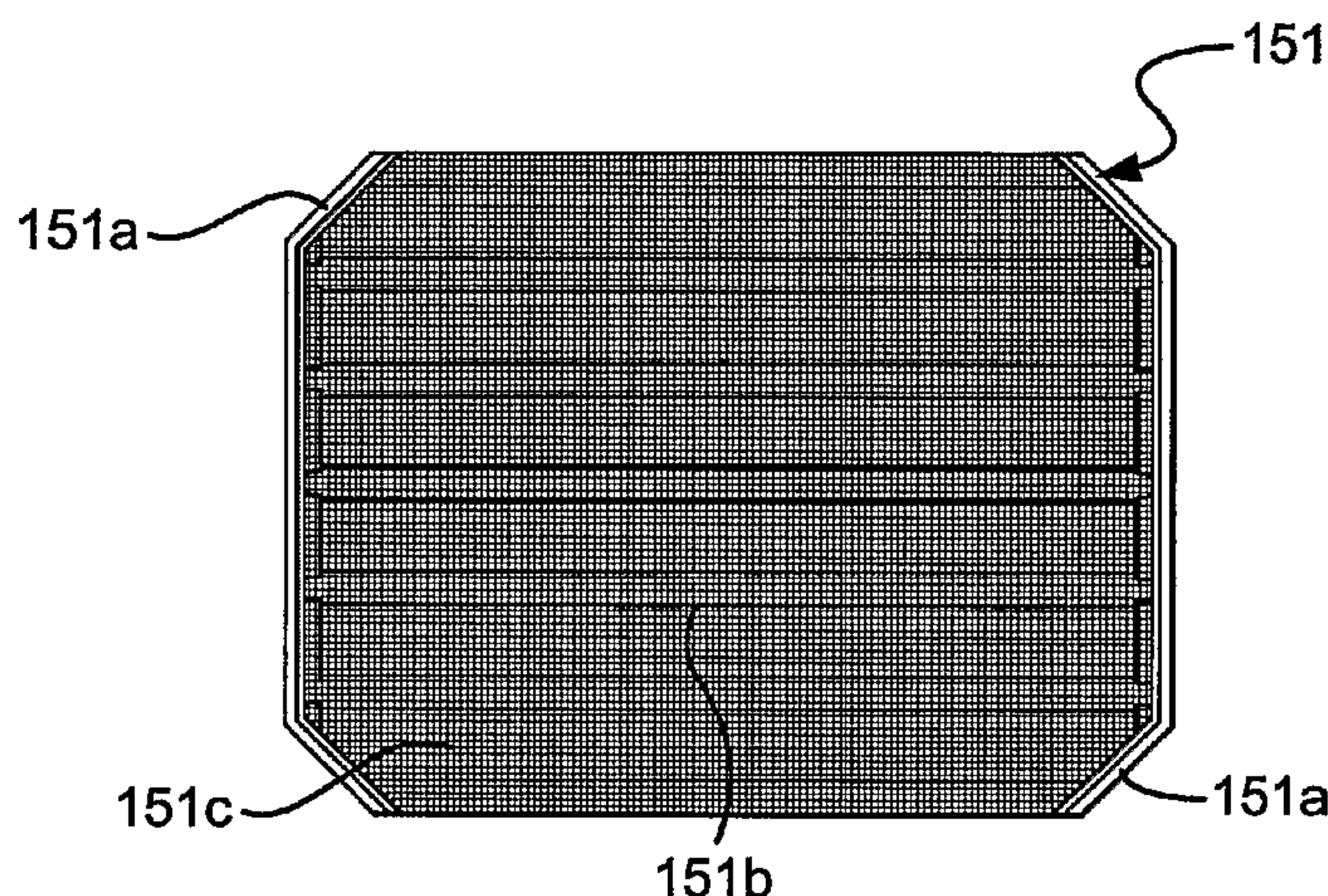
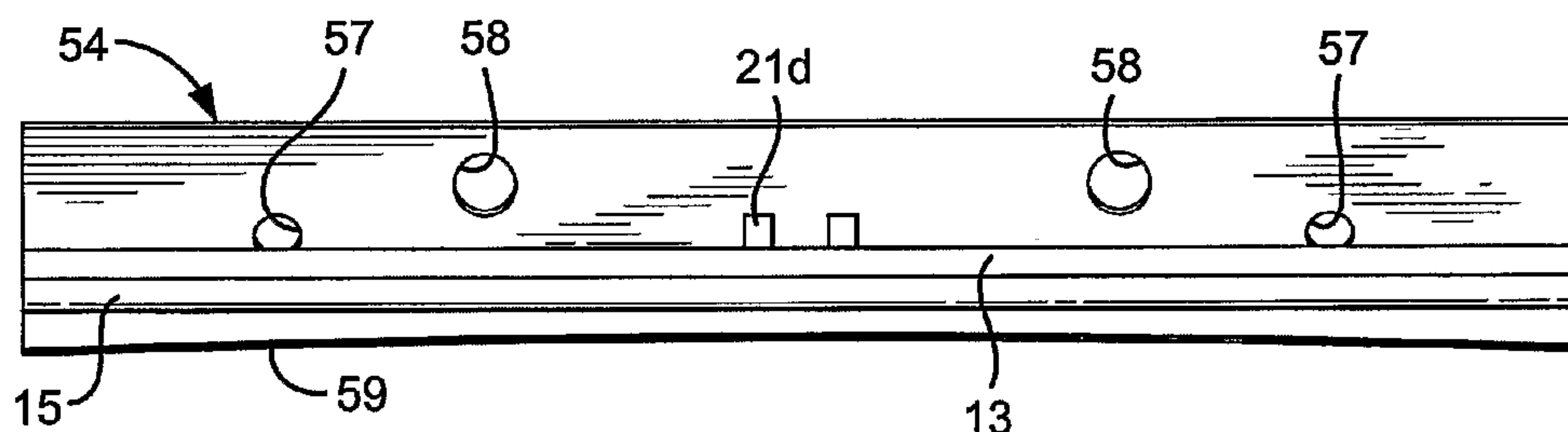




(86) Date de dépôt PCT/PCT Filing Date: 2002/10/07
 (87) Date publication PCT/PCT Publication Date: 2003/04/17
 (45) Date de délivrance/Issue Date: 2008/09/09
 (85) Entrée phase nationale/National Entry: 2003/11/05
 (86) N° demande PCT/PCT Application No.: GB 2002/004553
 (87) N° publication PCT/PCT Publication No.: 2003/031085
 (30) Priorité/Priority: 2001/10/05 (US09/972,837)

(51) Cl.Int./Int.Cl. *B07B 1/49* (2006.01),
B07B 1/46 (2006.01), *B07B 1/48* (2006.01),
F16B 2/06 (2006.01), *F16B 5/06* (2006.01)
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(54) Titre : SEPARATEUR VIBRANT, TAMIS ET COLLIER DE SERRAGE
 (54) Title: VIBRATORY SEPARATOR, SCREEN AND CLAMP



(57) **Abrégé/Abstract:**

A clamp for securing a screen in a vibratory separator, said clamp comprising a plate (13;43;77;80a;92;103;110) for contacting a side of a screen to be mounted in a vibratory separator, said plate (13;43;77;80a;92;103;110) having a length substantially equal to the length of the side of the screen. The invention also provides a vibratory separator comprising a clamp of the invention. A screen for use in a vibratory separator, said screen comprising a body having two sides, each side having ends which are curved.

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
17 April 2003 (17.04.2003)

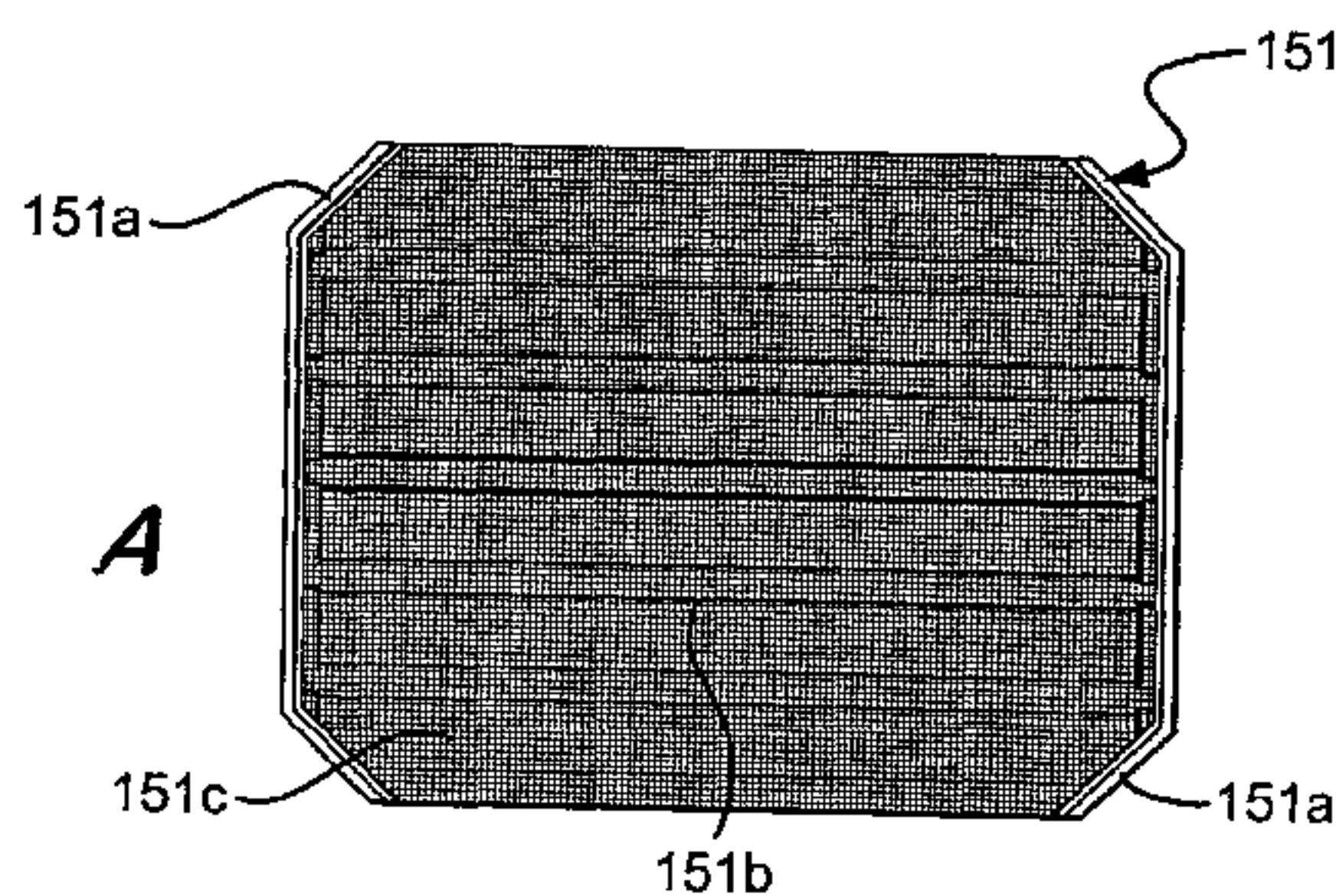
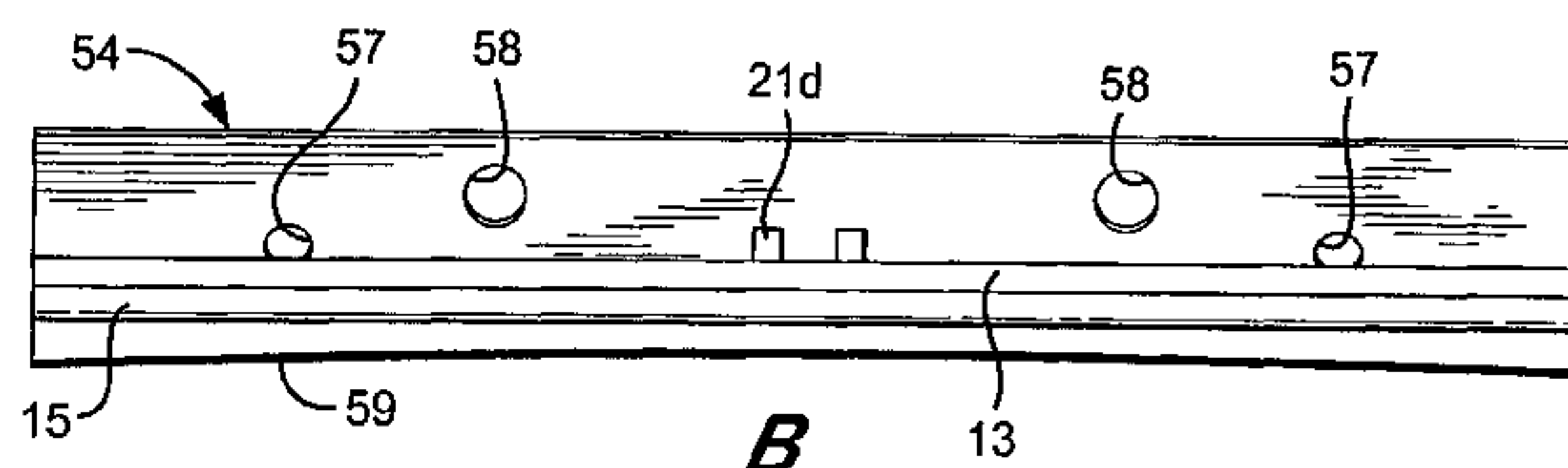
PCT

