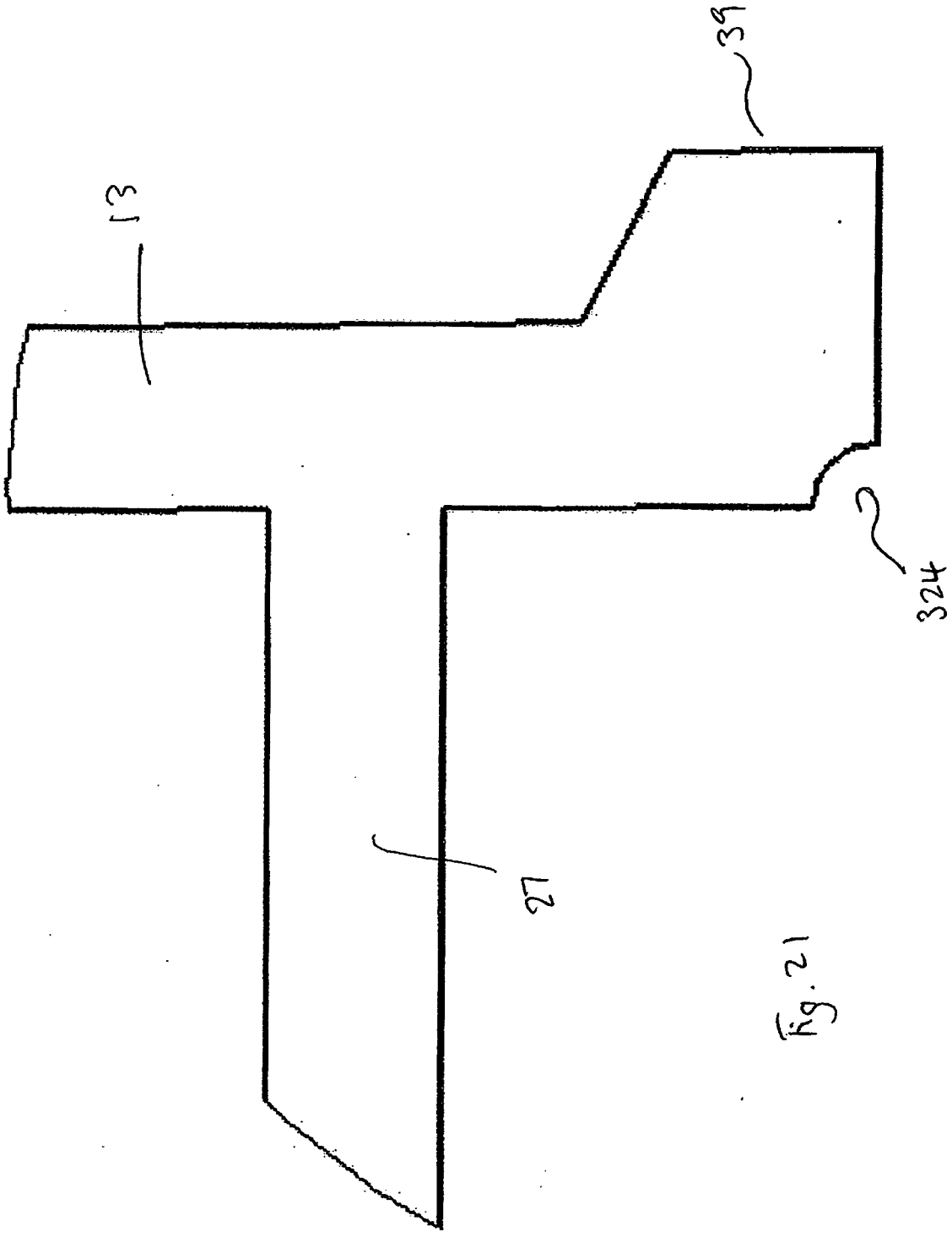


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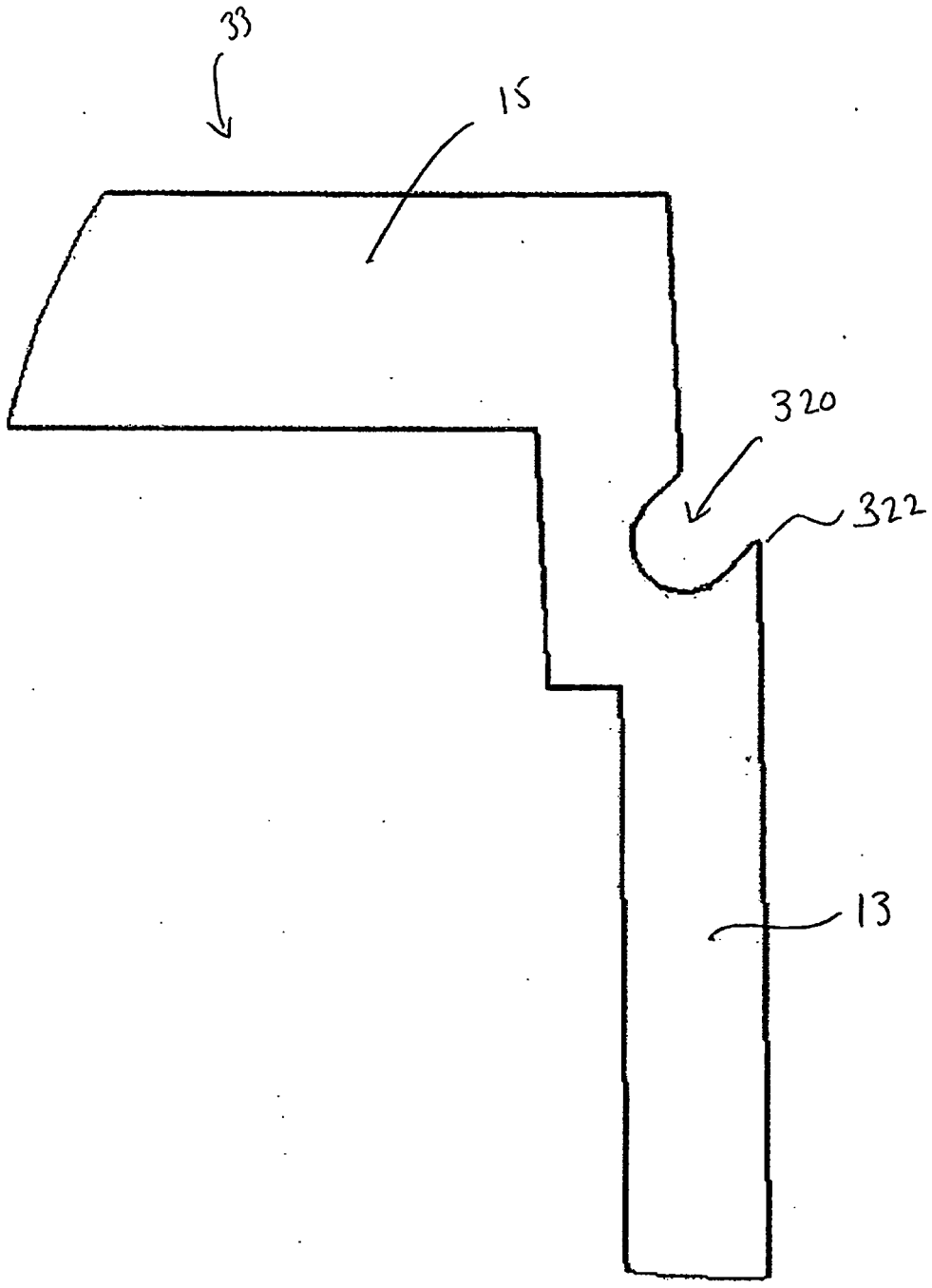


