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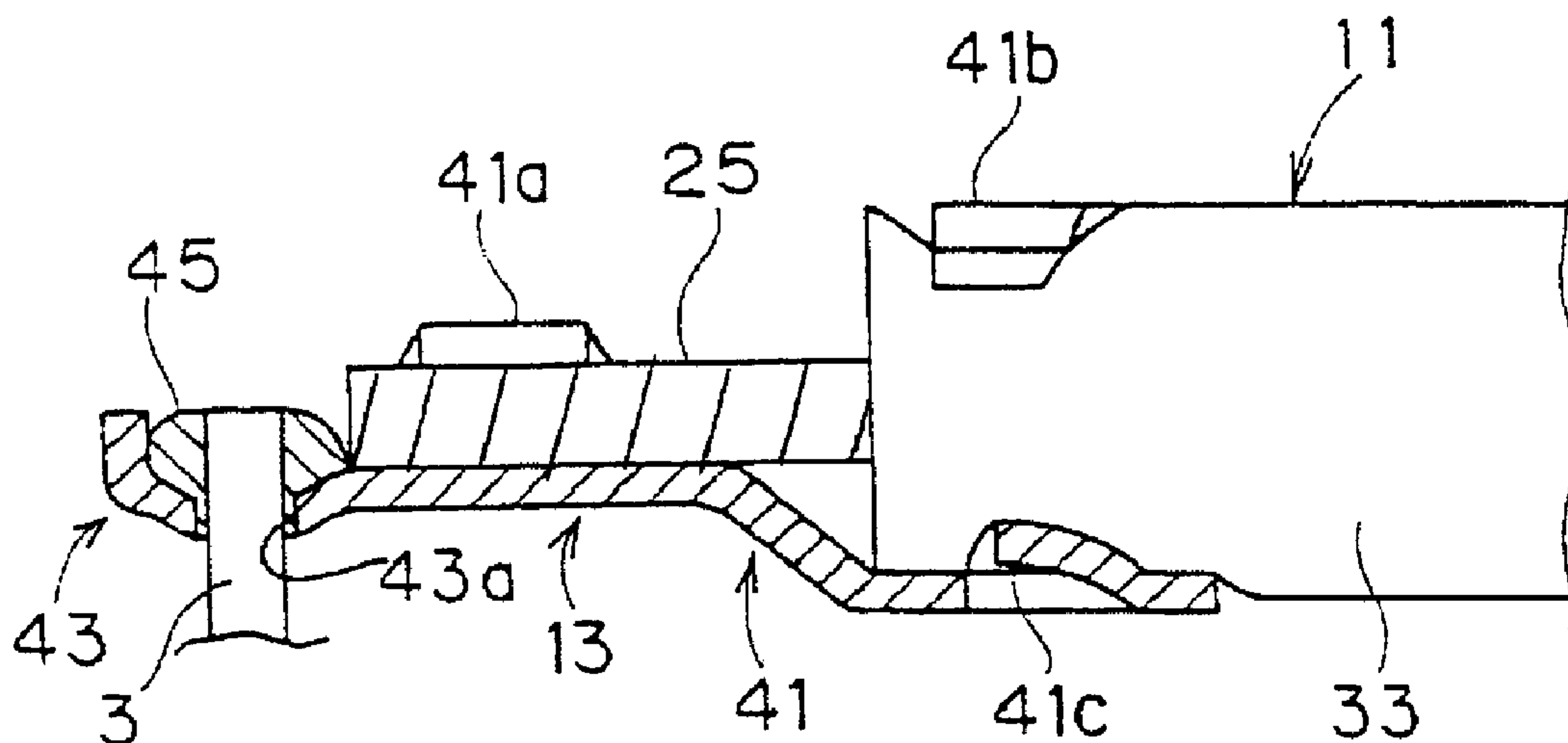
(72) Inventeurs/Inventors:
KOBAYASHI, YOSHINAO, JP;
KIRYU, MASUHIRO, JP

(73) Propriétaire/Owner:
SUMITOMO WIRING SYSTEMS, LTD., JP

(74) Agent: GOUDREAU GAGE DUBUC

(54) Titre : DISPOSITIF DE CONNEXION DE CABLE HAUTE TENSION

(54) Title: CONNECTING DEVICE FOR HIGH-VOLTAGE CABLE



(57) Abrégé/Abstract:

To improve noise suppression, there is provided a metallic connecting device for connecting a high-voltage electrical cable to a transformer. To further enhance the above effect, a coiled-type high-voltage noise-suppressing cable is used as the high-voltage electrical cable. The metallic connecting device comprises a cramping connector portion where the coiled-type high-voltage noise-suppressing cable is press-fitted, and a solder connector portion where a connector portion of transformer is fixed by soldering. The cramping connector portion may comprise a first barrel portion, a second barrel portion and a detent which is formed by notching and raising part of the base wall of the cramping connector portion. The solder connector portion is in the form of a cup. Its base center comprises a through hole whose diameter is slightly greater than that of the connector of transformer.



ABSTRACT OF THE DISCLOSURE

To improve noise suppression, there is provided a metallic connecting device for connecting a high-voltage electrical cable to a transformer. To further enhance the above effect, a coiled-type high-voltage noise-suppressing cable is used as the high-voltage electrical cable. The metallic connecting device comprises a cramping connector portion where the coiled-type high-voltage noise-suppressing cable is press-fitted, and a solder connector portion where a connector portion of transformer is fixed by soldering. The cramping connector portion may comprise a first barrel portion, a second barrel portion and a detent which is formed by notching and raising part of the base wall of the cramping connector portion. The solder connector portion is in the form of a cup. Its base center comprises a through hole whose diameter is slightly greater than that of the connector of transformer.

FIG. 10

CONNECTING DEVICE FOR HIGH-VOLTAGE CABLE

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to a connecting device, e.g. metallic
5 connecting device, used for connecting a high-voltage cable to a connector
portion provided in a transformer. The transformer generates a high electrical
voltage. The high electrical voltage thus produced is applied to electrical
apparatuses, such as office or home appliances for different purposes. The
connecting device according to the invention is used for sending the high
10 electrical voltage to the electrical apparatuses. Further, the invention
concerns methods of connecting such a high-voltage cable to a transformer.

2. Description of Background Information

FIG. 1 shows a known connecting technique, according to which a
high-voltage cable used for sending a high electrical voltage is connected to a
15 connector portion 3 of a transformer 1 in such electrical apparatuses. With
this technique, once a connector portion 3 of the transformer 1 is connected to
a high-voltage cable 5 for sending a high electrical voltage, there is no need to
detach them. Accordingly, the high-voltage cable 5 is stripped off of its
coating, thereby yielding a conductive portion 5a, and the conductive portion
20 5a is soldered to the connector portion 3 of transformer 1.

The transformer 1 comprises a vertically-extending housing 7. The
housing 7 contains a primary coil and a secondary coil which generate high
electrical voltages as a function of the inputted variable current. The housing
7 may also contain various electronic parts such as condensers, diodes or
25 impedance elements, connected to each coil. The housing 7 is provided with
a hollow portion 7a and a base from which a connector portion 3 of the
transformer 1 extends into the hollow portion 7a. The end portion of the
secondary coil of transformer 1 may thus be connected to an electronic

component. The latter includes an end section which may form a rod-shaped terminal portion. Accordingly, the connector portion 3 of transformer 1 may be comprised of the terminal portion of an impedance element, e.g. a capacitor in the housing 7. However, the connector portion 3 of transformer 1
5 may also be comprised of a lead wire extending from the electronic component.

The high-voltage cable 5 usually has a conductive portion 5a consisting of a plurality of copper wires, and a resin coating. When the high-voltage cable 5 is connected to a connector portion 3 of transformer 1, an epoxy resin
10 or the like is filled into the hollow portion 7a, so that the connected portion between the high-voltage cable and the connector portion 3 of the transformer 1 is sealed with the resin. Thereafter, a rubber grommet 9 is fitted onto part of the circular peripheral zone of the high-voltage cable 5. The hollow portion
15 7a of housing 7 includes a rectangular side chamber, whose outermost face has a notch 7b vertically atop thereof. After the high-voltage cable 5 has been mounted into the housing 7, the space formed between the notch 7b and the high-voltage cable 5 is closed by the rubber grommet 9, such that the sealing resin is prevented from overflowing.

When the transformer 1 generates a high electrical voltage, it also
20 generates noise through the high-voltage cable 5, and hence a countermeasure for reducing noise becomes necessary. To this end, either a magnetic coil is wound around the cylindrical outer surface of the high-voltage cable 5, or an impedance element is inserted in the conductive part of the high-voltage cable
5 so as to curb the noise current flowing in the high-voltage cable 5.
25 However, these methods yield only a limited effect, and there is a need for a more efficient noise-suppressing technique.

To further improve noise-suppressing efficiency, a coiled-type, high-voltage noise-suppressing cable may be used, instead of the high-voltage

cable 5. The coiled-type, high-voltage noise-suppressing cable comprises at least a core element of magnetic material, a coiled portion at least including a conductive wire for passing a high electrical voltage. The coil is helically wound around the core element, and a coating entirely covers the core
5 element and coiled portion. Such a structure is designed to suppress noise efficiently.

The conductive wires commonly used in a coiled-type cable for preventing high-voltage noise include wires such as nickel-chromium wires. However, such conductive wires are ill suited for soldering. Accordingly,
10 when using the above technique, the high-voltage cable 5 cannot be soldered directly to the connector portion 3 of the transformer 1.

SUMMARY OF THE INVENTION

An object of the present invention is to provide a connecting device, e.g. metallic connecting device, with improved noise-suppressing capacity
15 using a coiled-type cable for preventing high-voltage noise and which can easily connect the coiled-type, high-voltage noise-suppressing cable to a transformer, as well as to provide a method of connecting the coiled-type, high-voltage noise-suppressing cable to the transformer.

To this end, there is provided a metallic connecting device for
20 connecting a high-voltage electrical cable to a transformer having a connector portion from which a high electrical voltage is outputted. The high-voltage electrical cable includes a coiled-type high-voltage noise-suppressing cable at least comprising:

- a core element containing a magnetic material;
- 25 a coiled portion at least including a conductive wire through which the high electrical voltage is passed, the conductive wire being wound around the core element; and
- a coating covering the coiled portion.

The metallic connecting device comprises:

a cramping connector portion adapted for press-fitting the coiled-type high-voltage noise-suppressing cable; and

5 a solder connector portion formed in extension of the cramping connector portion and adapted for connecting to the connector portion of the transformer by soldering.

Preferably, the transformer is provided with an electronic part including a rod-shaped terminal portion. The connector portion of the transformer may be comprised of the rod-shaped terminal portion, while the solder connector
10 portion of the metallic connecting device may be substantially in the form of a cup having a base with a through hole. The rod-shaped terminal portion is then passed through the through hole, and connected and fixed to the solder connector portion by soldering.

Alternatively, the solder connector portion of the metallic connecting
15 device may be comprised of a substantially flat plate which is put into contact with the rod-shaped terminal portion along the length direction thereof. The rod-shaped terminal portion is then connected and fixed to the solder connector portion by soldering.

Alternatively yet, the solder connector portion of the metallic
20 connecting device may be comprised of a pair of lips extending substantially in parallel, between which the rod-shaped terminal portion is inserted. The rod-shaped terminal portion is then connected and fixed to the solder connector portion by soldering.

When using the metallic connecting device of the invention, the coiled-
25 type high-voltage noise-suppressing cable typically comprises an end portion which is stripped of its coating so that the coiled portion is exposed. The cramping connector portion may comprise a first barrel portion in which the coiled portion of the coiled-type high-voltage noise-suppressing cable is

press-fitted, and a second barrel portion in which the coiled-type high-voltage noise-suppressing cable is cramped from above its coating.

