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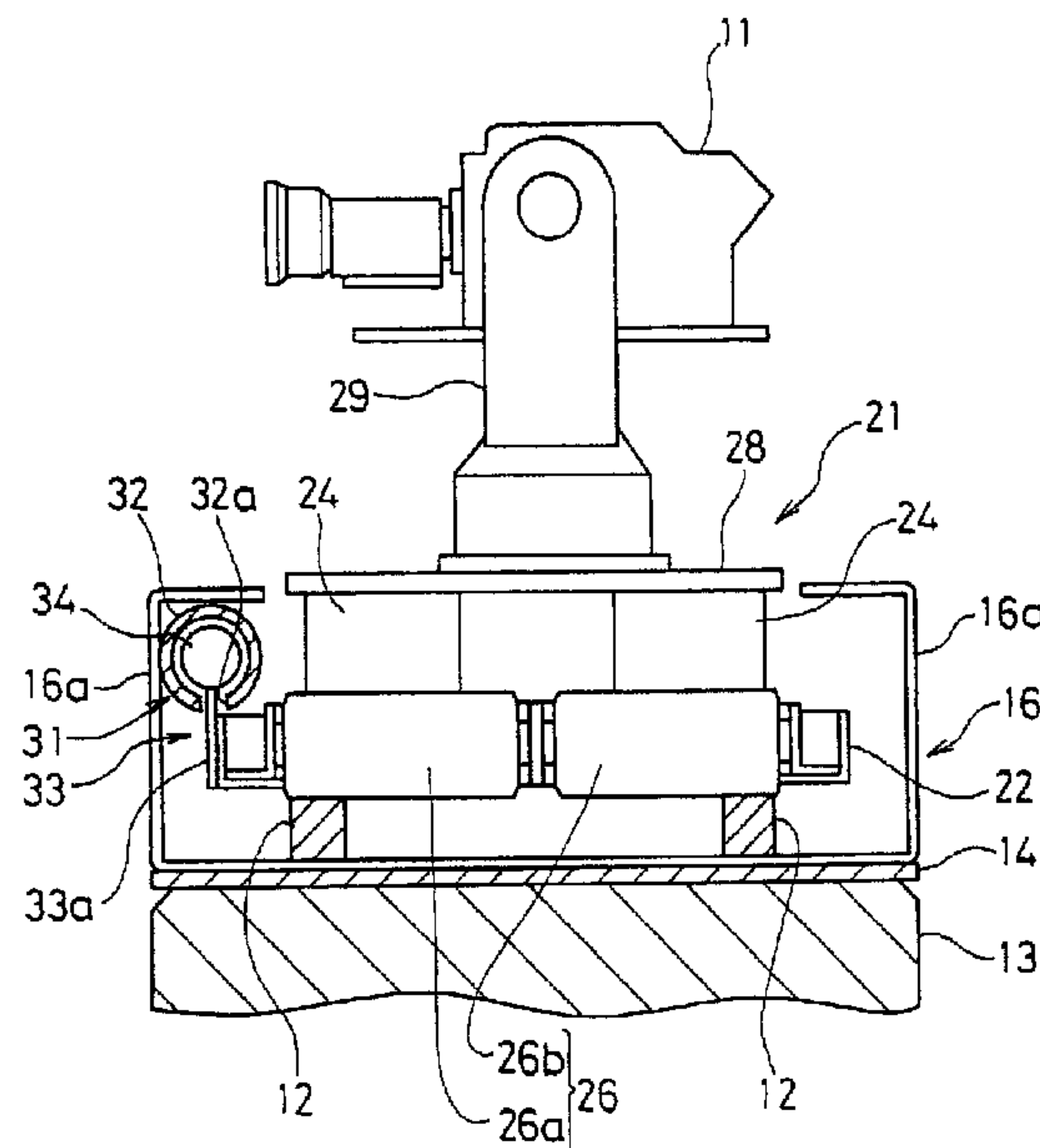
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(54) Titre : APPAREIL PERMETTANT LE DEPLACEMENT D'UNE CAMERA DE SURVEILLANCE AU MOYEN D'AIR
COMPRIME