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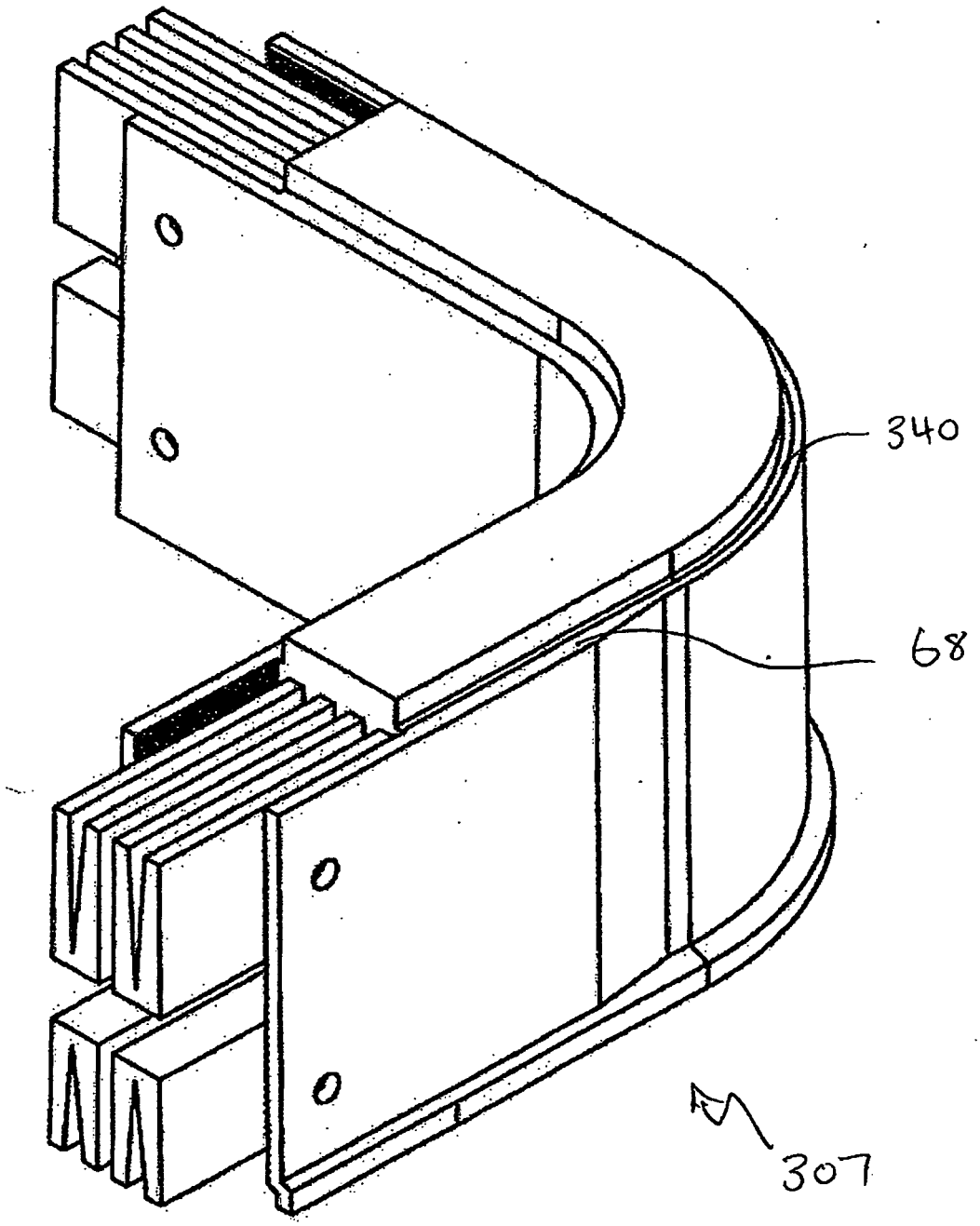


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