(10) International Publication Number
WO 03/031085 A1

- (51) International Patent Classification⁷: **B07B 1/49**, B01D 33/80
- (74) Agent: **LUCAS, Brian, Ronald**; 135 Westhall Road, Warlingham, Surrey CR6 9HJ (GB).
- (21) International Application Number: PCT/GB02/04553
- (22) International Filing Date: 7 October 2002 (07.10.2002)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:
09/972,837 5 October 2001 (05.10.2001) US
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- (81) Designated States (national): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.
- (84) Designated States (regional): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).
- Published:
— with international search report

[Continued on next page]

(54) Title: VIBRATORY SEPARATOR, SCREEN AND CLAMP



(57) Abstract: A clamp for securing a screen in a vibratory separator, said clamp comprising a plate (13;43;77;80a;92;103;110) for contacting a side of a screen to be mounted in a vibratory separator, said plate (13;43;77;80a;92;103;110) having a length substantially equal to the length of the side of the screen. The invention also provides a vibratory separator comprising a clamp of the invention. A screen for use in a vibratory separator, said screen comprising a body having two sides, each side having ends which are curved.

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For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

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VIBRATORY SEPARATOR, SCREEN AND CLAMP

This invention relates to a clamp for securing a screen in a vibratory separator, a screen and a vibratory separator.

5 In the drilling of a borehole in the construction of an oil or gas well, a drill bit is arranged on the end of a drill string and is rotated to bore the borehole. A drilling fluid known as "drilling mud" is pumped through the drill string to the drill bit to lubricate the drill
10 bit. The drilling mud is also used to carry the cuttings produced by the drill bit and other solids to the surface through an annulus formed between the drill string and the borehole. The drilling mud contains expensive synthetic oil-based lubricants and it is normal therefore
15 to recover and re-use the used drilling mud, but this requires the solids to be removed from the drilling mud. This is achieved by processing the drilling fluid. The first part of the process is to separate the solids from the solids laden drilling mud. This is at least partly
20 achieved with a vibratory separator known as a shale shaker, such as those disclosed in US 5,265,730, WO 96/33792 and WO 98/16328.

Shale shakers generally comprise an open bottomed basket having one open discharge end and a solid walled
25 feed end. A number of rectangular screens are arranged in the basket, which are held in C-channel rails located on the basket walls, such as those disclosed in GB-A-2,176,424 or tensioning devices such as those disclosed in PCT Publication No. WO 00/20131. The basket is
30 arranged on springs above a receptor for receiving recovered drilling mud. A skip or ditch is provided beneath the open discharge end of the basket. A motor is fixed to the basket, which has a drive rotor provided with an offset clump weight. In use, the motor rotates
35 the rotor and the offset clump weight, which causes the

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basket and the screens fixed thereto to shake. Solids laden mud is introduced at the feed end of the basket on to the screens. The shaking motion induces the solids to move along the screens towards the open discharge end.

5 The recovered drilling mud is received in the receptor for further processing and the solids pass over the discharge end of the basket into the ditch or skip.

The screens are generally of one of two types: hook-strip; and pre-tensioned.

10 The hook-strip type of screen comprises several rectangular layers of mesh in a sandwich, usually comprising one or two layers of fine grade mesh and a supporting mesh having larger mesh holes and heavier gauge wire. The layers of mesh are joined at each side edge by a strip which is in the form of an elongate hook. In use, the elongate hook is hooked on to a tensioning device arranged along each side of a shale shaker. The shale shaker further comprises a crowned set of supporting members, which run along the length of the basket of the shaker, over which the layers of mesh are tensioned. An example of this type of screen is disclosed in GB-A-1,526,663. The supporting mesh may be provided with or replaced by a panel having apertures therein.

25 The pre-tensioned type of screen comprises several rectangular layers of mesh, usually comprising one or two layers of fine grade mesh and a supporting mesh having larger mesh holes and heavier gauge wire. The layers of mesh are pre-tensioned on a rigid support comprising a rectangular angle iron frame and adhered thereto. The screen is then inserted into C-channel rails arranged in a basket of a shale shaker. An example of this type of screen is disclosed in GB-A-1,578,948.

35 There are a variety of known devices and apparatuses for securing a screen to a vibratory screening apparatus. Many of these systems employ a simple bolt, nut, and

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plate combination, with or without shock absorbing material. Tightening and loosening of a nut on a bolt provides tension adjustment. In many of these systems, multiple screen tensioners on each side of a screen are used for each individual screen. In some cases multiple screen tensioners are required along a side of a screen to provide a relatively even tension along the length of the screen. The use of multiple tensioners on each side of the screen or end of the screen requires a relatively long time to change screens since each individual screen tensioner must be released and then tightened. Prior patents include, but are not limited to, U.S. 4,303,509; 5,332,101; 5,392,925; and 6,179,128.

Typically a screen tensioning clamp, plate, bar or member (sometimes referred to as "tension rails", "drawbars", "brackets" or "side rails" has a squared-off upper edge. The plates of the tension clamps have squared off edges. It has been observed that this squared-off edge wears against the wall of the basket in which the tension clamp is mounted. One attempted prior solution to this problem was to weld a plate to a basket sidewall and to position the tensioning member's upper edge so that it contacts and wears against this plate (see U.S. Patent 5,332,101).

"Hookstrips" are used, as is well-known on sides of a screen to provide a surface or channel against which part of screen tension clamp bears to tighten a screen in place on a separator or shaker apparatus. Typically such hookstrips have a squared-off outer portion that bears against and wears against a wall of the basket or other side wall or member. Also, a tensioning member often has a squared-off lower edge that bears against and wears against part of a hookstrip. Reduction of the wearing of these parts is desirable.

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The prior art teaches that it is ideal to apply uniform screen tension in and across screen assemblies installed in shale shakers. When multiple screen tensioners are used at each end of a screen, efforts have
5 been made - which often are unsuccessful - to insure that each screen tensioner applies the same amount of tension to the screen mounted therein. If part of a screen is not tensioned properly, it may not perform properly and may lead to screen damage.

10 U.S. Patent 5,332,101 discloses a screen tensioning structure that includes body members with a cam arrangement whose movement creates a pulling effect when cam followers slide up camtracks. As shown in the patent, a plurality of screen tensioning devices are used
15 for each individual screen with multiple screen tensioners on each end of the screen. Certain commercially available embodiments require a special wrench to turn a movable adjustment nut.

It is desirable for a clamp to be used with existing
20 vibratory separators. It is also desirable for a clamp to be easily installed, and relatively quickly installed so that installation personnel have minimal exposure to vapors and materials associated with the use of vibratory separators. It is also desirable for a clamp that reduces
25 misalignment between the apparatus and structural members of the vibratory system and which applies uniform tension across a screen. It is also desirable for a clamp which reduces wear and, as the inventor has noted, friction on the vibratory separator and on parts of it.

30 The inventor has found that that it is important to counter the tendency of screen ends to bow out from a basket wall when clamps are tightened and that this should be carried out in a manner which at least partly overcomes some of the problems stated above.

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The present invention provides a clamp for securing a screen in a vibratory separator, said clamp comprising an elongate draw bar for contacting a hookstrip on a side of a screen to be mounted in a vibratory separator, said
5 elongate draw bar having a length substantially equal to the length of the side of the screen characterised in that said clamp comprises a single bolt structure to contact with said elongate draw bar to secure said screen.

Preferably, said plate has a hook portion for
10 engagement with a said screen, advantageously, a hook a hookstrip portion of said screen. Preferably, said hook portion extends substantially the length of said plate. Advantageously, said hook portion has an end which is rounded off.

15 Preferably, the clamp further comprises a bolt and a hole in said plate for receiving said bolt. In use, the bolt passes through the hole in the plate and through a hole in the basket of a vibratory shaker in which a screen is to be mounted. A tensioning means, such as a
20 nut may be used to pull the bolt through the hole in the basket, moving the plate which tensions the screen. Advantageously, the clamp further comprising a bolt holder on said plate. Preferably, said bolt holder inhibits said bolt from turning therein. Advantageously,
25 said bolt as a head with two portions extending radially therefrom, which may facilitate being received in said bolt holder which may have corresponding recess therefor. Preferably, the clamp further comprising yieldably urging means arranged on said bolt. Advantageously, said
30 yieldably urging means comprises a spring. Preferably, a single bolt is used in any one clamp.

Advantageously, said plate has a rear edge for, in use, abutting the screen, the rear edge having substantially straight profile. The rear edge may be a
35 hookstrip portion.

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Alternatively, said plate has a rear edge for, in use, abutting the screen, the rear edge having a curved profile or crescent shaped and preferably, said plate has two opposed ends and a centre, the curved profile extending inwardly from the two opposed ends towards the centre, preferably, by between 1/32" (0.08cm) and 1/8" (0.32cm). This accommodates the typical slackening or bowing of the outer sides at the end of a screen that is put under tension on a vibratory separator or shaker. This curved shape insures that the ends of the screen are tightened as is the rest of the screen. Alternatively, the single drawbar has sufficient strength, for example by making it sufficiently large and/or massive, that tightening the drawbar prevents the screen end's outer parts from resisting tensioning and bowing inwardly.

Advantageously, said plate has a lower end having a member extending at an angle to said plate, which, amongst other things, strengthens the plate. Preferably, the member extends substantially the same length as said plate. Advantageously, said member has at least one drain hole. Preferably, said member has at least one finger hole.

Advantageously, an upper part of said plate has a main planar portion and an upper portion at an angle thereto, which preferably extends substantially the length of the plate. Preferably, said plate has an upper edge which is rounded off.

The present invention also provides a vibratory separator comprising the clamp of the invention. The vibratory separator may have a basket having sides on which clamps of the invention are arranged.

Preferably, the vibratory separator has a basket having two sides for receiving two screens, each screen fitting between said two sides and arranged one in front of the other, wherein said plate of said clamp extends

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along the length of said two screens.

The invention also provides a method of mounting a screen in a vibratory separator using the clamp of the invention, the method comprising the step of activating
5 said single bolt structure to co-act with said elongate draw bar to tension said screen.