Advantageously, the second barrel portion comprises a base wall and a detent formed on the base wall.

5 There is also provided a method of connecting a transformer containing a connector portion to a high-voltage electrical cable having an end portion. The method comprises the steps of:

10 a) preparing a coiled-type high-voltage noise-suppressing cable used as a high-voltage electrical cable, the coiled-type high-voltage noise-suppressing electrical cable comprising:

 a core element containing a magnetic material;

 a coiled portion including a conductive wire through which a high electrical voltage is passed, the conductive wire being wound around the core element; and

15 a coating covering the coiled portion;

 b) stripping the end portion of the coating so that the coiled portion is exposed;

 c) preparing a metallic connecting device comprising:

20 a cramping connector portion adapted for press-fitting the coiled-type high-voltage noise-suppressing cable;

 a solder connector portion provided in extension of the cramping connector portion and adapted for connecting the connector portion of the transformer to the end portion of coiled-type high-voltage noise-suppressing cable by soldering; and

25 d) press-fitting the coiled-type high-voltage noise-suppressing cable in the cramping connector portion, while connecting and fixing the end portion of the coiled-type high-voltage noise-suppressing cable to the connector portion of the transformer by soldering at the solder connector portion;

whereby the transformer is connected and fixed to the coiled-type high-voltage noise-suppressing cable via the metallic connecting device.

BRIEF DESCRIPTION OF THE DRAWINGS

The above and other objects, features and advantages of the present invention will be made apparent from the following description of the preferred embodiments, given as non-limiting examples, with reference to the accompanying drawings, in which:

FIG. 1 is a perspective view showing how a high-voltage electrical cable is connected to a transformer according to a known technique;

10 FIG. 2 is a top plan view of a metallic connecting device according to a first embodiment of the present invention;

FIG. 3 is a lateral cross-sectional view of the metallic connecting device of FIG. 2 along line A-A;

15 FIG. 4 is a transversal cross-sectional view of the metallic connecting device of FIG. 2 along line B-B;

FIG. 5 is a transversal cross-sectional view of the metallic connecting device of FIG. 2 along line C-C;

20 FIG. 6 is a partially exploded lateral view of a coiled-type high-voltage noise-suppressing cable which is connected to a transformer via the metallic connecting device of FIG. 2;

FIG. 7 is a top plan view of the metallic connecting device of FIG. 2 when it press-fits the coiled-type high-voltage noise-suppressing cable of FIG. 6;

25 FIG. 8 is a transversal cross-sectional view of the metallic connecting device of FIG. 7 along line D-D;

FIG. 9 is a transversal cross-sectional view of the metallic connecting device of FIG. 7 along line E-E;

FIG. 10 is a lateral cross-sectional view of the metallic connecting device of FIG. 2, when it is soldered to a transformer while press-fitting the coiled-type high-voltage noise-suppressing cable;

FIG. 11 is a top plan view of a second embodiment of the metallic
5 connecting device according to the present invention;

FIG. 12 is a partially transparent, lateral view of the second embodiment of FIG. 11;

FIG. 13 is an elevated view of the solder connector portion of the second embodiment of FIG. 11, when it is put into contact with a connector
10 portion of a transformer;

FIG. 14 is a lateral cross-sectional view of the second embodiment of FIG. 11, when the metallic connecting device is soldered to the connector portion of a transformer;

FIG. 15 is a top plan view of a third embodiment of the metallic
15 connecting device according to the present invention;

FIG. 16 is a partially transparent, lateral view of the third embodiment of FIG. 15; and

FIG. 17 is a top plan view of the third embodiment of FIG. 15, when it is put into contact with a connector portion of a transformer.

20 DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

FIG. 2 is a top plan view of the metallic connecting device according to a first embodiment of the present invention. FIG. 3, FIG. 4 and FIG. 5 are respectively a cross-sectional views of the metallic connecting device along lines A-A, B-B and C-C. FIG. 6 is a partially exploded side view of a
25 coiled-type high-voltage noise-suppressing cable. This cable is connected to a transformer through a metallic connecting device according to the invention.

According to the embodiments of the present invention, commonly known high-voltage electrical cables 5 are replaced by coiled-type high-

voltage noise-suppressing cables 11 (hereinafter referred to as "noise-suppressing electrical cable") shown in FIG. 6. The noise-suppressing electrical cable 11 is connected to a connector portion 3, mounted in a transformer 1 as shown in FIG. 1, via a metallic connecting device 13 shown in FIGS. 2 to 5. Otherwise, the configuration of transformer 1 used is the same as the known one. As in the known techniques, the hollow portion 7a of transformer 1 is filled with resin after a noise-suppressing electrical cable 11 has been connected. Likewise, the space formed between the noise-suppressing electrical cable 11 and the notched portion 7b of the housing 7 is sealed by a rubber grommet 9.

The noise-suppressing electrical cable 11 used in the present embodiments has the following technical features. As shown in FIG. 6, this cable 11 first includes a fibrous reinforcement thread 21a comprised of glass fibers and synthetic fibers. A resin material mixed with ferrite powder (a magnetic material) is then extruded thereon, yielding a core element 21 having a small diameter. Subsequently, a conductive wire 23 for sending a high-electrical voltage is wound around the core element 21, to form a coiled portion 25. Thereafter, the cylindrical outer surface of the coiled portion 25 is covered with a coating 33 comprising a conductive internal layer 27, an insulating layer 29 and an external sheath 31.

As shown in FIGS. 2 to 5, the metallic connecting device 13 may be integrally formed by a press plastic method from a single metal piece. One end of the metallic connecting device 13 has a cramping connector portion 41 into which a noise-suppressing electrical cable 11 is press-fitted. The other end of metallic connecting device has a solder connector portion 43, to which a connector portion 3 mounted in the transformer 1 (FIG. 1) is soldered.

As shown in FIGS. 4 and 5, the cramping connector portion 41 has a cross-section substantially in the form of U. The cramping connector portion

41 may comprise a first barrel portion 41a located at a position to be fitted with the edge side of noise-suppressing electrical cable 11, a second barrel portion 41b located at a position farther therefrom, and a detent 41c. The detent 41c is cut out from the base wall of the second barrel portion 41b and
5 raised inwardly therefrom so as to project into the second barrel portion.

In the first barrel portion 41a, shown in FIGS. 7 and 9, a coiled portion 25 is exposed by stripping off the coating 33 from the end portion of noise-suppressing electrical cable 11. The bare coiled portion 25 is then press-fitted into the first barrel portion 41a and held therein. In the second barrel portion
10 41b, shown in FIGS. 7 and 8, the coated end portion of noise-suppressing electrical cable 11 is cramped from over its coating 33 and held in the second barrel portion 41b.

As shown in FIG. 8, the second barrel portion 41b is longitudinally open, so as to form two longitudinal edges, and holds the noise-suppressing electrical cable 11 by penetrating the longitudinal edges onto the coating 33.
15 By contrast, as shown in FIG. 9, the longitudinal edges of first barrel portion 41a hold the coiled portion 25 by wrapping, but without boring into it. The connector portion 3 of the transformer is thus press-connected to the conductive wire 23 contained in the coiled portion 25.

20 As shown in FIG. 10, the detent 41c is formed by notching part of the base and raising it up along a fulcrum line such that its edge becomes inclined towards the advancing direction of the electrical cable. Accordingly, when the noise-suppressing electrical cable 11 is fixed into the cramping connector portion 41, the edge of detent 41c penetrates onto the noise-suppressing
25 electrical cable 11, so that the latter is prevented from moving back. In this compressed state, the detent 41c continuously presses against the outer surface of noise-suppressing electrical cable 11 along the diametrically inward direction by its elastic force.

In the first embodiment of the invention, shown in FIGS. 2 and 3, the solder connector portion 43 is in the form of a cup, whose base center is provided with a through hole 43a having a diameter slightly greater than that of the connector portion 3 of transformer 1 (see FIG. 1).

5 When a noise-suppressing electrical cable 11 is connected to a transformer 1, the end portion of the noise-suppressing electrical cable 11 is first stripped of its coating 33. The noise-suppressing electrical cable 11 having the end portion thus prepared is then inserted into a cramping connector portion 41 of metallic connecting device 13 and press-fitted therein
10 as shown in FIGS. 7 to 9. The connector portion 3 of transformer 1 is then inserted into the solder connector portion 43 of the metallic connecting device 13 via the through hole 43a from the base side of the solder connector portion 43 (see FIG. 10). Subsequently, the solder connector portion 43 and the connector portion 3 of the transformer 1 are joined by soldering. As the
15 solder connector portion 43 is in the form of a cup, the solder 45 forms a mass inside it and solidifies. The solder connector portion 43 is thus firmly soldered.

 According to the above embodiment, the noise-suppressing electrical cable 11 can be connected to the transformer 1 by means of a metallic
20 connecting device 13. Because the noise-suppressing electrical cable 11 is used as a high-voltage cable, noise suppression is further improved, compared to the other kinds of high-voltage cables. Furthermore, the connections between the metallic connecting device 13 and the noise-suppressing electrical cable 11 on the one hand, and between the metallic connecting
25 device 13 and the transformer 1 on the other, are obtained simply by cramping or soldering. The noise-suppressing electrical cable 11 can thus be easily - but reliably - connected to the transformer 1.

Further, the solder connector portion 43 of metallic connecting device 13 is in the form of a cup whose base center is provided with a through hole 43a. By virtue of this configuration, the connector portion 3 of transformer 1 can be inserted into the cup-shaped solder connector portion 43 from the base side thereof, via the through hole 43a. Thereafter, the solder connector portion 43 is fixed by soldering. The solder 45 then forms a mass in the solder connector portion 43, so that the solder connector portion 43 is firmly soldered with the connector portion 3 of transformer 1. Further, the soldering process is easily carried out, for example, by dripping fused solder onto the solder connector portion 43. The soldering process is thus simplified.

Moreover, the cramping connector portion 41 of metallic connecting device 13 may comprise a first barrel portion 41a in which the coiled portion 25 at the bared end portion of the noise-suppressing electrical cable 11 is held by press-fitting. The cramping connector portion may further comprise a second barrel portion 41b in which the noise-suppressing electrical cable 11 is held by press-fitting from above the coating 33. In this manner, the noise-suppressing electrical cable 11 can be firmly and reliably connected to the metallic connecting device 13.

When the noise-suppressing electrical cable 11 is press-fitted, the edge portion of detent 41c provided in the metallic connecting device 13 penetrates onto the outer circular surface of noise-suppressing electrical cable 11, so that the latter is prevented from being pulled out. Moreover, the detent 41c presses the outer circular surface of noise-suppressing electrical cable 11 constantly inwardly by its elastic force, so that the latter is kept stably in a pressed state even after a prolonged use.

FIG. 11 shows a top plan view of a metallic connecting device 51 according to a second embodiment (first variant) of the present invention, while FIG. 12 shows a side view thereof. In the metallic connecting device

51 of the second embodiment, the cup-shaped solder connector portion 43 is replaced by a flat-type solder connector portion 53.

As shown in FIGS. 13 and 14, when connecting the metallic connecting device 51 of the second embodiment to the transformer 1, the flat-type solder connector portion 53 is put into contact with the connector portion 3 of transformer 1 along its length direction, and soldered.

According to the method described above, the flat-type solder connector portion 53 of the metallic connecting device 51 of the second embodiment is very easily soldered to the connector portion 3 of transformer 1. Further, the flat-type solder connector portion 53 of the metallic connecting device 51 of the second embodiment has a simple, substantially flat shape. The shape of the metallic connecting device 51 constructed therewith can be simplified accordingly, and manufactured more easily.