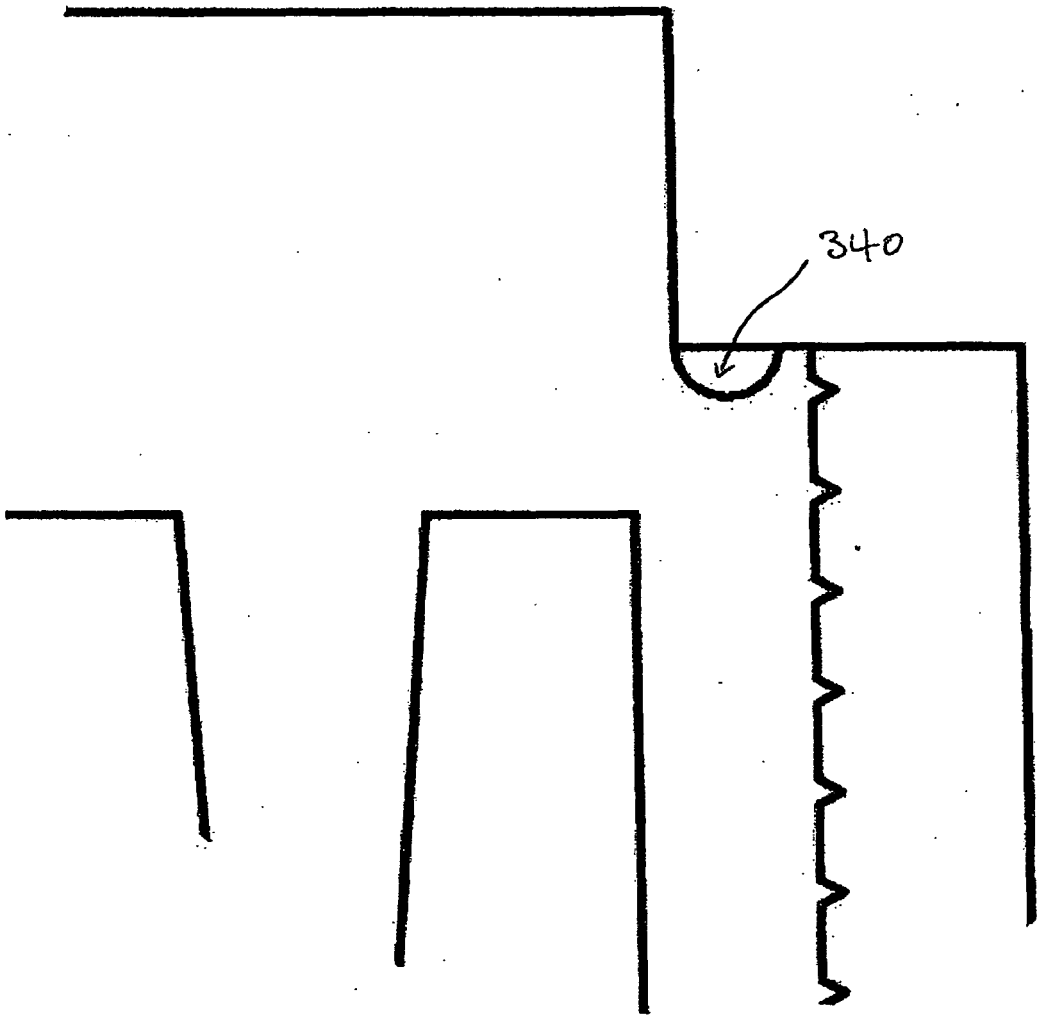


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