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For a better understanding of the present invention, reference will now be made, by way of example, to the accompanying drawings, in which:

5 Figure 1A is a side view of part of a clamp in accordance with the present invention;

Figure 1B is an end view of the part of the clamp shown in Figure 1A;

Figure 2A is a side view of a part of a clamp in accordance with the present invention;

10 Figure 2B is an end view of the part of the clamp shown in Figure 2A;

Figure 3A is a side view of a bolt of the clamp in accordance with the present invention;

15 Figure 3B is another side view of the bolt of Figure 3A;

Figure 4A is an end view of a part of a clamp in accordance with the present invention;

Figure 4B is a top plan view of the part of the clamp shown in Figure 4A;

20 Figure 5A is an end view of a part of a clamp in accordance with the present invention;

Figure 5B is a top plan view of the part of the clamp shown in Figure 5A;

25 Figures 6A is an end view of a clamp in accordance with the present invention;

Figures 6B is an end view of a clamp in accordance with the present invention;

Figures 6C is an end view, in cross-section, of a clamp in accordance with the present invention;

30 Figures 6D is a perspective view of a clamp in accordance with the present invention;

Figures 6E is an end view, in cross-section of a clamp in accordance with the present invention;

35 Figure 7 is a perspective view of a vibratory separator in accordance with the present invention with

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a clamp in accordance with the present invention; and

Figures 8A to 8C are top plan views of screens in accordance with the present invention.

Referring to Figures 1A and 1B, clamp 10 for
5 tensioning a screen in a vibratory separator in accordance with the present invention has a bar 12 with a main body 13, a top part 14, a top edge 15, a lower member 16 with a hook portion 17, a bolt holder 20, and a bolt hole 18 through which part of a tensioning bolt
10 extends during use.

The bolt holder 20 (which is optional) has two spaced-apart side members 21, 22 each with a recess 21a, 22a, respectively in which part of a bolt end is received and held during use.

15 The top edge 15 of the top part 14 of the main body 13 is rounded to inhibit unwanted wear of a side wall and of the top edge 15 against a side wall of a vibratory separator or shale shaker in which the clamp 10 is used. Although the cross-section of the top edge 15 is shown as
20 generally circular, and desired curved shaped may be used in accordance with the present invention, including, but not limited to, an elliptical or partially elliptical shape. As shown, the top edge 15 is formed integrally with the top part 14; but it is within the
25 scope of this invention to form a curved top edge or top part separately and to attach or connect it to the top part 14, either permanently or removably, for example with welding, or epoxy, or with interfitting parts or clip on structure.

30 As shown in Figures 1A and 1B the lower member 16 projects out from the bolt holder 20 and out from the main member 13 in the shape of a bar (to the left in Figure 1B). In certain aspects, the lower member 16 is sized and made of material of sufficient mass and
35 strength such that a single clamp 10 with such a lower

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member 16 effectively holds a screen in place in a vibratory separator or shale shaker and inhibits or prevents outer screen parts at a screen end from bowing inwardly and/or from being tensioned non-uniformly. The screen may comprise layers of screening material, such as wire mesh. The screening material at the ends of the screen may inhibit or prevent outer screen parts at a screen end from bowing inwardly and/or from being tensioned non-uniformly. In certain aspects such a clamp 10 is made from 314 stainless steel, 316 stainless steel, or sufficiently springy carbon steel (in one aspect, nickel plated); such an apparatus 10 is, in one particular aspect, about 24½" (62.2cm) long and about 5/16" (0.8cm) thick, with a hole 18 13/16" (2.06cm) wide and about 1½" (3.81cm) long, with a top edge 15 having a diameter (made of stainless steel round bar of 304, 314, or 316 SS), in cross-section, of about 0.5" (1.27cm), and a lower member 16 about 2" long (measured from the rear line of the bolt holder 20 in Figure 1B to the distal end, to the left in Figure 1B, of the lower member 16).

Figures 2A and 2B show a clamp 40 for tensioning a screen in a vibratory separator in accordance with the present invention has a bar 42 with a main body 43, a top part 44, a top edge 45 with a hook portion 47, a bolt holder 41, and a bolt hole 48 through which part of a tensioning bolt extends during use.

The bolt holder 41 (which is optional) has two spaced-apart side members 41a, 42b each with a recess 41c, 42c, respectively in which part of a bolt end is received and held during use.

The top edge 45 of the top part 44 of the main body 43 is rounded to reduce friction and/or to inhibit unwanted wear of a side wall and of the top edge 45 against a side wall of a separator or shaker in which the

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clamp 10 is used.

Figures 3A and 3B show a bolt 50 in accordance with the present invention with a main bolt body 51, a T-head 52, and a threaded end 53. The T-head 52 is insertable
5 through a hole in a drawbar (for example, but not limited to the hole 18, Figure 1A) and, after turning the T-head 90 degrees, the T-head is received in and rests against recesses, if present, in bolt holder sides (for example, but not limited to as in the bolt holder 20,
10 Figure 1A).

Referring now to Figures 4A and 4B, a clamp 54 for tensioning a screen in a vibratory separator in accordance with the present invention, is similar to the clamp shown in Figures 1A and 1B and like numerals
15 indicate like parts. A bar has a main body 13 and a top part part with a top edge 15, an optional lower member 56 (which may be used for added weight and/or added stability) with a hook portion 17, a bolt holder 21d (like the bolt holder 20, Figure 1A), with a bolt hole
20 (not shown- like the bolt hole 18, Figure 1A) through which part of a tensioning bolt extends during use. The body 13 has, optionally, one or more drainage holes 57 and, optionally, one or more finger holes 58 to facilitate manipulation of the clamp 54 [and any drawbar
25 or plate for a rail herein may have such drain hole(s) and or finger hole(s) may be added to any known rail, drawbar, or plate used in clamps.

As shown in Figure 4B a rear edge 59 (the lower edge as viewed in Figure 4B) of the hook portion 17 of the
30 main body 13 is curved or radiused so that a non-straight edge abuts a screen end or side, or hookstrip or other screen mounting apparatus on a screen end or side; thus a tendency of the main body 13 to bow is compensated for and more even tension is applied by the clamp 54 to a
35 screen that it is used with. As shown, the middle of the

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rear edge 59 of the main body 13 is about 3/32" (0.24cm) further inward (toward the top of the page in Figure 4B as shown) as compared to the spaced-apart ends of the main body 13. However, it is within the scope of this invention for this distance to be any suitable desired distance; and, in certain particular aspects, this distance ranges between 1/32" (0.08cm) and 1/8" (0.32cm).

Figures 6A and 6B illustrate screen assembly clamps in accordance with the present invention which are similar to those disclosed in U.S. Patent 5,179,128 co-owned with the present invention. As shown in Fig 6A a screen assembly 72 has hookstrips 73 along its sides (for example along both sides as is shown, for example in the apparatus of Figure 7 or as is shown in U.S. Patents 4,575,421 and 6,269,953 and the references cited in them. A basket of a separator apparatus or shaker in which the screen assembly 72 is mounted has a side wall 74 which is contacted by an outer part 75 of the hookstrip(s). The outer part 75 has a curved surface (viewed in cross-section as in Figure 6A) to inhibit wear of the outer part 75 against the side wall 74.

A tension rail 80 has a main body 77 with a hole 84 through which projects part of a bolt tensioning apparatus 78. The tension rail 80 has a lower hook portion 79 with a curved outer edge 81 for inhibiting wear of the outer edge against the hookstrip 73's interior. The tension rail 80 has a top part 82 with a curved top edge 83 for inhibiting wear of the curved top edge 83 against the side wall 74 and for inhibiting wearing of the side wall itself. It is within the scope of the present invention to delete either the curved top edge 83 or the curved outer edge 81; or to delete the curved surface of the outer part 75; and it is within the scope of the present invention to use any suitable curve or non-squared off shape for these parts and surfaces to

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inhibit wear. it is within the scope of the present invention to use such curved parts and surfaces on any known tension clamp or tensioner for tensioning screen assemblies and to use a curved edge like the curved edge of the outer part 75 for any known hookstrip (including, but not limited to, hookstrips as disclosed in U.S. Patent 6,220,449, Figures 2A and 2B, co-owned with the present invention, and in the references cited in this patent).

10 As shown in Figure 6B another embodiment of the tension rial 80, labelled "80a" in Figure 6B, has a lower hook portion 79a with a bulbous end 81a for inhibiting wear against the interior of a hookstrip 73a of a screen assembly 72a. The hookstrip 72a abuts a stop member 85. Like parts in Figures 6A and 6B have like identifying numerals.

15 Figure 6C shows a screen, hookstrip, and screen mounting apparatus like that disclosed in U.S. Patent 4,575,421; but with an upper curved portion 91 of a body 20 92 of a draw bar 90. A lower portion 93 of the body 92 is held against a hookstrip 94 of a screen 95 by a bolt 96 that extends through a side wall 97 of a vibrating screening machine. The upper curved portion 91 inhibits wear of this part and of the side wall 97 against which it bears. A helical compression spring 98 (which, 25 alternatively or in addition may include one, two, or more disc springs) between a nut 99 and a washer 94 on the bolt 96 facilitates application of a desired amount of tightness and therefore, of a desired amount of tension to the screen 95. Such a spring or springs may be used with any bolt of any system disclosed herein. In certain aspects, a spring of sufficient spring force is applied which facilitates correct tensioning and uniform 30 tensioning of systems in accordance with the present invention and, thus, a substantially equal amount of 35

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tension is applied by each rail, plate or drawbar.

Figure 6D shows a drawbar 100 in accordance with the present invention which is like the drawbar of Figure 12 of U.S. Patent 5,332,101; but which has a rounded top edge 102 of a body 103. The rounded top edge 102 reduces wear of a basket wall or side wall in contact with the rounded top edge 102 and reduces wear of the top edge itself. The body 103 has an upturned tab 104 which enters notch 105 of a hookstrip 106 of a screen assembly 107 to correctly position the drawbar 100 with respect to the screen assembly 107. It is within the scope of the present invention to provide a rounded or curved top edge or top part, for example, but not limited to as these of Figures 1B, 6C or 6D, for any known drawbar or tension rail.

Figure 6E shows a drawbar 110 in accordance with the present invention like a drawbar 23 as disclosed in U.S. Patent 5,332,101; but with an upper rounded part 111 for inhibiting wear. The drawbar 110 may be used in a basket 112 which has a plate 113 welded to its side wall (or walls). Optionally stop block(s) 114 may be used and, although a bolt tensioner 115 as disclosed in U.S. Patent 5,332,101 is shown, any suitable bolt or bolt tensioner may be used according to the present invention. A screen 116 has a hookstrip 117 in which is disposed a lower part 118 of the drawbar 110.

Figure 7 shows a shale shaker 130 in accordance with the present invention with multiple screen assemblies 132 mounted therein. Each end of a screen assembly 132 is tensioned in place by a single tensioner 134 (like any tensioner or tensioning apparatus according to the present invention described herein). It is also to be understood that, although the shale shaker 130 is like one shown in U.S. Patent 5,332,101, any suitable known vibratory separator or shale shaker may be used,

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including, but not limited to any disclosed in any patent or reference referred to herein.

5 Figures 8A to 8C show screen assemblies 151, 152, and 153 respectively, in accordance with the present invention, each of which has screen ends with bars, frame pieces, tubular members (none shown) or as shown, hookstrips which are not straight, but which have curved or angled portions 151a, 152a, 153a respectively at the outer edges of the ends. The in-turned hookstrips at the
10 screen ends shown in Figures 8A to 8C will contact a drawbar extending from one side of the screen end to the other before other portions of the hookstrip; thus the tendency of the screen ends outer part to be un- tensioned or tensioned less than the remainder of the
15 screen is reduced or eliminated. The hookstrips at the outer edges of the screen ends may be turned in or curved inwardly as shown in Figures 8A - 8C or, in accordance with the present invention, they may be turned in or curved inwardly any desired amount.