FIG. 15 is a top plan view of a metallic connecting device 61 according to a third embodiment (second variant) of the present invention, while FIG. 16 shows a side view thereof. In the metallic connecting device 61 of the third embodiment, the cup-shaped solder connector portion 43 of the first embodiment is replaced by a lip-type solder connector portion 63 comprising a pair of lips 63a and 63b extending in parallel from the edge of the cramping connector portion 41.

The lip-type solder connector portion 63 comprises a link portion 63c which leads to the edge of cramping connector portion 41, and a pair of flat lips 63a and 63b. The latter is formed by bending each lateral end of the link portions 63c downwardly (or upwardly). Both lips 63a and 63b protrude forward (in the insertion direction of the noise-suppressing electrical cable 11) from the link portion 63c. They face each other along their longitudinal direction over a distance slightly greater than the diameter of connector portion 3 of transformer 1.

As shown in FIG. 17, the connector portion 3 of transformer 1 is flanked by the respective lips 63a and 63b of the lip-type solder connector portion 6, and fixed thereto as it is, whereby the metallic connecting device 61 of the third embodiment is connected to the transformer 1.

5 According to the above embodiment, the connector portion 3 of transformer 1 is interposed between a pair of lips 63a and 63b of the lip-type solder connector portion 63 of the metallic connecting device 61 of third embodiment, and they are soldered as they stand. As the connector portion 3 of transformer 1 and the lip-type solder connector portion 63 are positioned as
10 desired beforehand, the soldering process is easily carried out. Furthermore, as the pair of lips 63a and 63b are soldered while flanking the connector portion 3 of transformer 1, the mechanical strength of the connecting portion is enhanced.

According to the present invention, a high-voltage electrical cable is
15 connected to a transformer through an inventive metallic connecting device. By virtue of this configuration, the coiled-type high-voltage noise-suppressing cable can be used as a high-voltage electrical cable, resulting in a further enhanced noise suppression effect. Besides, the connections among the metallic connecting device, the coiled-type high-voltage noise-suppressing
20 cable and the transformer are made by a simple process such as cramping or soldering. As a result, the coiled-type high-voltage noise-suppressing cable and the transformer can be connected easily and reliably.

According to a first embodiment, the solder connector portion of metallic connecting device is in the form of a cup provided with a through
25 hole in its base center. A connector portion of the transformer, such as a rod-shaped terminal portion 3, is then passed through the through hole from the base side of cup-shaped solder connector portion, inserted therein, and soldered in this state. As the solder forms a mass in the solder connector

portion, the latter and the rod-shaped terminal portion are firmly soldered. Moreover, the soldering process is easily carried out by dripping fused solder from above the solder connector portion. The soldering process can thus be greatly simplified.

5 According to a second embodiment, the surface of the solder connector portion of metallic connecting device is put into contact with the length direction of a connector portion of transformer 1 such as a rod-shaped terminal portion 3, and are fixed by soldering. The soldering process can thus be carried out easily. Moreover, the solder connector portion of the metallic
10 connecting device is comprised of a simple, substantially flat plate. By virtue of this simple construction of the solder connector portion, the whole structure of metallic connecting device itself can be simplified. The metallic connecting device can thus be manufactured more easily.

 According to a third embodiment, a connector portion of the
15 transformer 1, such as a rod-shaped terminal portion 3, is inserted between a pair of lips provided in the solder connector portion of the metallic connecting device. The connector portion of transformer 1 and the pair of lips of the metallic connecting device are soldered in this state, so that the connector portion of the transformer and the solder connector portion of the metallic
20 connecting device can be positioned properly. By virtue of this configuration, the soldering process is easily conducted, and the mechanical strength of connected portions is improved.

 According to another embodiment, the cramping connector portion of metallic connecting device comprises a first barrel portion, in which the
25 coiled portion, prepared by baring the end portion of coiled-type high-voltage noise-suppressing cable, is held by press-fitting. The cramping connector portion further comprises a second barrel portion, in which the coiled-type high-voltage noise-suppressing cable is held by cramping from above its

coating. In this manner, the coiled-type high-voltage noise-suppressing cable is firmly and reliably press-connected to the metallic connecting device.

5 Although the invention has been described with reference to particular means, materials and embodiments, it is to be understood that the invention is not limited to the particulars disclosed and extends to all equivalents within the scope of the claims.

The present disclosure relates to subject matter contained in the corresponding issued U.S. Patent No. 6,335,489.

WHAT IS CLAIMED:

1. A metallic connecting device for connecting a high-voltage electrical cable to a transformer having a connector portion from which a high electrical voltage is outputted, said high-voltage electrical cable including a
5 coiled-type high-voltage noise-suppressing cable at least comprising:

a core element containing a magnetic material;

a coiled portion at least including a conductive wire through which the high electrical voltage is passed, said conductive wire being wound around said core element; and

10 a coating covering said coiled portion;

said metallic connecting device comprising:

a cramping connector portion adapted for press-fitting said coiled-type high-voltage noise-suppressing cable; and

a solder connector portion formed in extension of said cramping
15 connector portion and adapted for connecting to said connector portion of said transformer by soldering.

2. The metallic connecting device according to claim 1, wherein said transformer is provided with an electronic part including a rod-shaped terminal portion, wherein said connector portion of said transformer is
20 comprised of said rod-shaped terminal portion, while said solder connector portion of said metallic connecting device is substantially in the form of a cup having a base with a through hole, and wherein said rod-shaped terminal portion is passed through said through hole, and connected and fixed to said solder connector portion by soldering.

25 3. The metallic connecting device according to claim 1, wherein said transformer is provided with an electronic part including a rod-shaped terminal portion, wherein said connector portion of said transformer is comprised of said rod-shaped terminal portion, while said solder connector

portion of said metallic connecting device is comprised of a substantially flat plate which is placed into contact with said rod-shaped terminal portion along the length direction thereof, and wherein said rod-shaped terminal portion is connected and fixed to said solder connector portion by soldering.

5 4. The metallic connecting device according to claim 1, wherein said transformer is provided with an electronic part including a rod-shaped terminal portion, wherein said connector portion of said transformer is comprised of said rod-shaped terminal portion, while said solder connector portion of said metallic connecting device is comprised of a pair of lips
10 extending substantially in parallel, between which said rod-shaped terminal portion is inserted, and wherein said rod-shaped terminal portion is connected and fixed to said solder connector portion by soldering.

 5. The metallic connecting device according to claim 1, wherein said coiled-type high-voltage noise-suppressing cable comprises an end portion,
15 said end portion being stripped of said coating so that said coiled portion is exposed, and wherein said cramping connector portion comprises a first barrel portion in which said coiled portion of said coiled-type high-voltage noise-suppressing cable is press-fitted, and a second barrel portion in which said coiled-type high-voltage noise-suppressing cable is cramped from above said
20 coating.

 6. The metallic connecting device according to claim 2, wherein said coiled-type high-voltage noise-suppressing cable comprises an end portion, said end portion being stripped of said coating so that said coiled portion is exposed, and wherein said cramping connector portion comprises a first barrel
25 portion in which said coiled portion of said coiled-type high-voltage noise-suppressing cable is press-fitted, and a second barrel portion in which said coiled-type high-voltage noise-suppressing cable is cramped from above said coating.

7. The metallic connecting device according to claim 3, wherein said coiled-type high-voltage noise-suppressing cable comprises an end portion, said end portion being stripped of said coating so that said coiled portion is exposed, and wherein said cramping connector portion comprises a first barrel
5 portion in which said coiled portion of said coiled-type high-voltage noise-suppressing cable is press-fitted, and a second barrel portion in which said coiled-type high-voltage noise-suppressing cable is cramped from above said coating.

8. The metallic connecting device according to claim 4, wherein said
10 coiled-type high-voltage noise-suppressing cable comprises an end portion, said end portion being stripped of said coating so that said coiled portion is exposed, and wherein said cramping connector portion comprises a first barrel portion in which said coiled portion of said coiled-type high-voltage noise-suppressing cable is press-fitted, and a second barrel portion in which said
15 coiled-type high-voltage noise-suppressing cable is cramped from above said coating.

9. The metallic connecting device according to claim 5, wherein said second barrel portion comprises a base wall and a detent formed on said base wall.

20 10. The metallic connecting device according to claim 6, wherein said second barrel portion comprises a base wall and a detent formed on said base wall.

11. The metallic connecting device according to claim 7, wherein said second barrel portion comprises a base wall and a detent formed on said base
25 wall.

12. The metallic connecting device according to claim 8, wherein said second barrel portion comprises a base wall and a detent formed on said base wall.

13. A method of connecting a transformer containing a connector portion to a high-voltage electrical cable having an end portion, said method comprising the steps of:

5 preparing a coiled-type high-voltage noise-suppressing cable used as a high-voltage electrical cable, said coiled-type high-voltage noise-suppressing electrical cable comprising:

a core element containing a magnetic material;

10 a coiled portion including a conductive wire through which a high electrical voltage is transmitted, said conductive wire being wound around said core element; and

a coating covering said coiled portion;

stripping said end portion of said coating so that said coiled portion is exposed;

preparing a metallic connecting device comprising:

15 a cramping connector portion adapted for press-fitting said coiled-type high-voltage noise-suppressing cable;

20 a solder connector portion provided in extension of said cramping connector portion and adapted for connecting said connector portion of said transformer to said end portion of coiled-type high-voltage noise-suppressing cable by soldering; and

press-fitting said coiled-type high-voltage noise-suppressing cable in said cramping connector portion, while connecting and fixing said end portion of said coiled-type high-voltage noise-suppressing cable to said connector portion of said transformer by soldering at said solder connector portion;

25 whereby said transformer is connected and fixed to said coiled-type high-voltage noise-suppressing cable via said metallic connecting device.