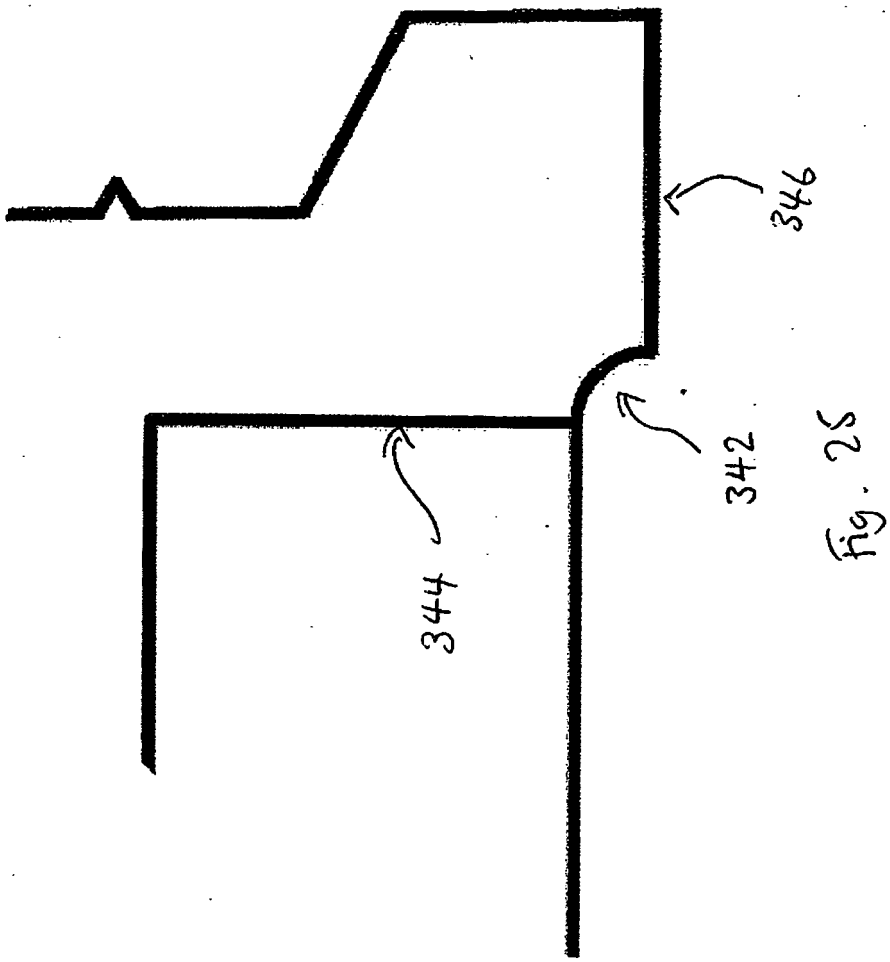


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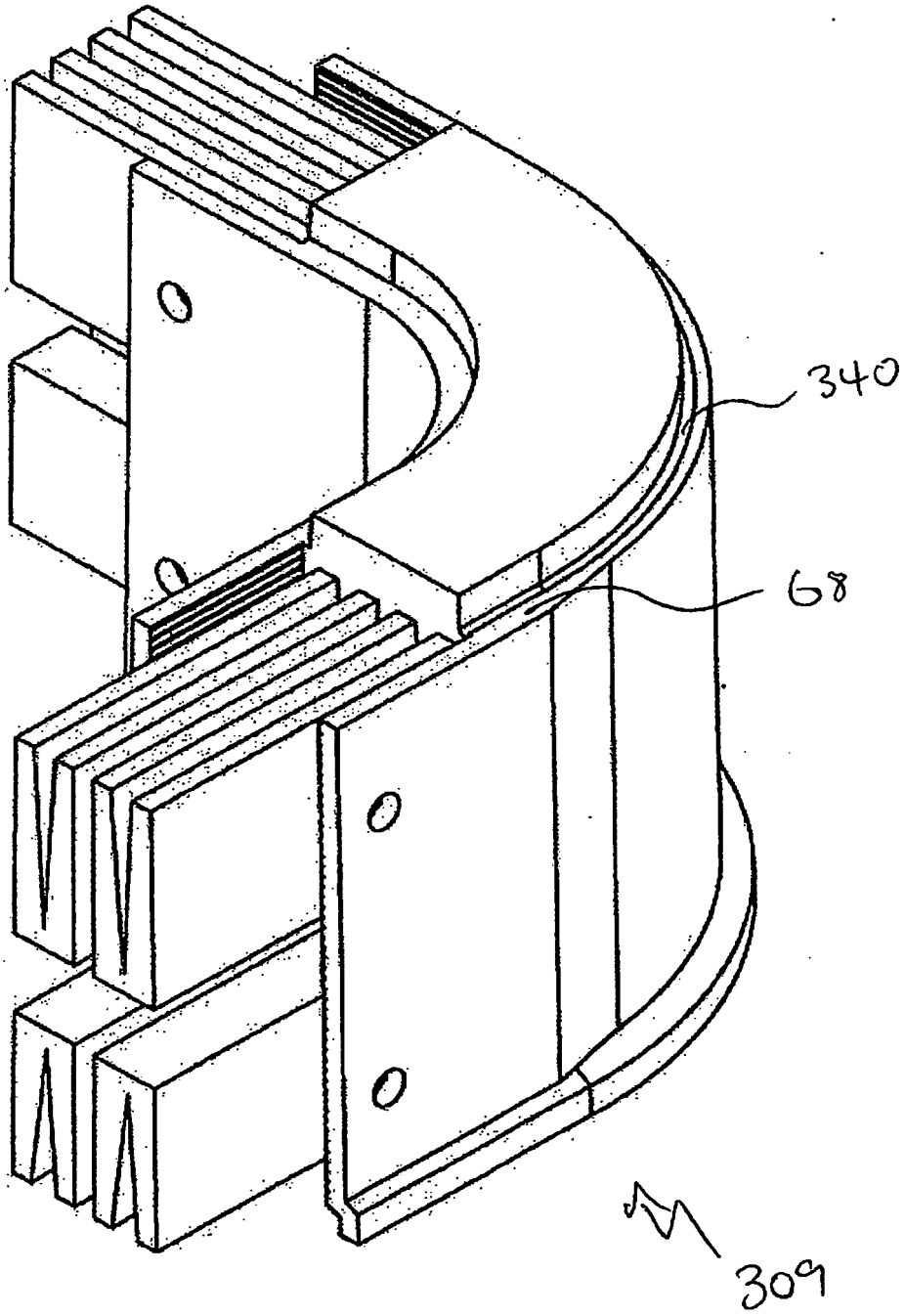