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CLAIMS:

1. A clamp for securing a screen in a vibratory separator, said clamp comprising an elongate draw bar for contacting a hookstrip on a side of a screen to be mounted in the vibratory separator, said elongate draw bar having a length substantially equal to a length of the side of the screen characterised in that said clamp comprises a single bolt structure to co-act with said elongate draw bar to secure said screen wherein said draw bar has a rear edge for, in use, abutting the screen, the rear edge having a curved profile.

2. The clamp as claimed in claim 1, wherein said elongate draw bar has a hook portion for engagement with the hookstrip on said screen.

3. The clamp as claimed in claim 2, wherein said hook portion extends substantially the length of said elongate draw bar.

4. The clamp as claimed in claim 2 or 3, wherein a cross-section of a distal end of said hook portion has a rounded profile.

5. The clamp as claimed in any one of claims 1 to 4, wherein said bolt structure comprises a bolt and a hole in said elongate draw bar for receiving said bolt.

6. The clamp as claimed in claim 5, further comprising a bolt holder on said elongate draw bar.

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7. The clamp as claimed in claim 6, wherein said bolt holder inhibits said bolt from turning therein.

8. The clamp as claimed in claim 5, 6 or 7, wherein said bolt has a head with two portions extending radially therefrom.

9. The clamp as claimed in any one of claims 5 to 8, further comprising a nut and said bolt has a threaded portion for receiving said nut.

10. The clamp as claimed in claim 9, further comprising elastic urging means arranged on said bolt.

11. The clamp as claimed in claim 10, wherein said elastic urging means comprises a spring.

12. The clamp as claimed in any one of claims 1 to 11, wherein said elongate draw bar has two opposed ends and a centre, the curved profile extending inwardly from the two opposed ends towards the centre.

13. The clamp as claimed in any one of claims 1 to 11, wherein said elongate draw bar has two opposed ends and a centre, the curved profile extending inwardly from the two opposed ends towards the centre by between 1/32" (0.08cm) and 1/8" (0.32cm).

14. The clamp as claimed in any one of claims 1 to 13, wherein said elongate draw bar has a distal end having a member extending therefrom at an angle to said draw bar.

15. The clamp as claimed in claim 14, wherein the member

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extends substantially the same length as said draw bar.

16. The clamp as claimed in claim 14 or 15, wherein said member has at least one drain hole.

17. The clamp as claimed in claim 14, 15 or 16, wherein said member has at least one finger hole.

18. The clamp as claimed in any one of claims 1 to 17, wherein an upper part of said elongate draw bar has a main planar portion and an upper portion at an angle thereto.

19. The clamp as claimed in any one of claims 1 to 18, wherein said elongate draw bar has an upper edge which is rounded off.

20. A vibratory separator having a basket and a motor for inducing vibrations, said basket comprising a clamp for securing a screen in the vibratory separator, said clamp comprising an elongate draw bar for contacting a hookstrip on a side of the screen to be mounted in the vibratory separator, said elongate draw bar having a length substantially equal to a length of the side of the screen characterised in that said clamp comprises a single bolt structure to co-act with said elongate draw bar to secure said screen wherein said drawbar has a rear edge for, in use, abutting the screen, the rear edge having a curved profile.

21. The vibratory separator as claimed in claim 20, wherein said basket has two sides for receiving two screens, each screen fitting between said two sides and arranged one in front of the other, wherein said elongate draw bar of said

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clamp extends along the length of said two screens.

22. A method of mounting a screen in a vibratory separator using the clamp as claimed in any one of claims 1 to 19, the method comprising the step of activating said single bolt structure to co-act with said elongate draw bar to tension said screen.

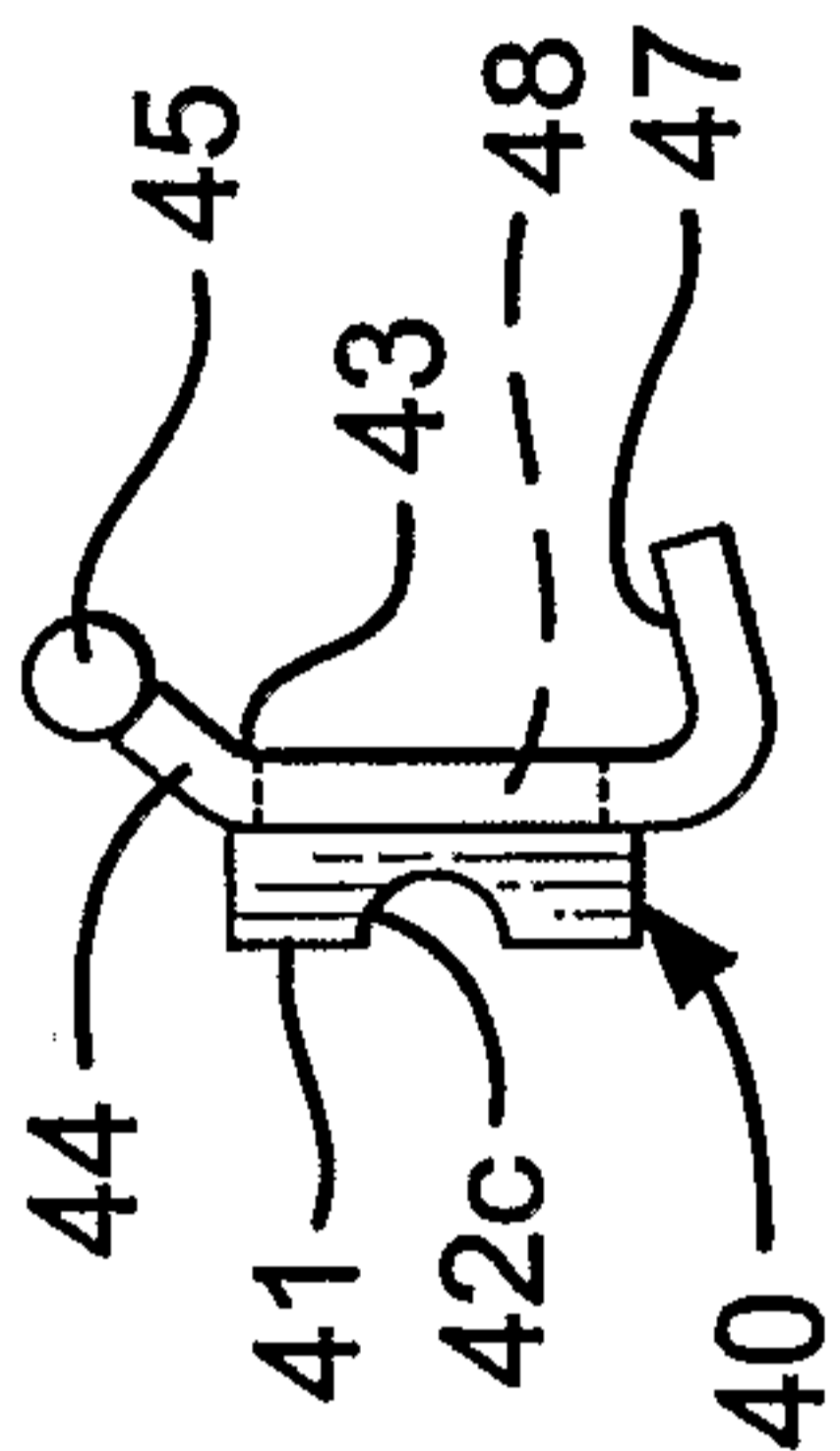
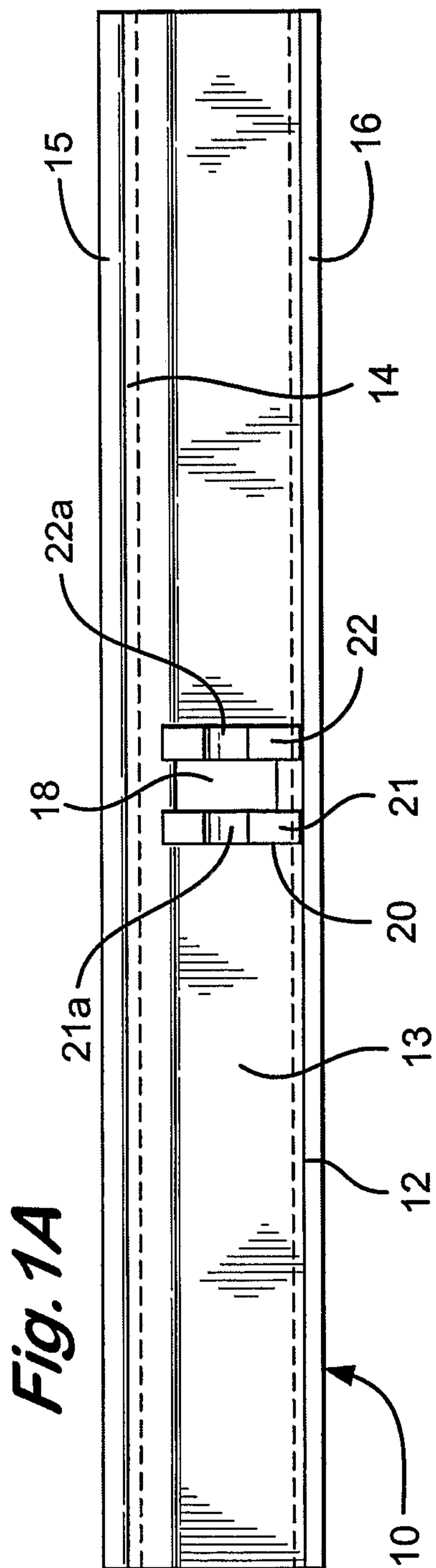