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FIG. 1 PRIOR ART

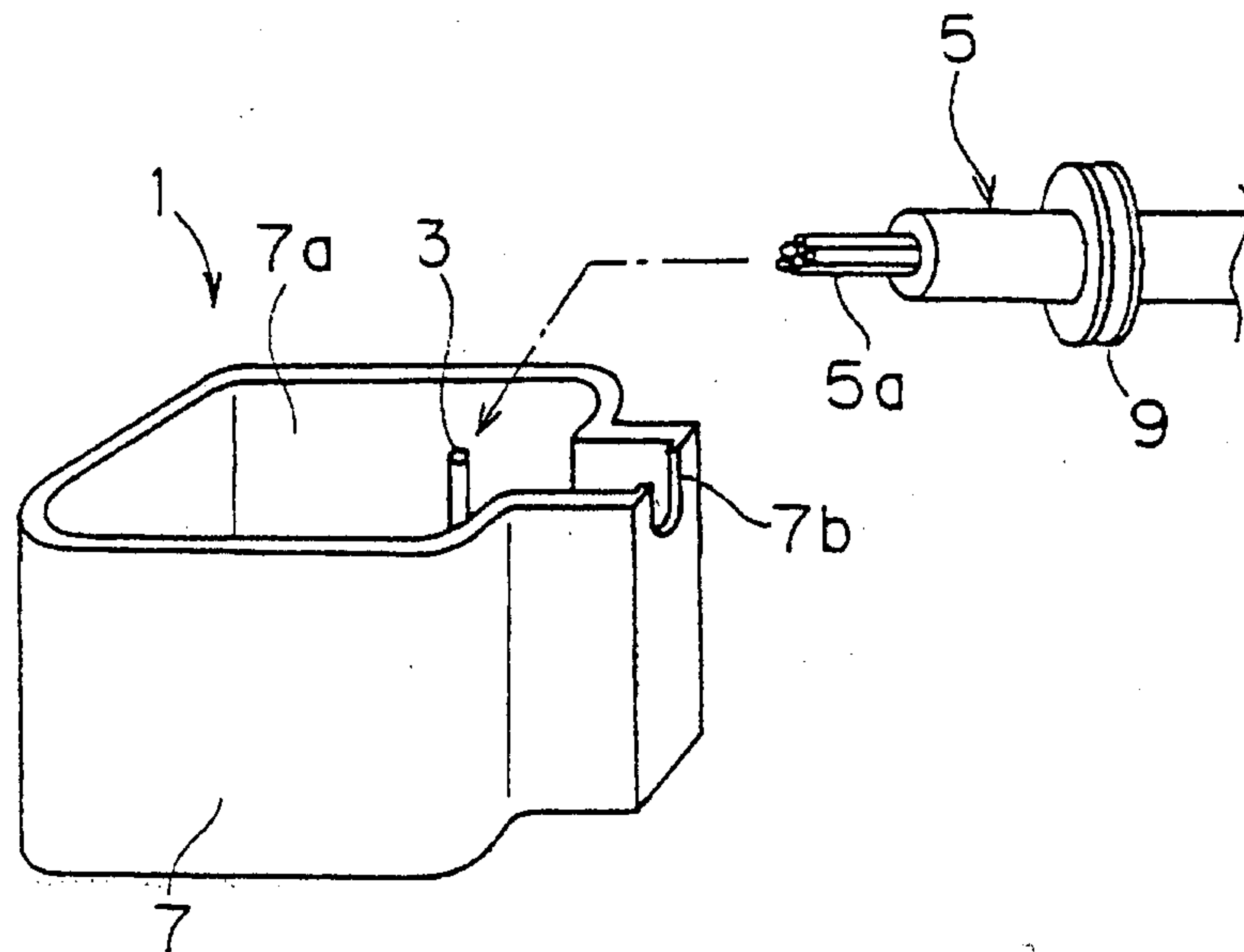
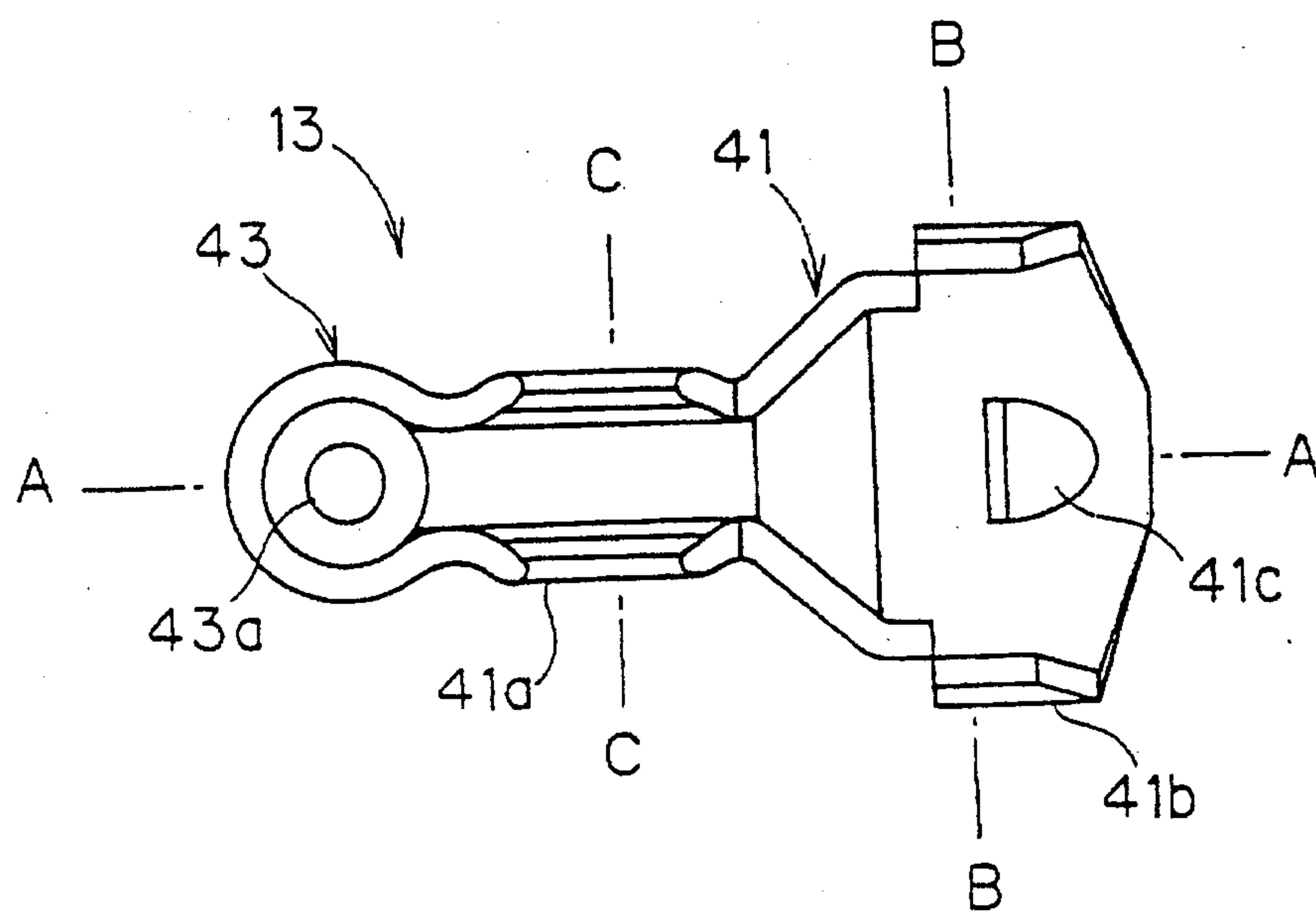
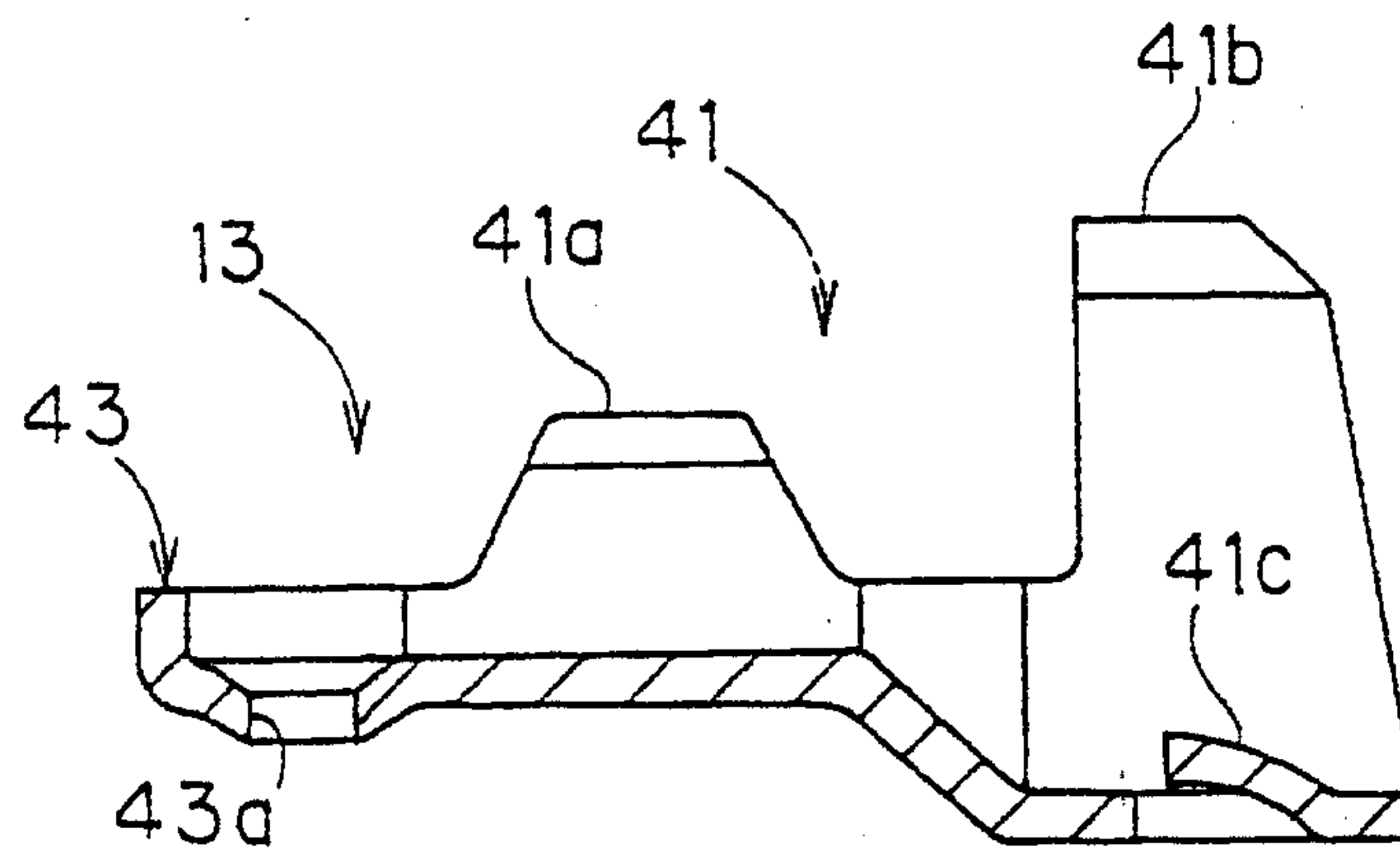
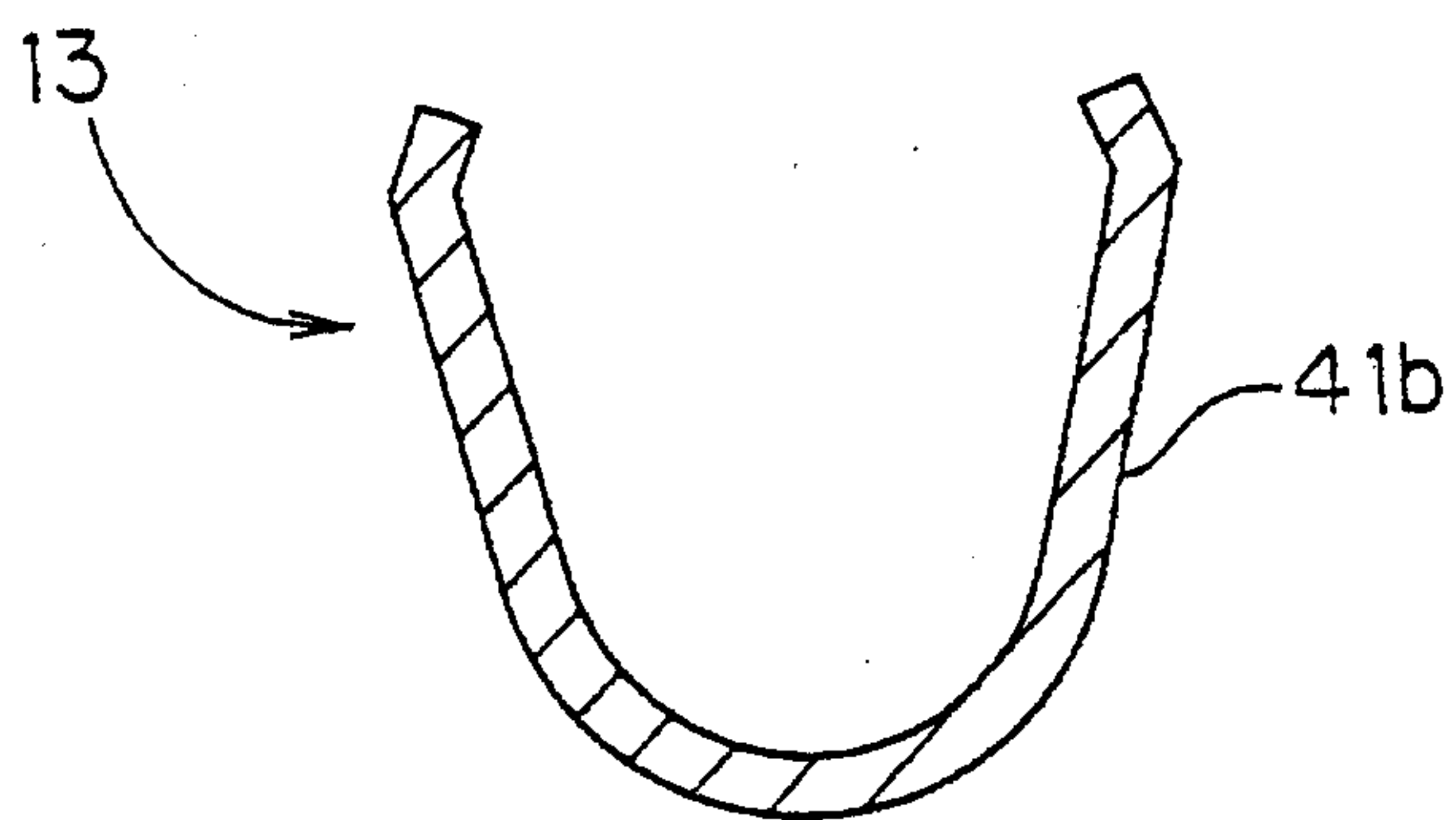
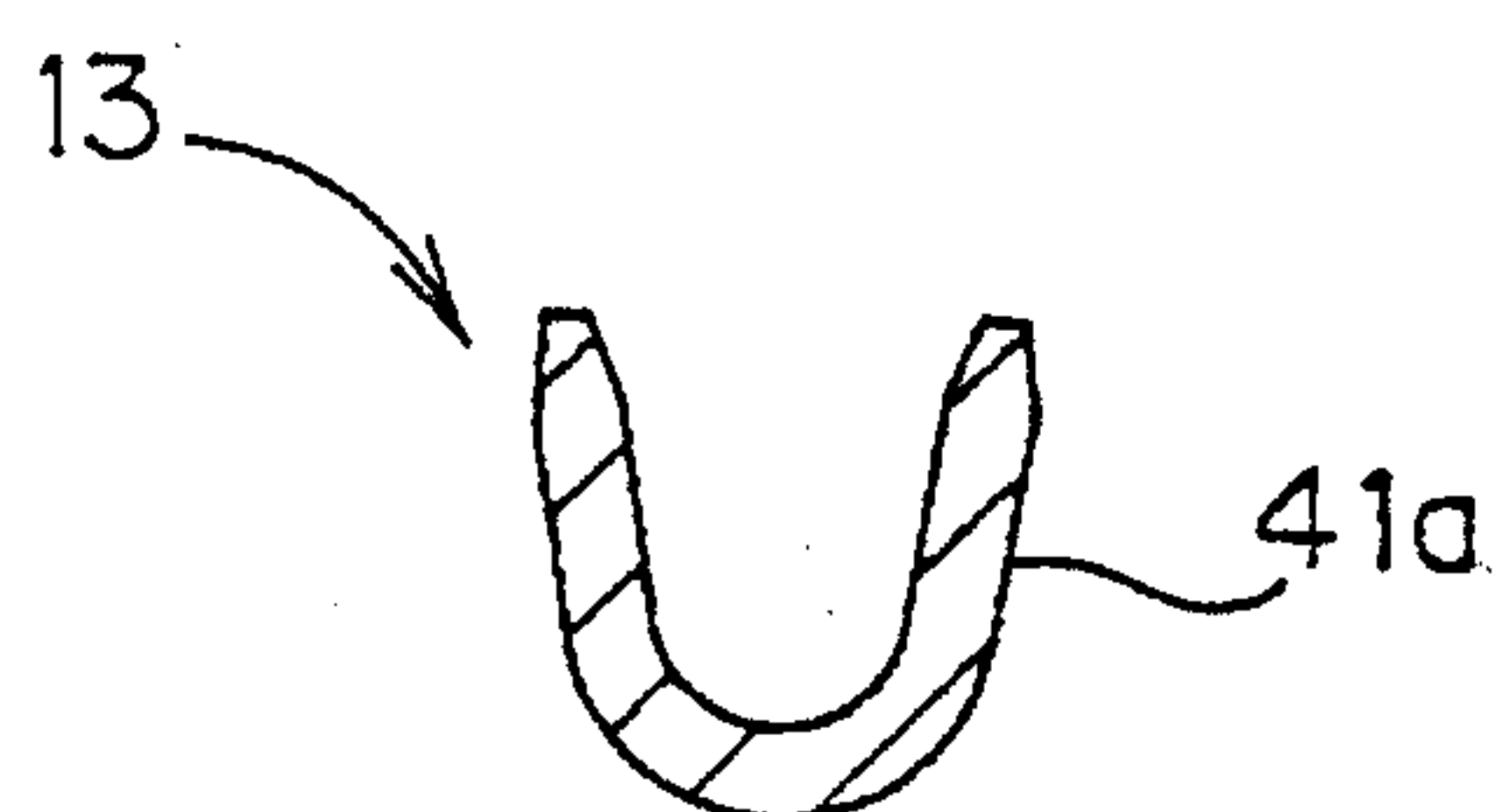