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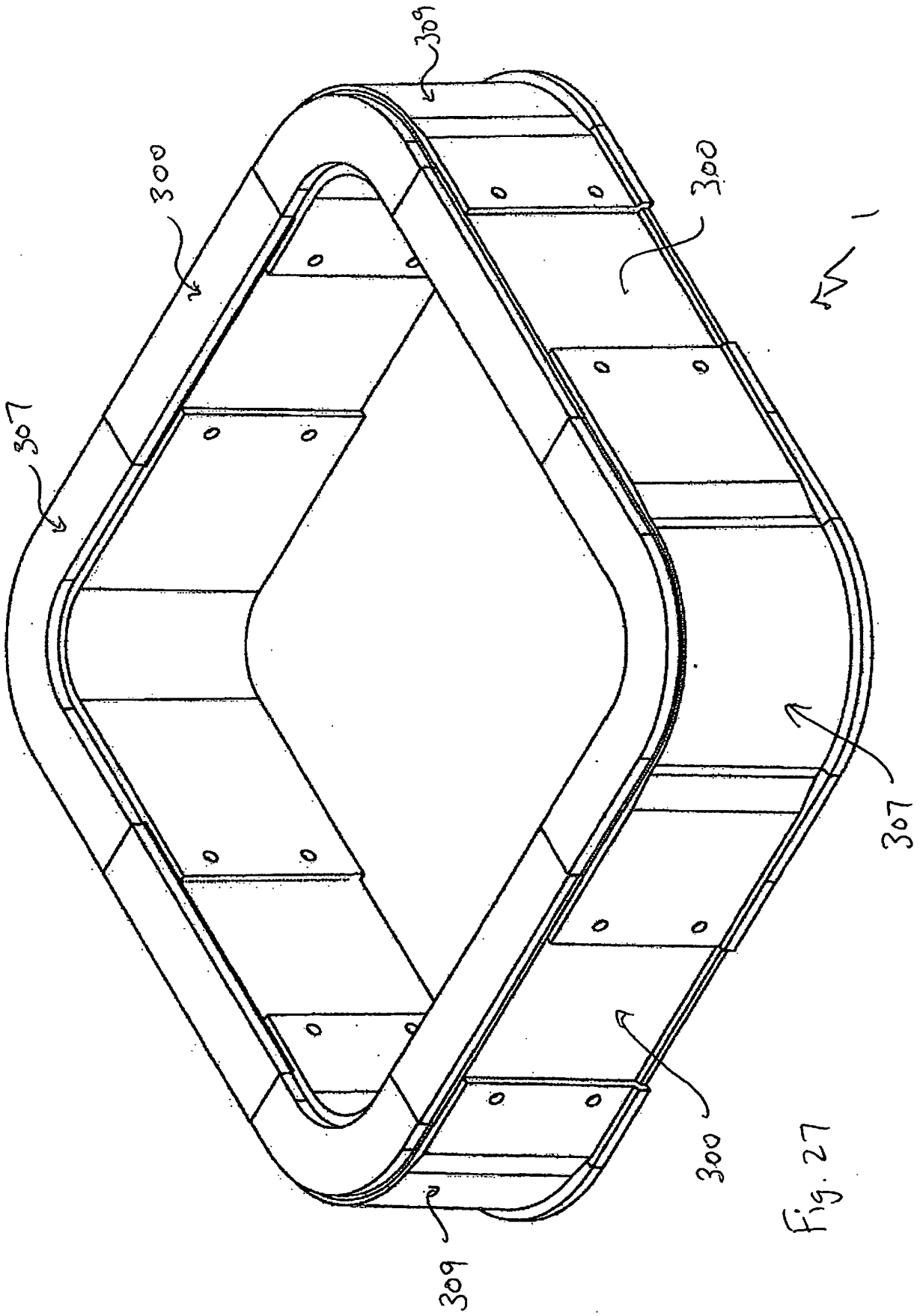


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