Fig. 2B

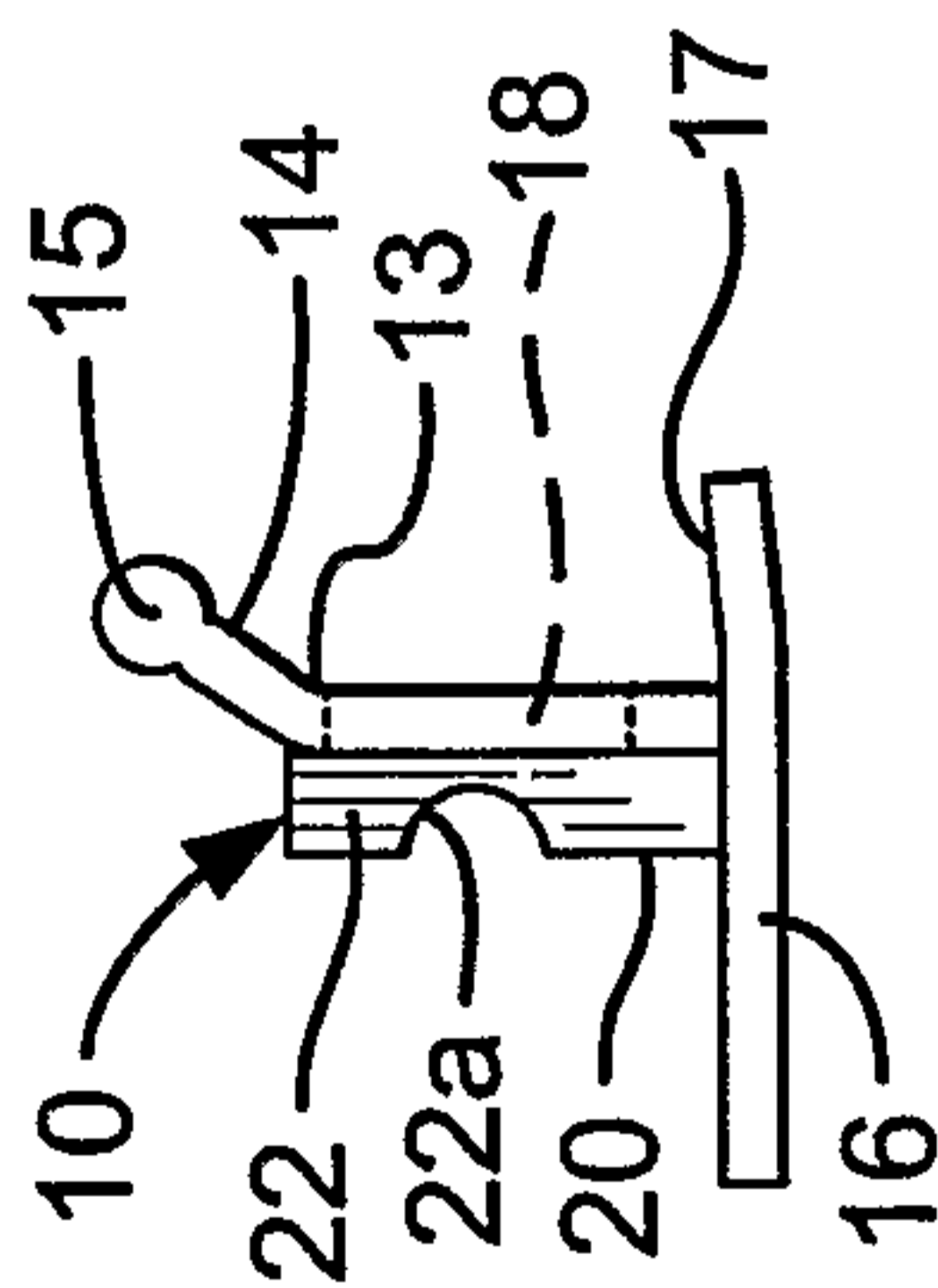


Fig. 1B

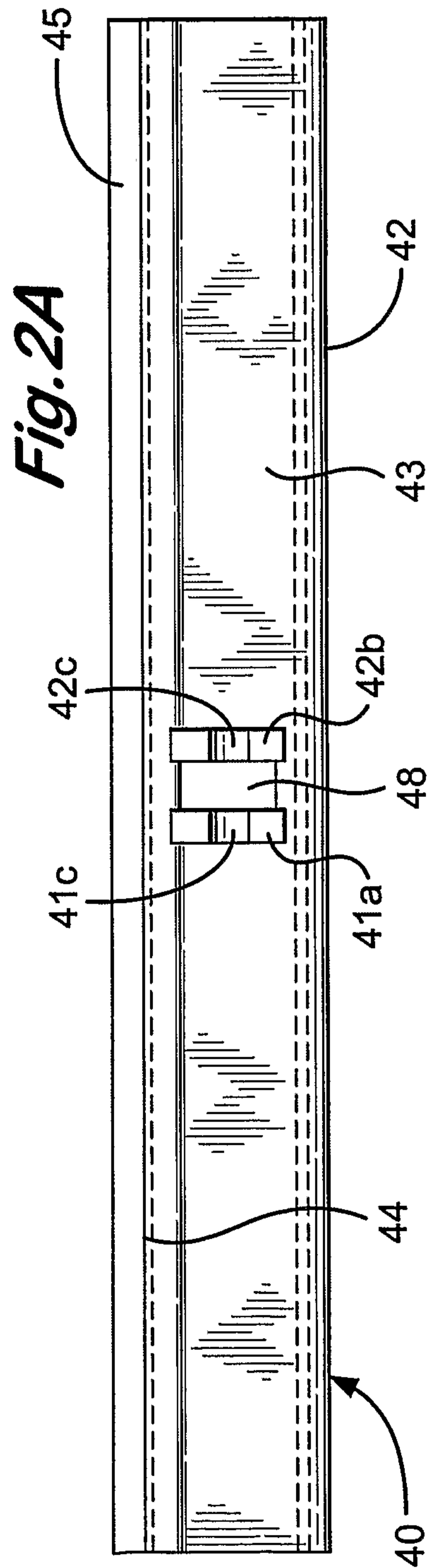


Fig. 2A

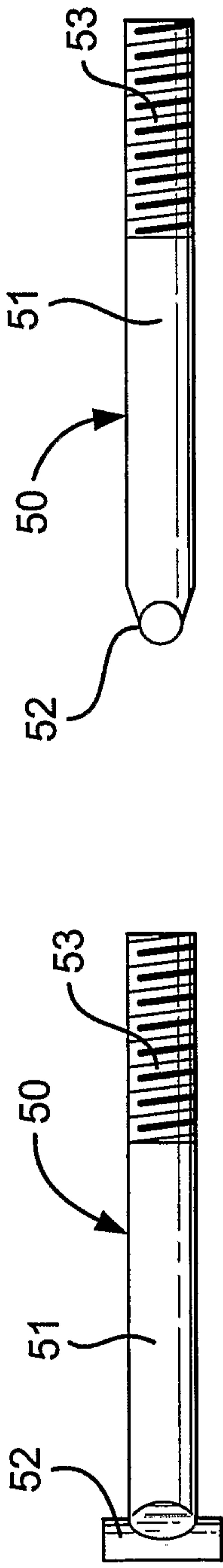


Fig. 3A

Fig. 3B

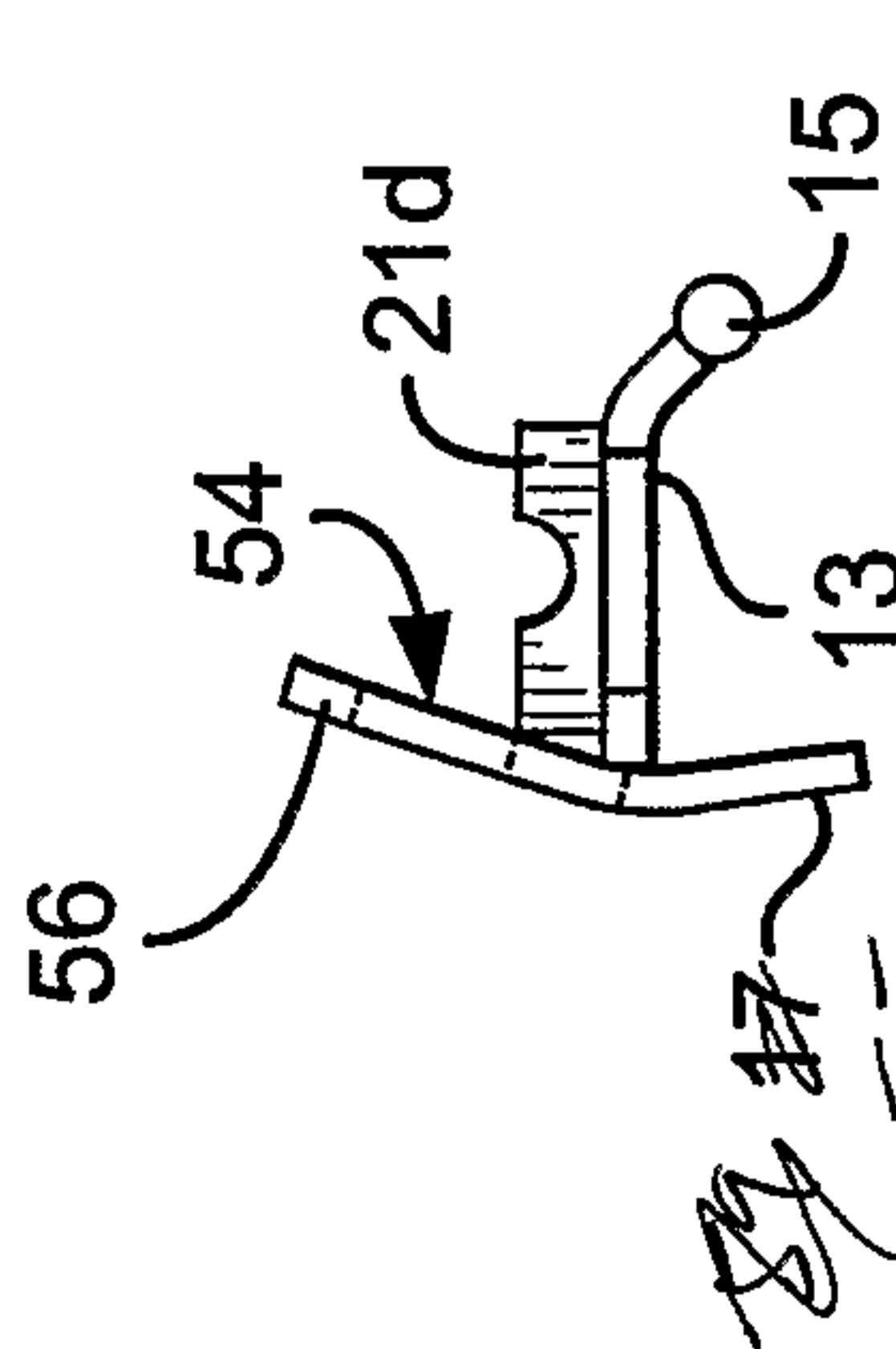


Fig. 4A