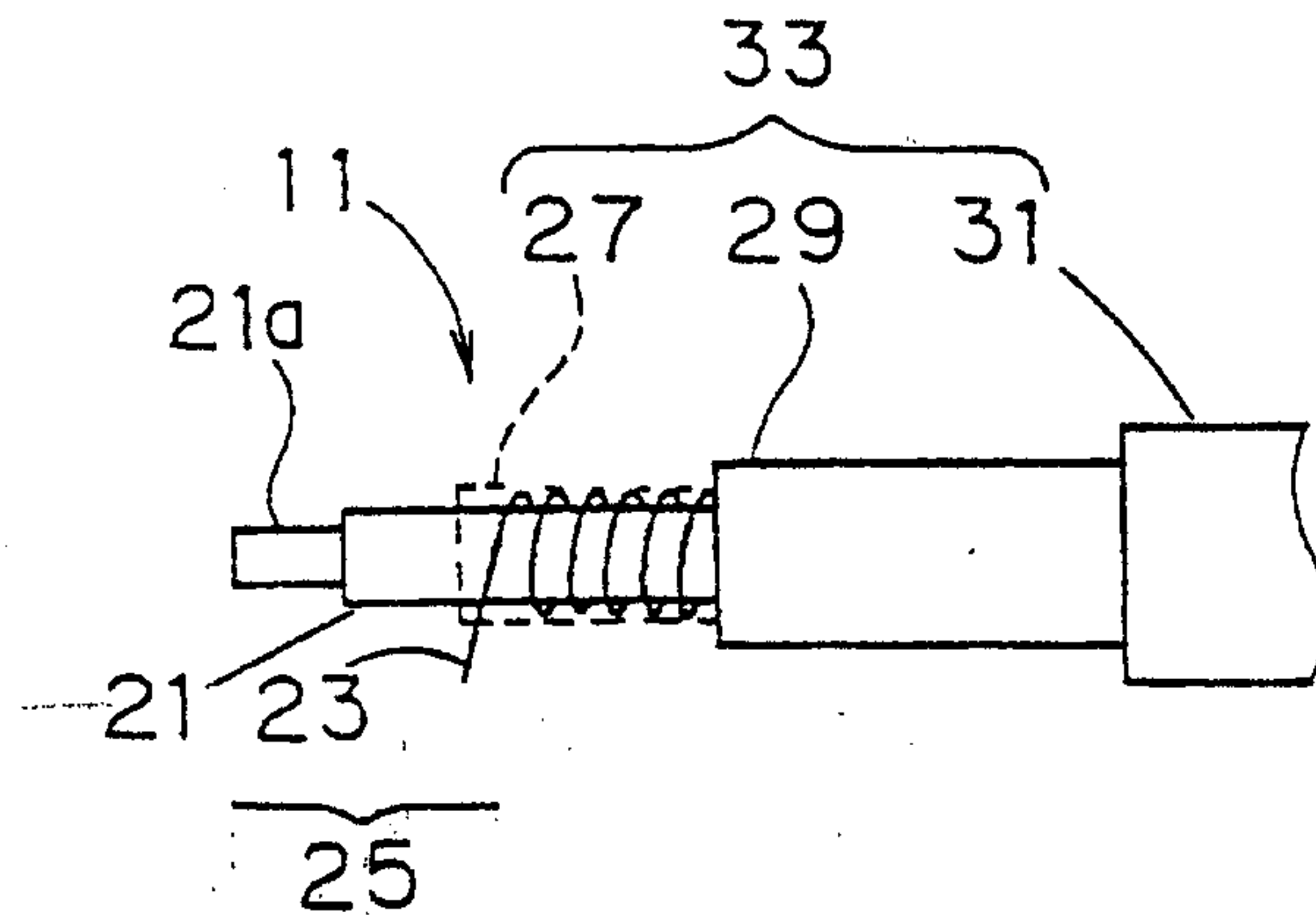
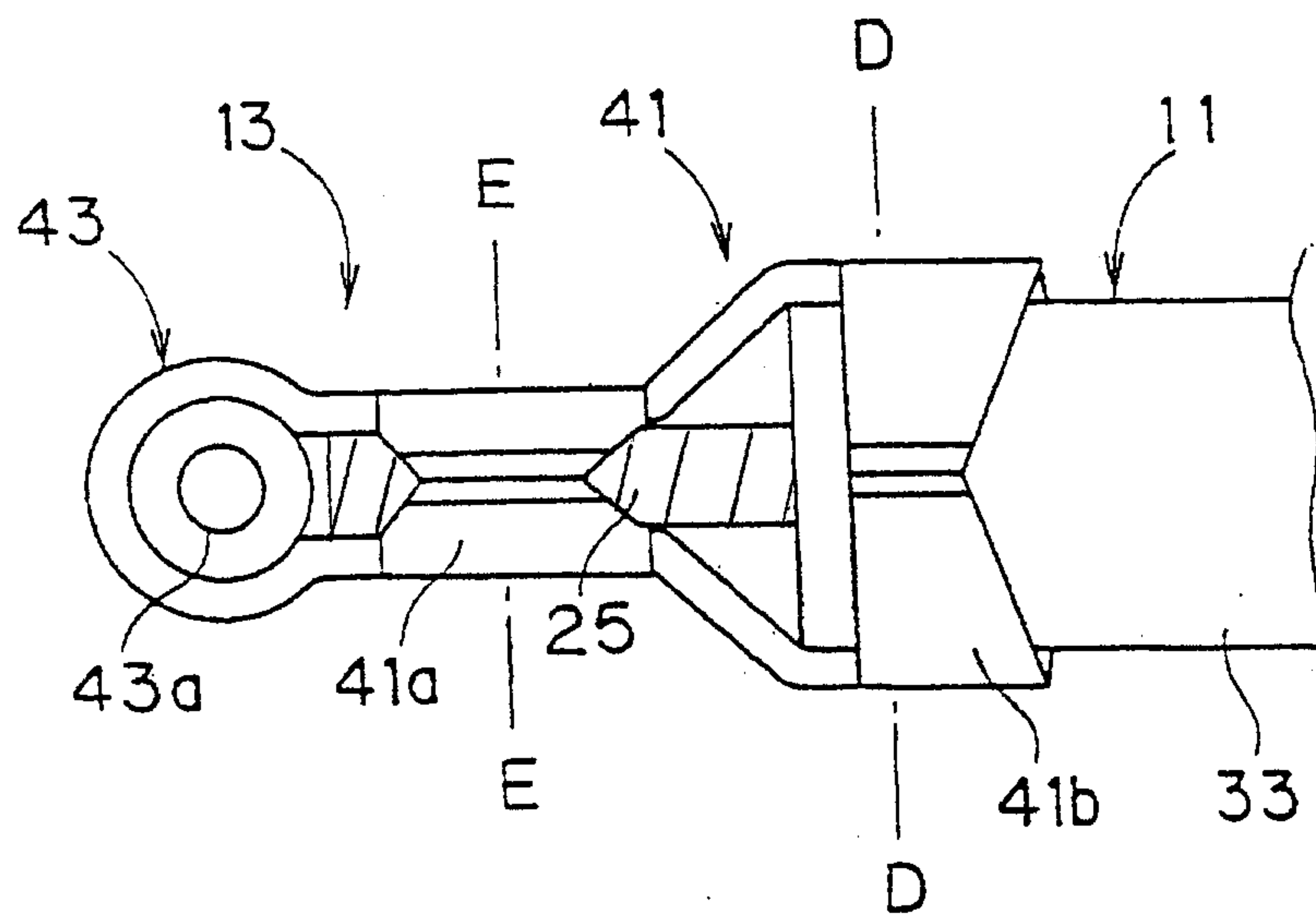
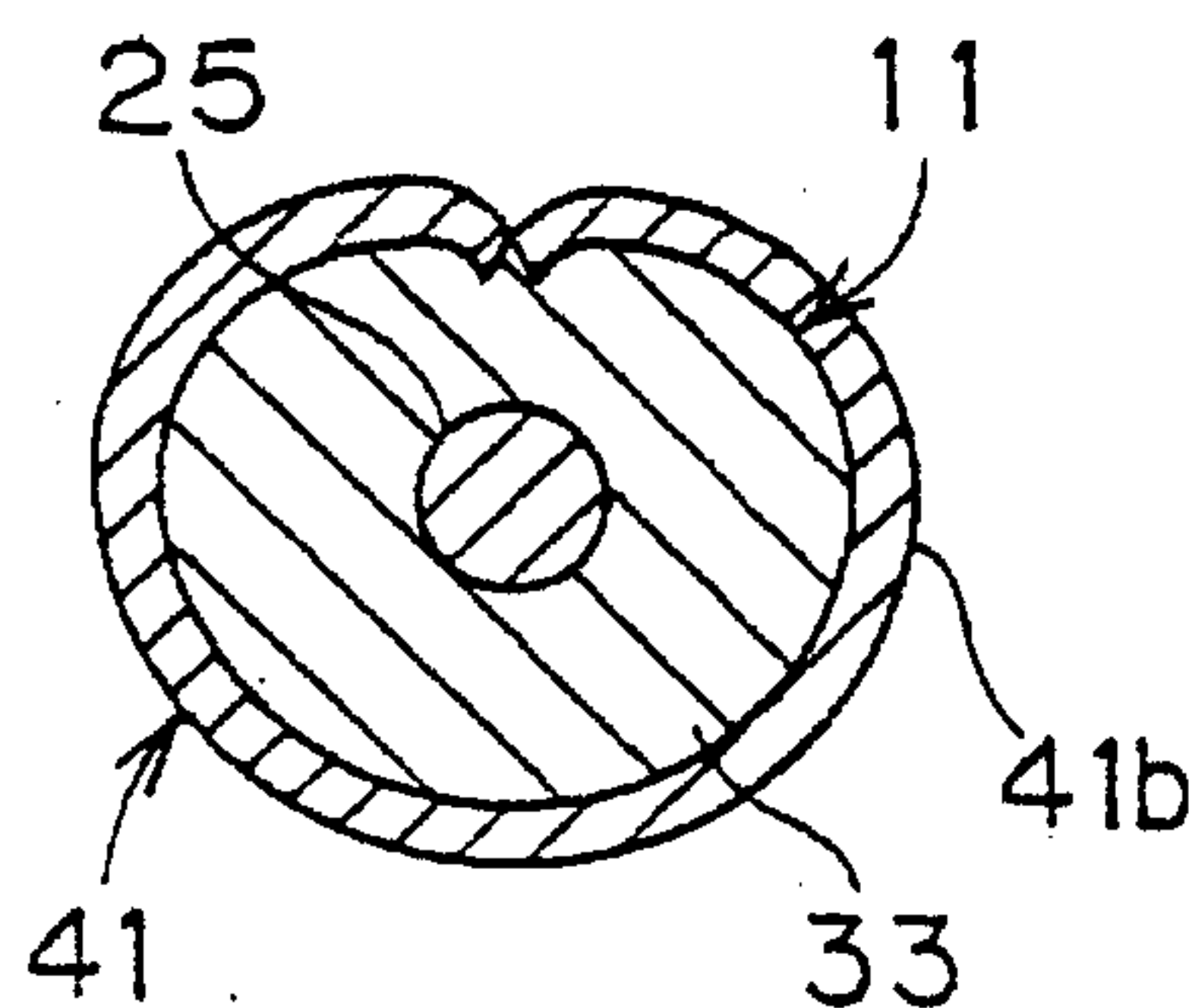
FIG. 2