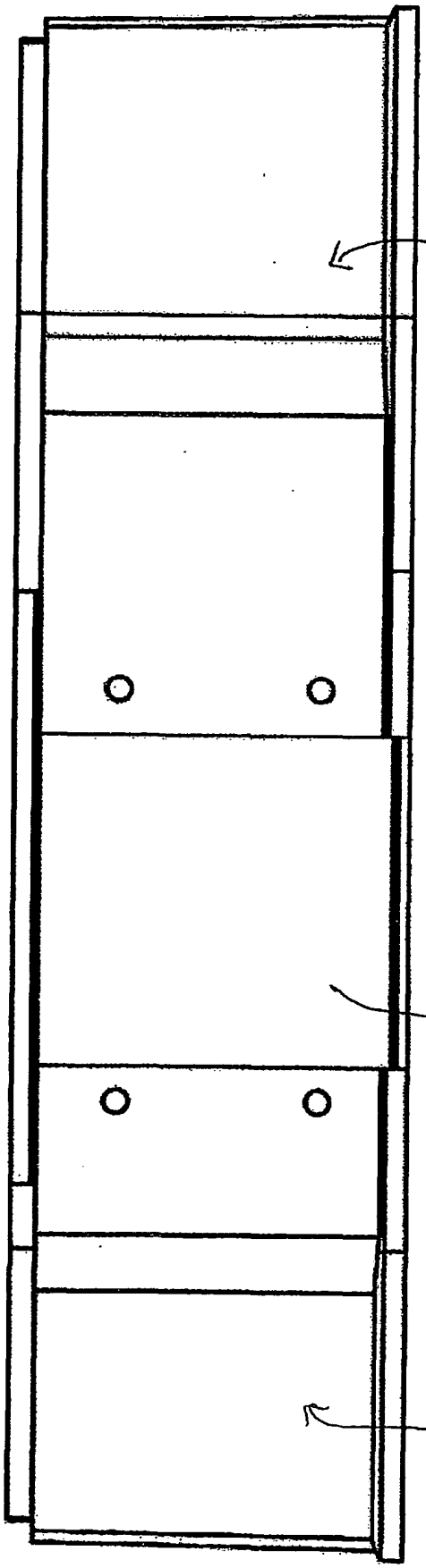


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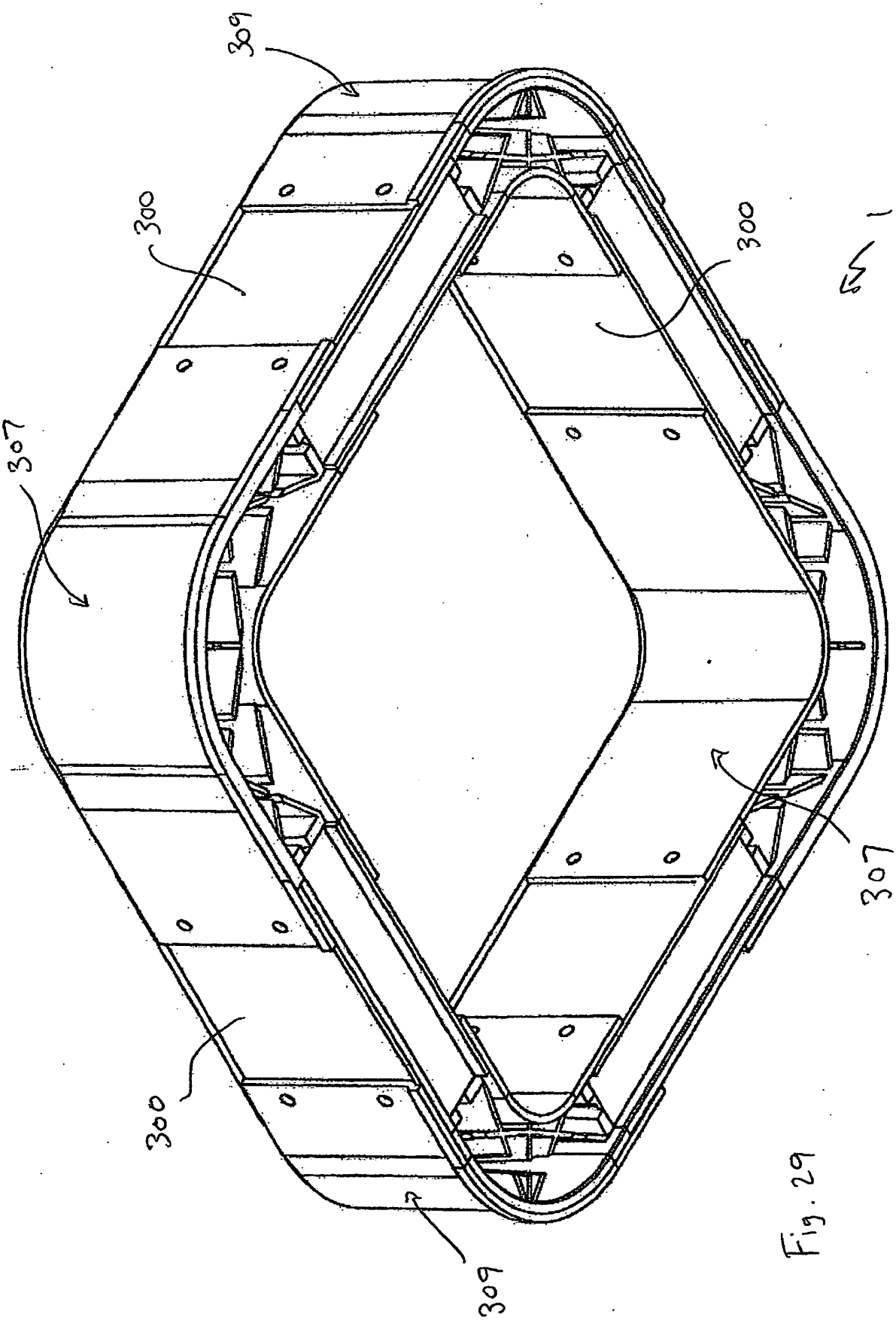