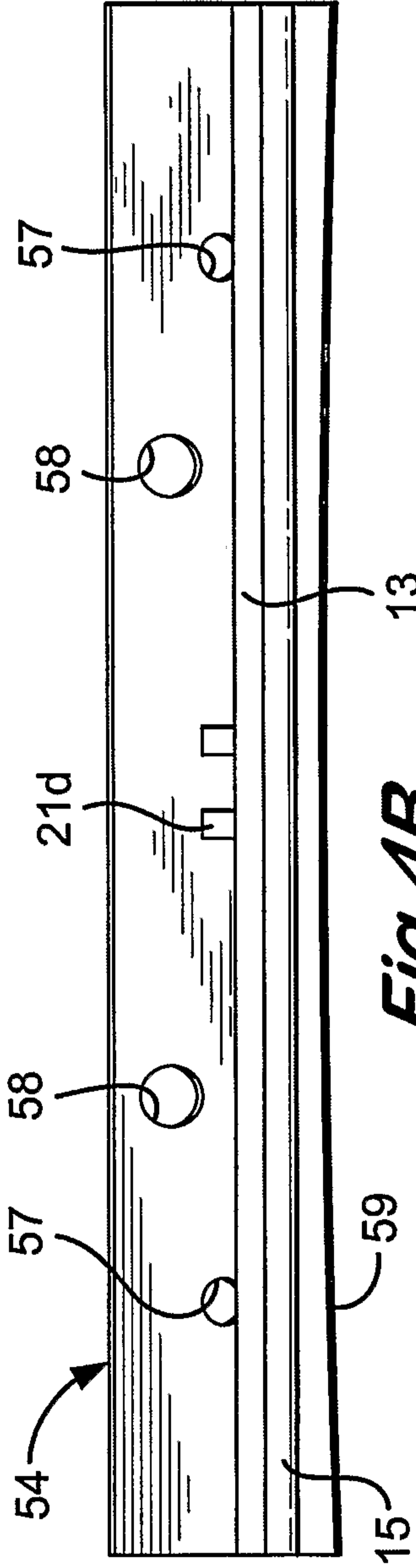


Fig. 4B

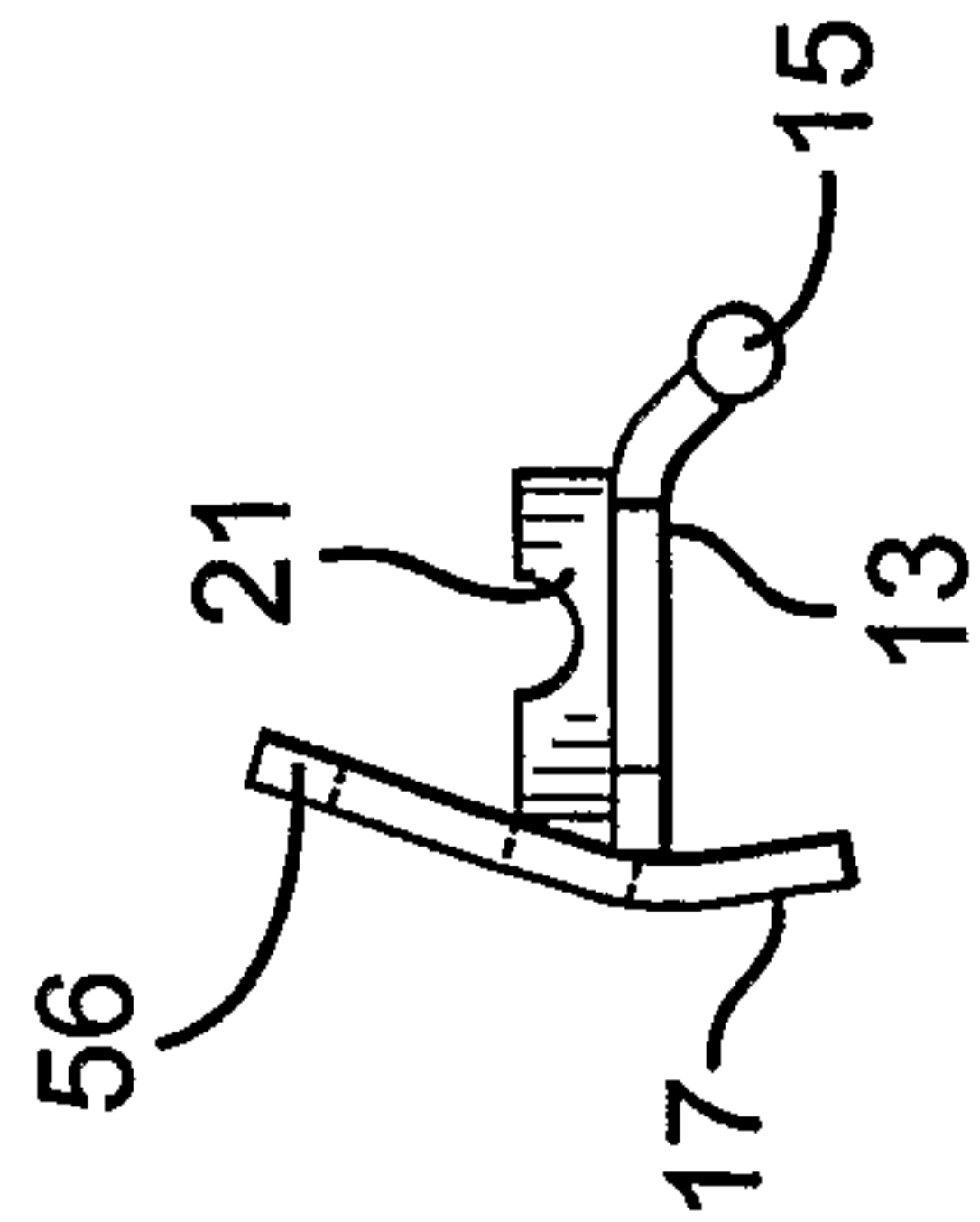


Fig. 5A

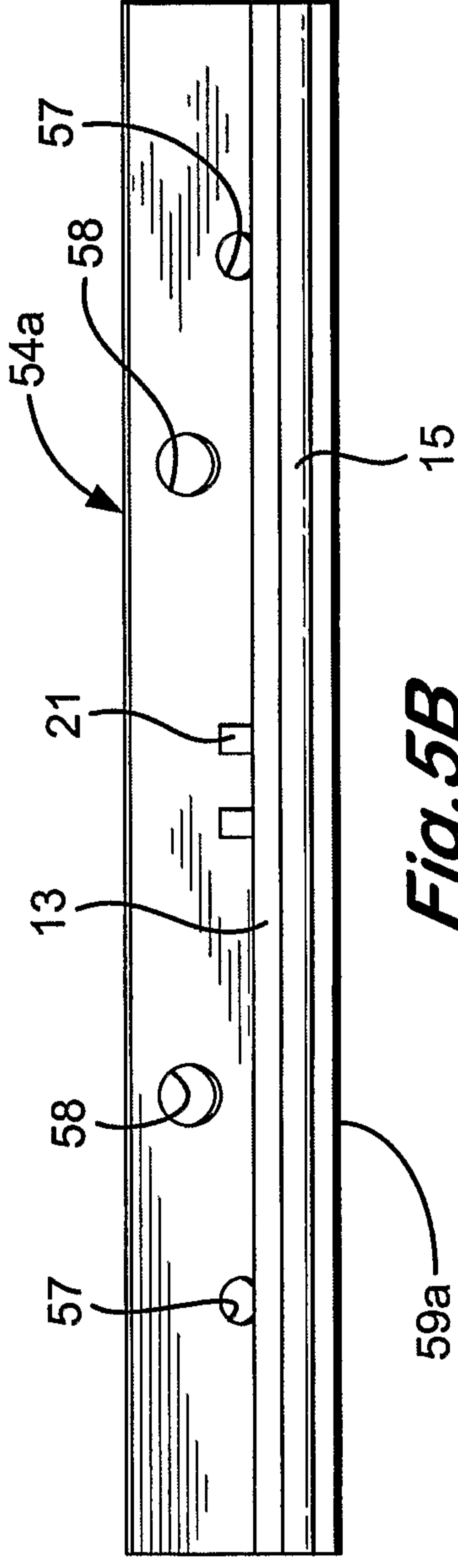


Fig. 5B

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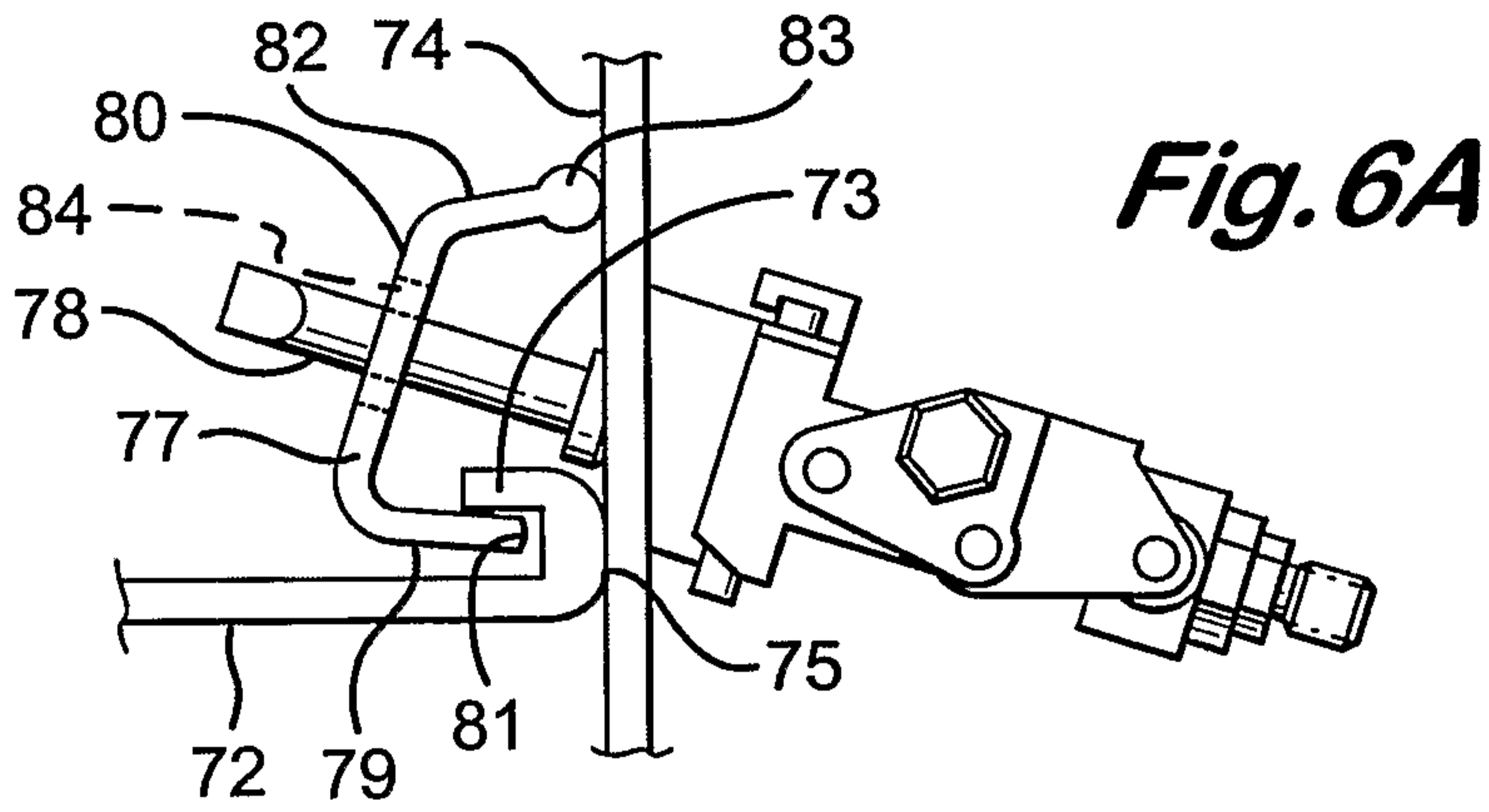