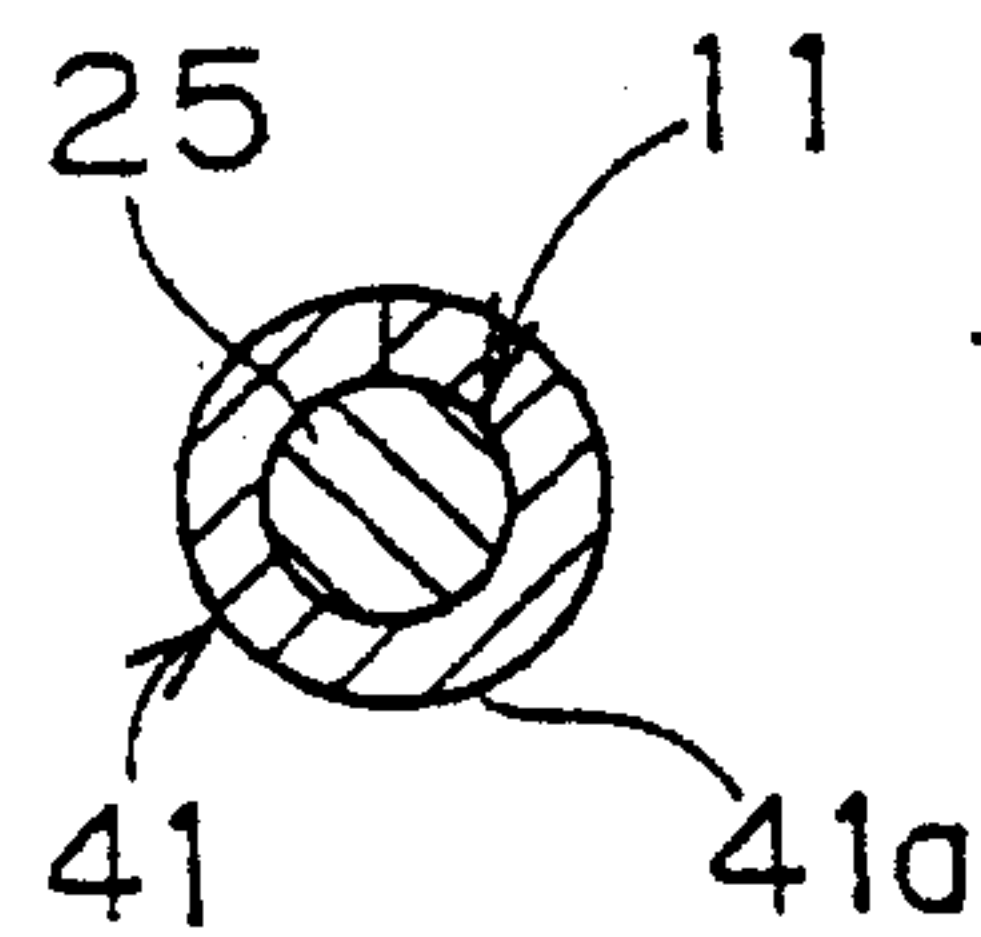
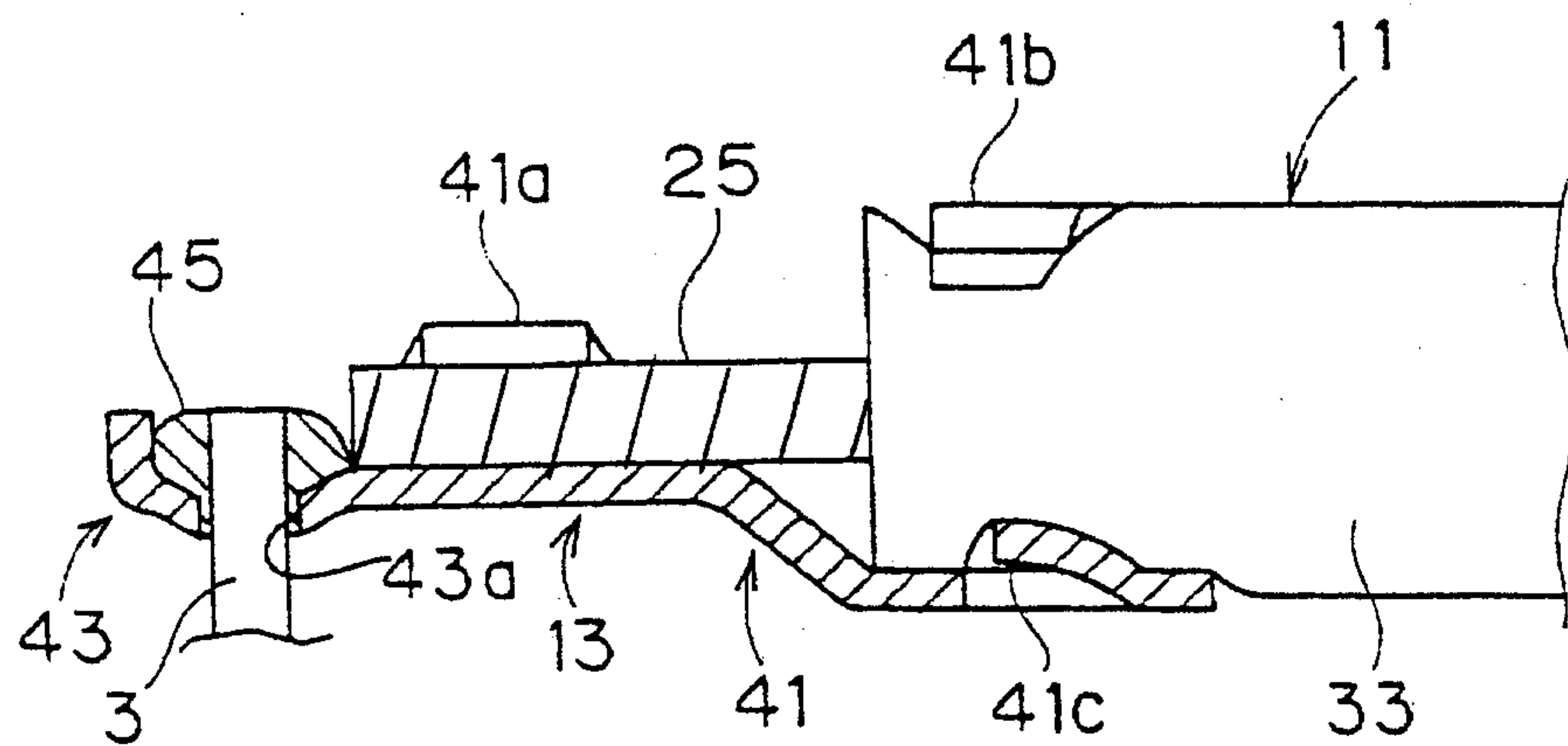
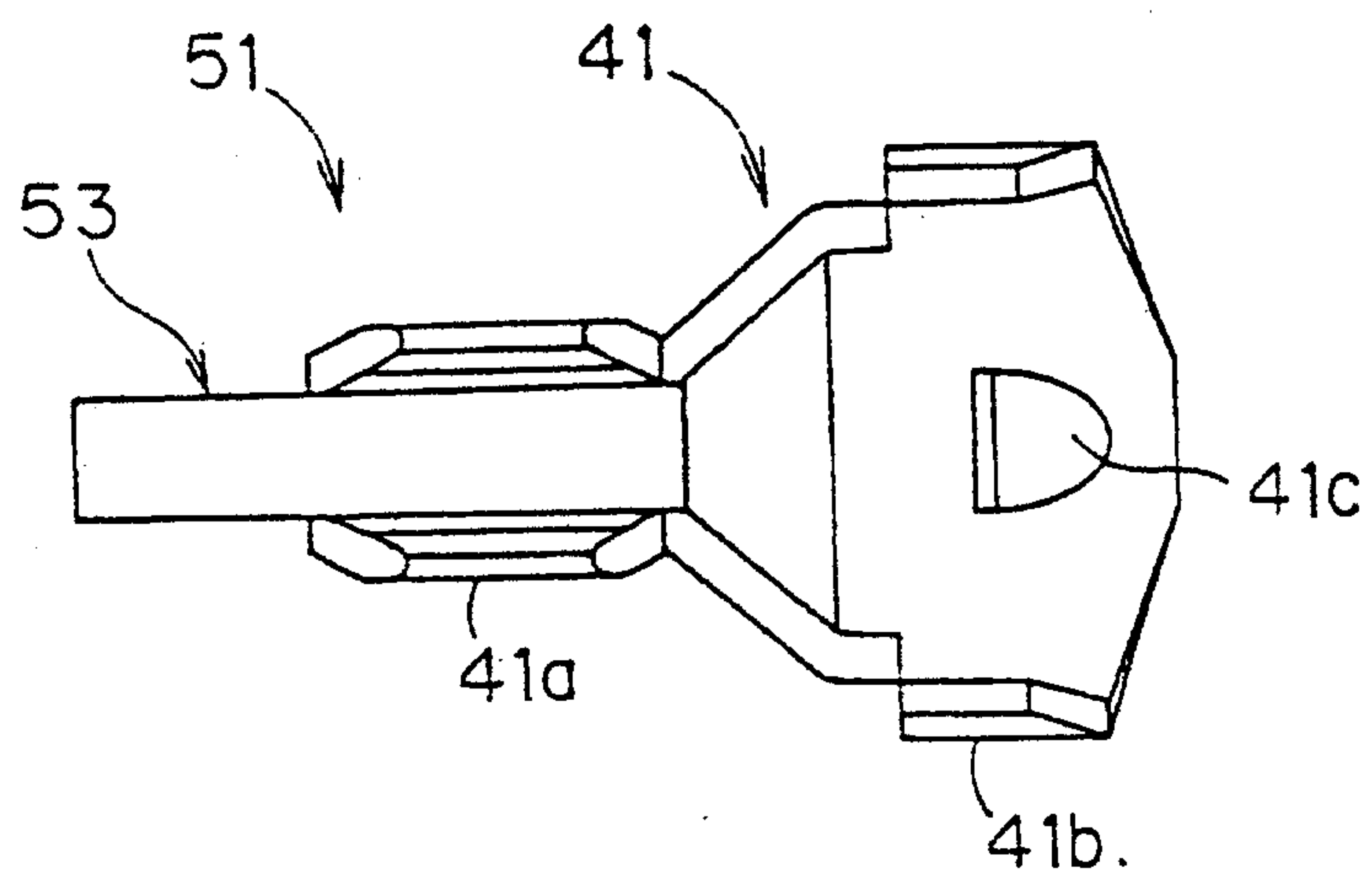
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FIG. 3*FIG. 4**FIG. 5*