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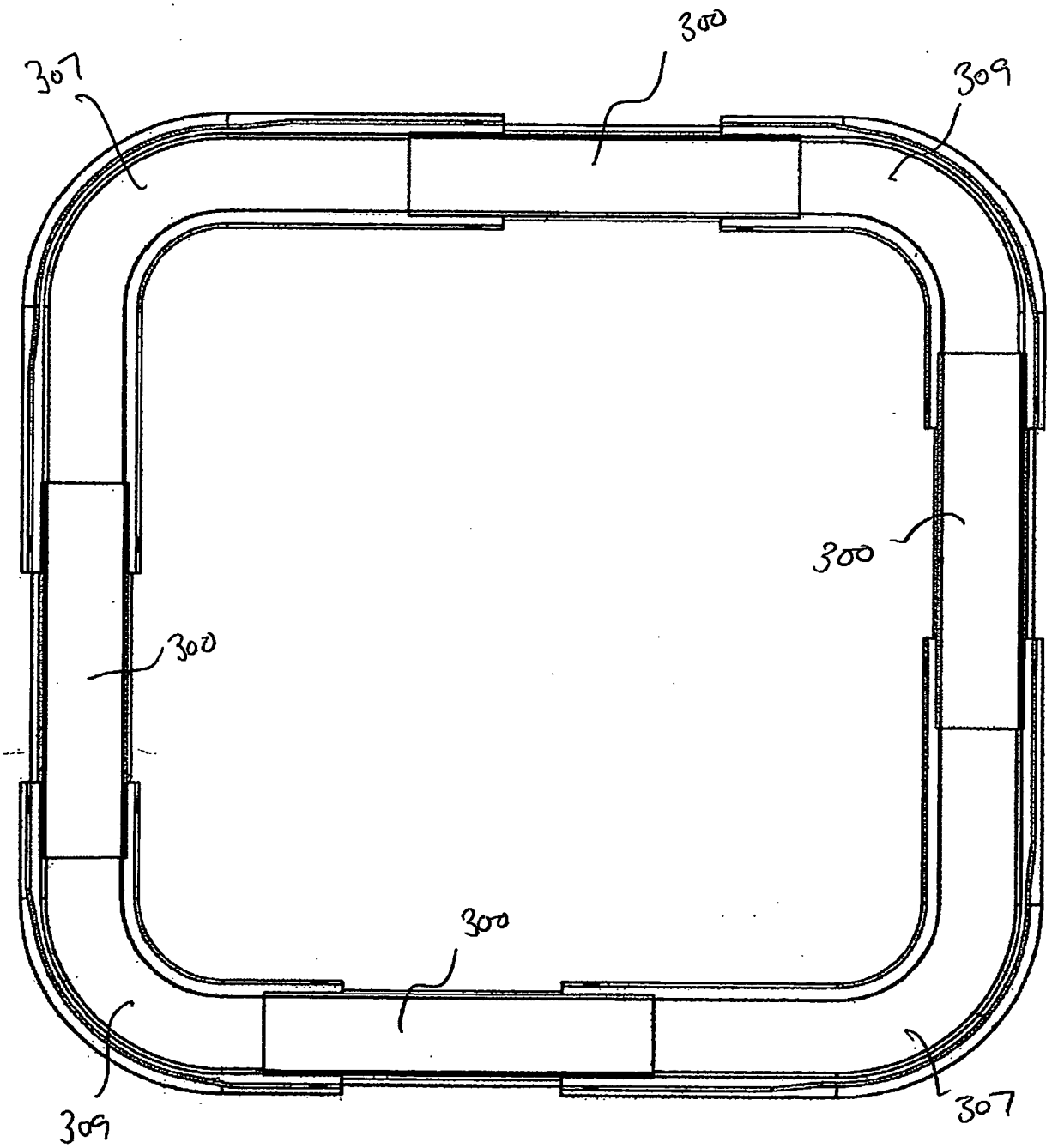


Fig. 30

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Patent documents cited in the description

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