Fig. 6A

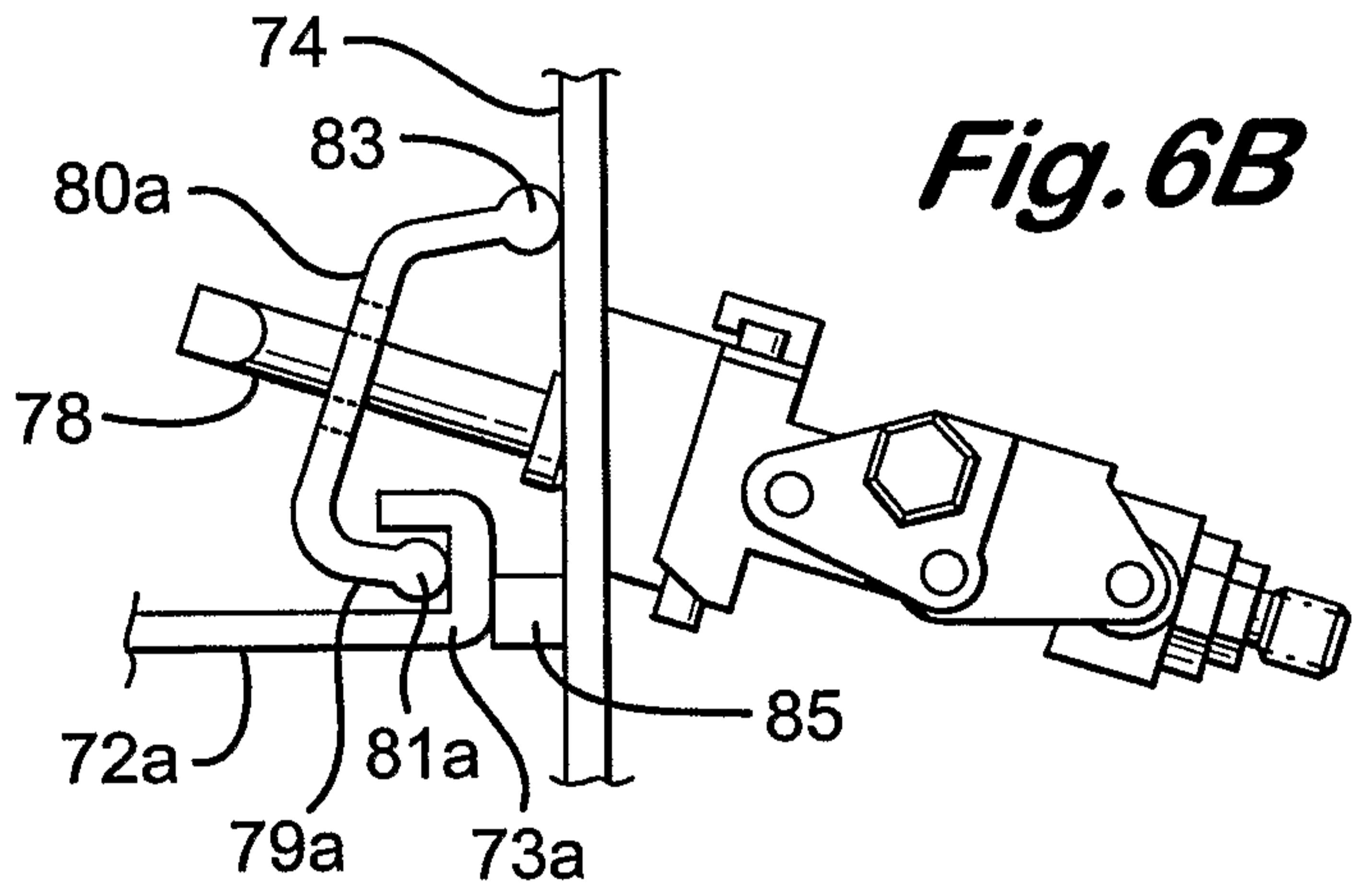


Fig. 6B

Fig. 6C

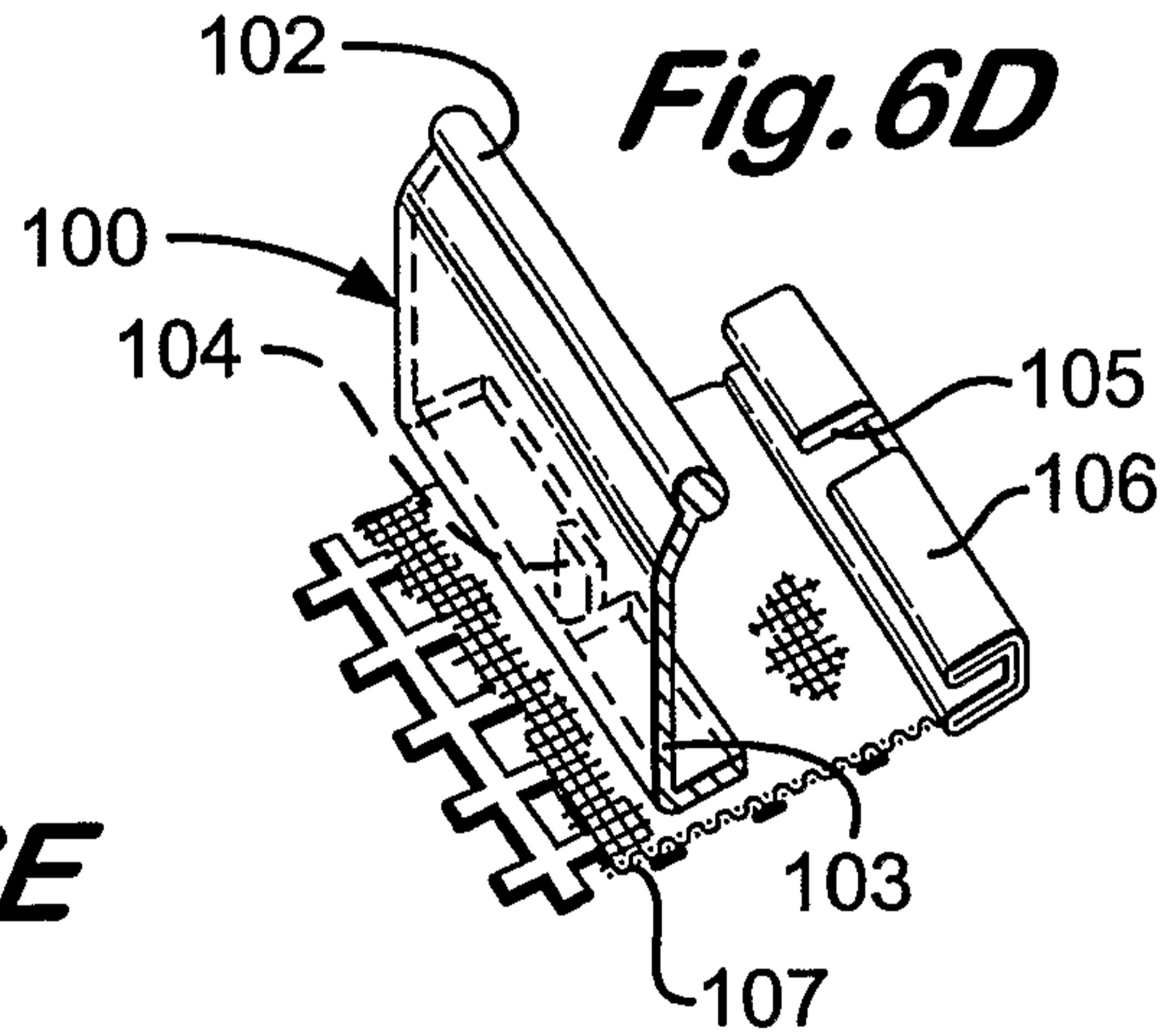
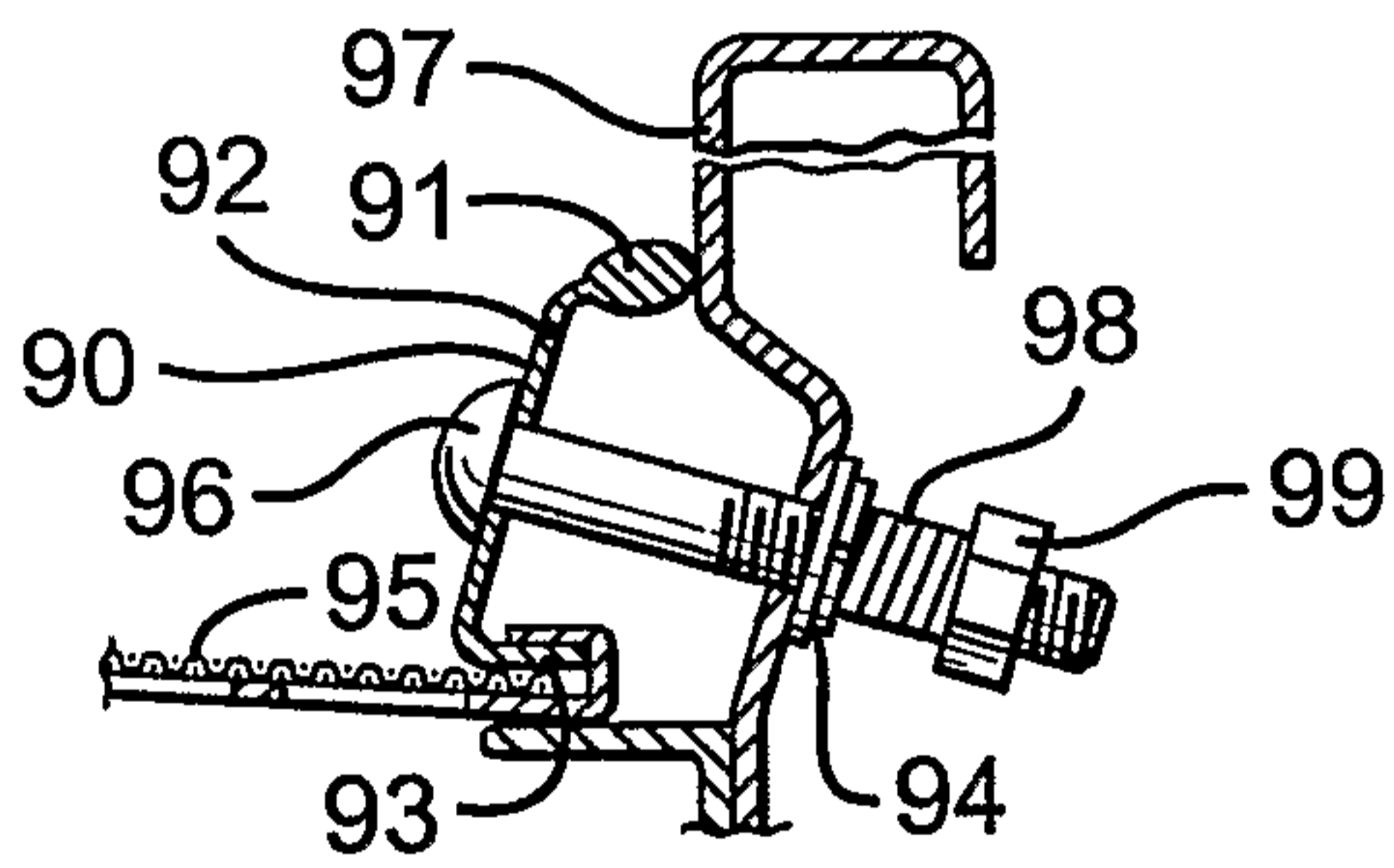