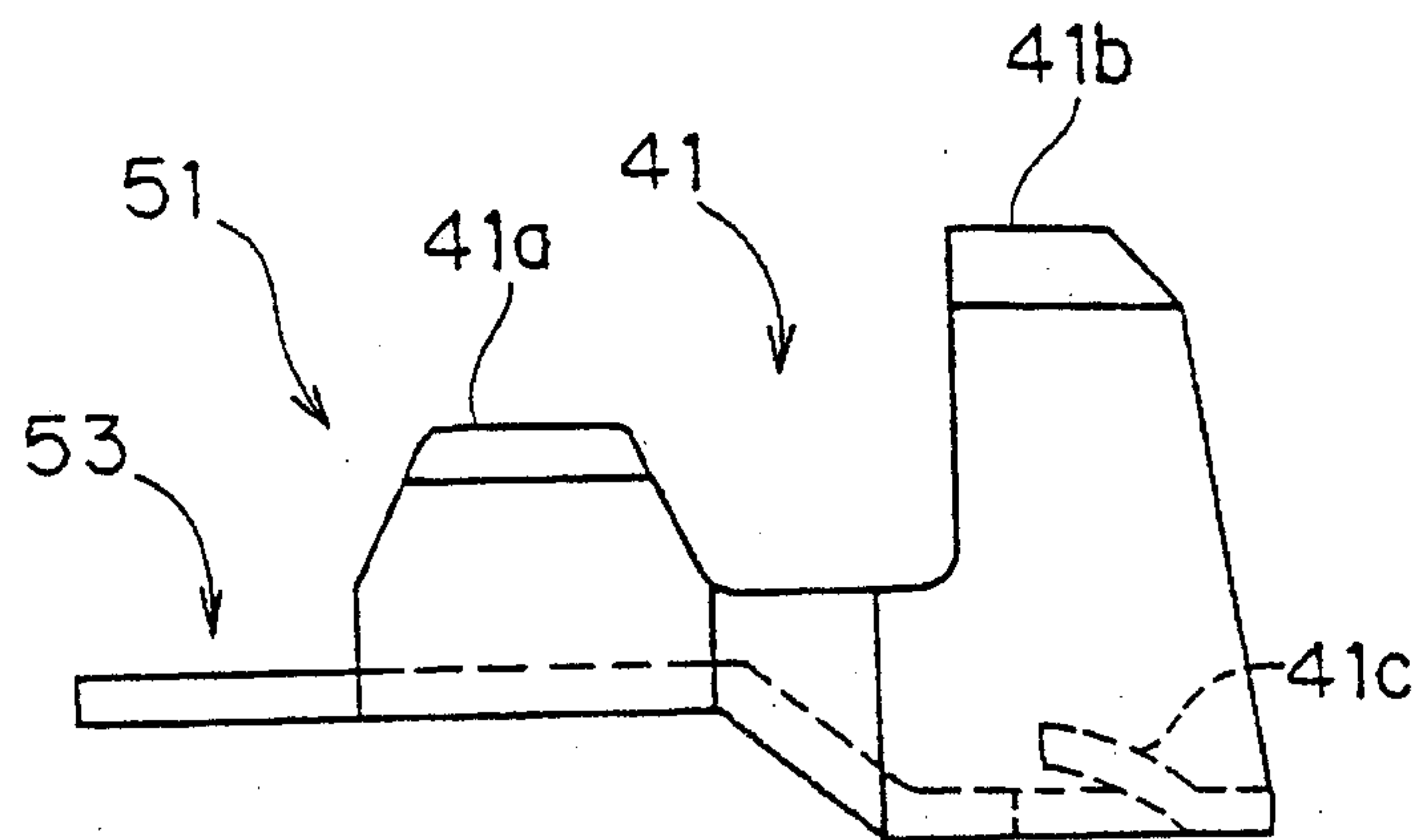
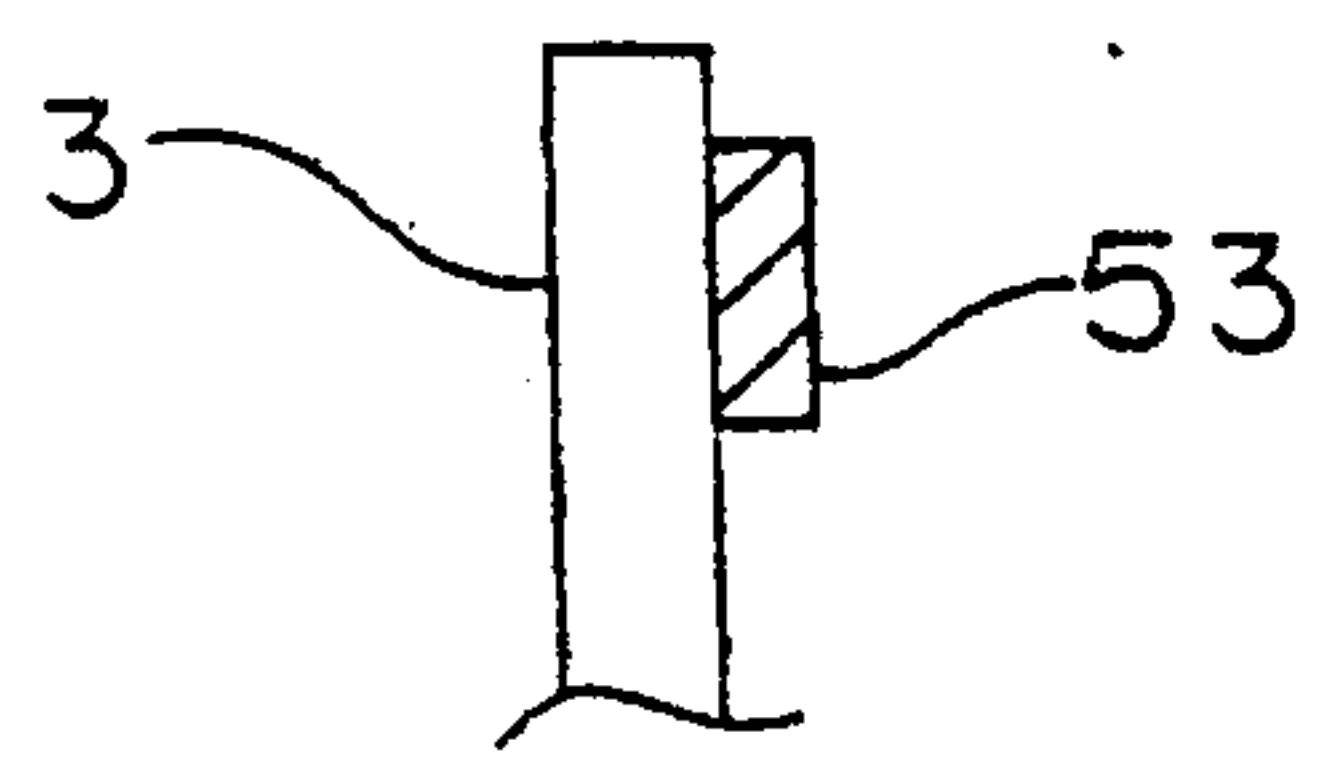
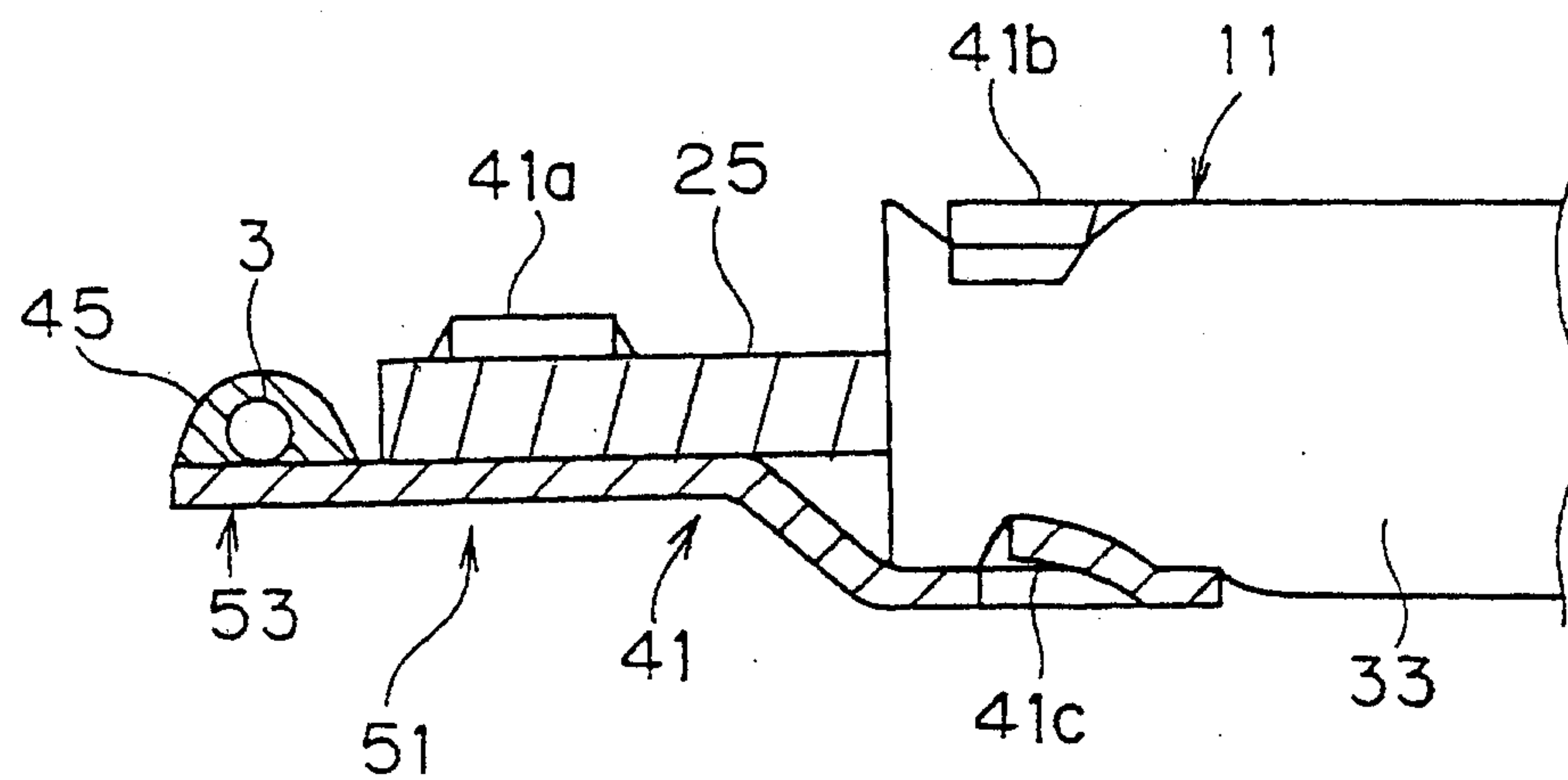
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FIG. 6*FIG. 7**FIG. 8*