Fig. 6D

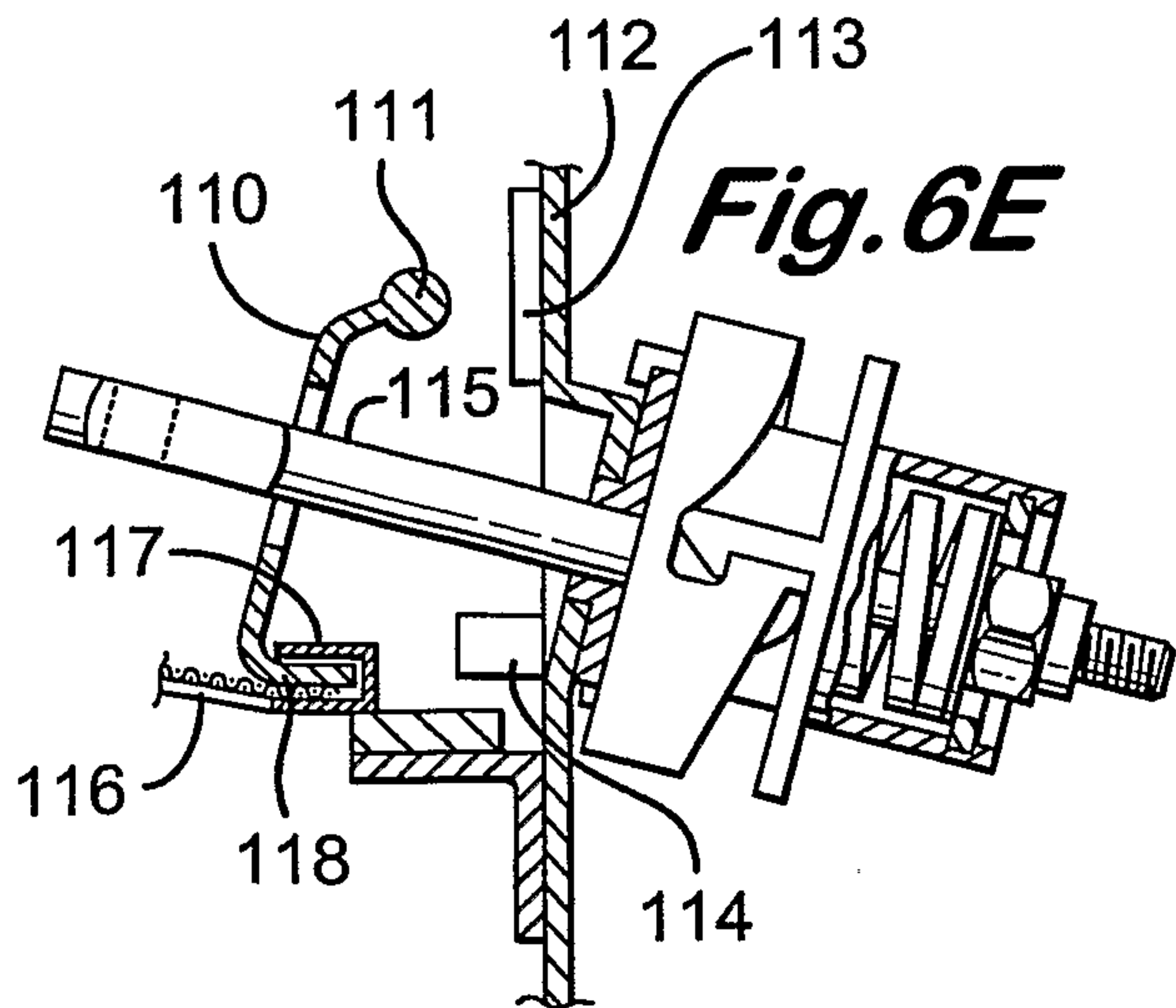


Fig. 6E

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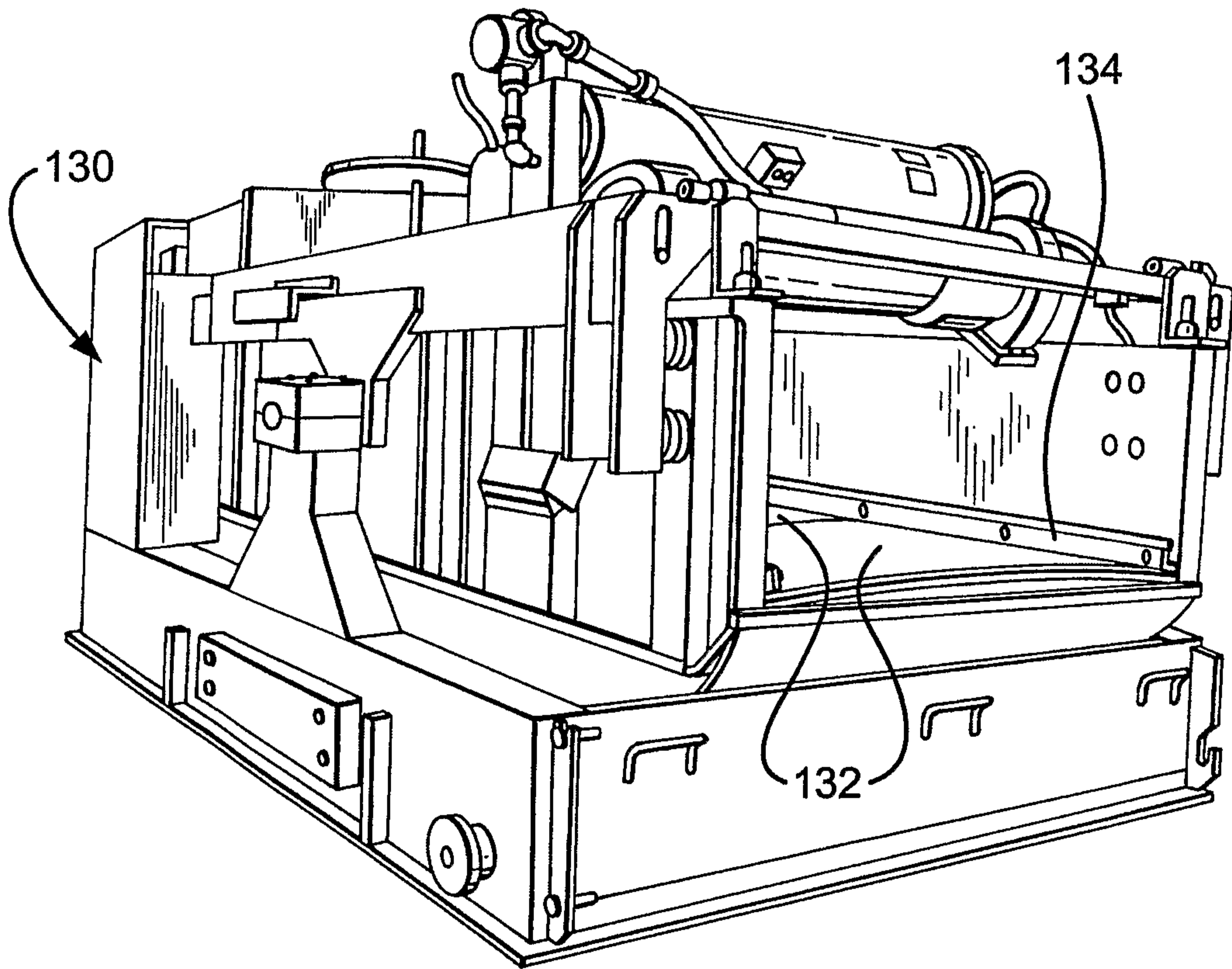


Fig. 7

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Fig. 8A

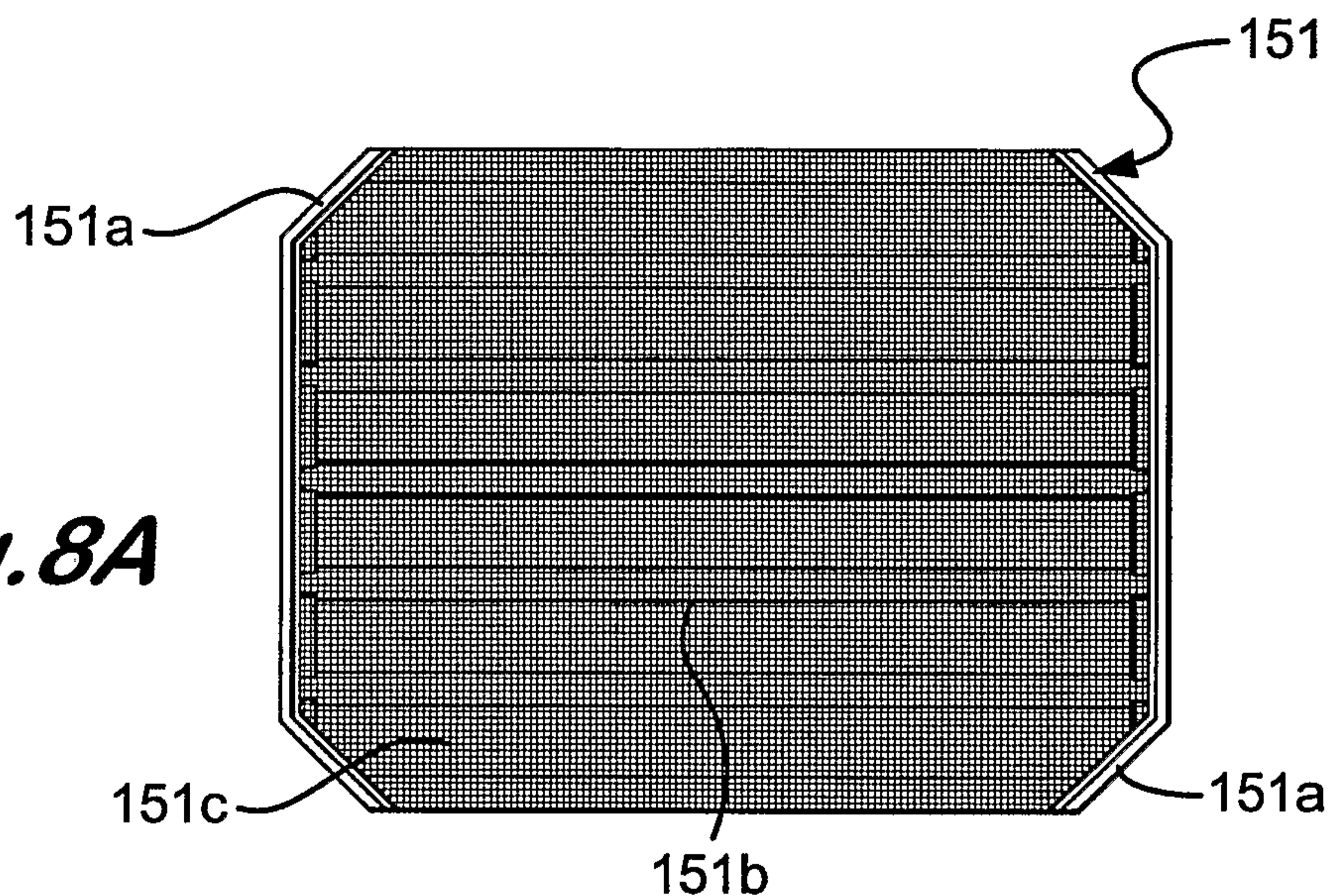


Fig. 8B

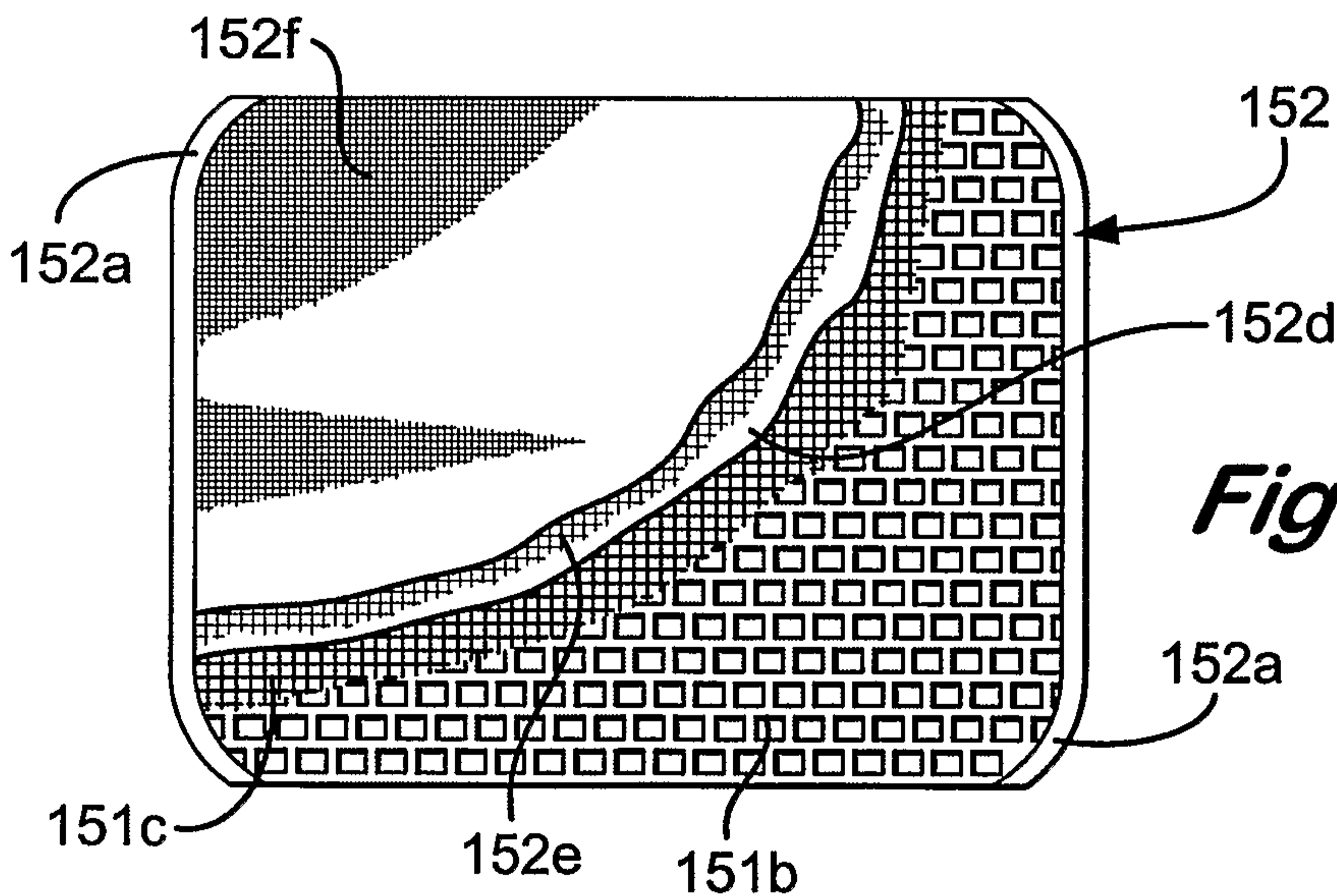


Fig. 8C