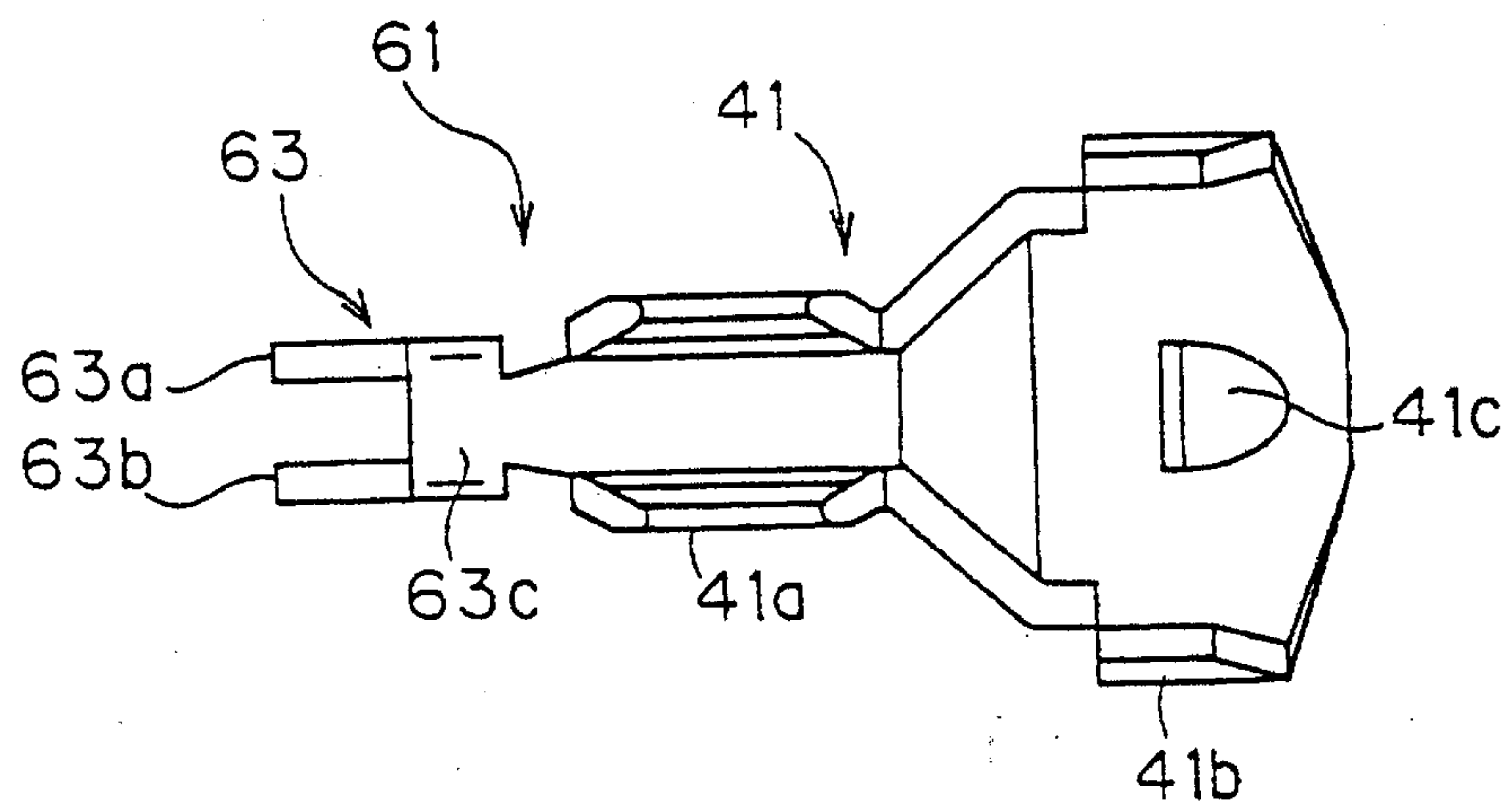
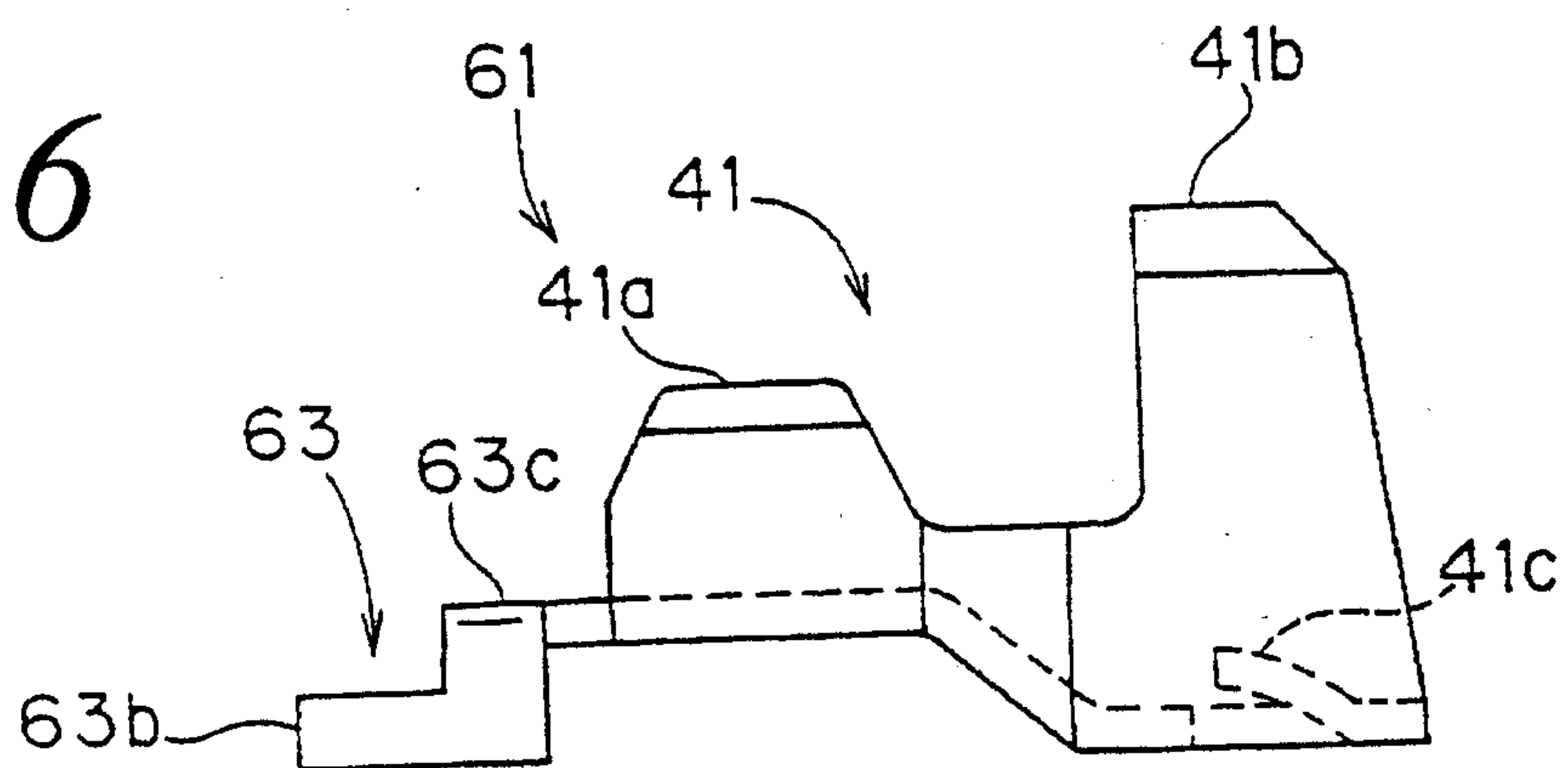
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FIG. 9*FIG. 10**FIG. 11*

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FIG. 12*FIG. 13**FIG. 14*

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FIG. 15*FIG. 16**FIG. 17*