(54) Title: MONITOR CAMERA TRANSPORTING APPARATUS BY MEANS OF COMPRESSED AIR

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(57) **Abrégé/Abstract:**

A monitor camera transporting apparatus comprises rails laid along a transportation path of a monitor camera, a carriage having the monitor camera mounted thereon and movable along the rails, and transporting means for moving the carriage by means of compressed air. The transporting means includes a pipe provided parallel to the rails and having a slit formed in its lower part along a full length of the pipe, an internal moving body movable within the pipe by means of compressed air introduced into the pipe, a connecting plate connected at its one end to the internal moving body and externally projected at the other end through the slit to be connected with the carriage, a sealing wire disposed within the pipe along the full length of the pipe to close the slit, and a wire-retracting part formed in the internal moving body or connecting plate for retracting inwardly of the pipe the sealing wire located at the connecting plate. Thereby, even in dangerous places where no persons are allowed to enter and no electric motors can be used, the monitor camera can be transported efficiently, safely and reliably even to observe the inside of the places where high-speed objects are to be photographed.



ABSTRACT

A monitor camera transporting apparatus comprises rails laid along a transportation path of a monitor camera, a carriage having the monitor camera mounted thereon and movable along the rails, and transporting means for moving the carriage by means of compressed air. The transporting means includes a pipe provided parallel to the rails and having a slit formed in its lower part along a full length of the pipe, an internal moving body movable within the pipe by means of compressed air introduced into the pipe, a connecting plate connected at its one end to the internal moving body and externally projected at the other end through the slit to be connected with the carriage, a sealing wire disposed within the pipe along the full length of the pipe to close the slit, and a wire-retracting part formed in the internal moving body or connecting plate for retracting inwardly of the pipe the sealing wire located at the connecting plate. Thereby, even in dangerous places where no persons are allowed to enter and no electric motors can be used, the monitor camera can be transported efficiently, safely and reliably even to observe the inside of the places where high-speed objects are to be photographed.

MONITOR CAMERA TRANSPORTING APPARATUS
BY MEANS OF COMPRESSED AIR

The present invention relates to a monitor camera transporting apparatus which utilizes compressed air and, more particularly, to a monitor camera transporting apparatus based on compressed air, which can be used to observe an interior of a pipe in which persons cannot enter, to monitor an interior of a facility, or to photograph a subject moving at a high speed.

For the purpose of observing the interior of a pipe into which persons cannot enter physically, or from the viewpoints of safety or monitoring of the inside of a facility, a self-propelled monitor camera transporting apparatus driven by an electric motor has been conventionally run through the pipe or facility to photograph the inside of the pipe or facility so that an operator can observe or monitor the inside safely and reliably on the basis of the photographed video images.

Meanwhile, when competitors' movements in track-and-field events at stadiums are broadcast on TV, an operator or cameraman carrying a monitor camera is stationed in the vicinity of an athlete, and follows the movement of the athlete. He may move to photograph necessary video images with use of the monitor camera, or an operator zooms in on the athlete for close-ups from a monitor camera installed in a stand of the stadium.

However, such a self-propelled monitor camera transporting apparatus based on an electric motor as mentioned above cannot be used because, at locations where a flammable substance such as an organic solvent or a flammable gas is placed, there is a danger that an electric spark in the motor may cause a fire. There is another problem with the above apparatus that, even when the cameraman wants to photograph the athlete running at a high speed as in a sprint race at the stadium, it is very difficult for the cameraman to follow the athlete for photographing and thus it is impossible to acquire strong appealing video images.

It is therefore an object of the present invention to provide a monitor camera transporting apparatus based on compressed air, which can observe and monitor inside of a place that persons cannot access and an electric motor cannot be used, and can be transported efficiently, safely and reliably up to a subject moving at a high speed to obtain clear and strong appealing video images.

In accordance with an aspect of the present invention, there is provided, as shown in Figures 1 and 4, a monitor camera transporting apparatus based on compressed air, which comprises rails laid along a transportation path of a monitor camera; a carriage having the monitor camera mounted thereon and movable along the rails; and transporting means for moving the carriage by means of compressed air; and wherein the transporting means includes a pipe provided parallel to the rails and having a slit formed in its lower part along a full length of the pipe, an internal moving body inserted into the pipe and movable within the pipe by means of compressed air introduced into the pipe, a connecting plate connected at its one end to the internal moving body within the pipe and projected at the other end externally of the pipe through the slit, the carriage being connected to the projection, a sealing wire disposed within the pipe along the full length of the pipe to close the slit, and a wire-retracting part formed in the internal moving body or connecting plate for retracting inwardly of the pipe the sealing wire located at the connecting plate.

In the present invention, the carriage is moved by means of the compressed air along the rails on which it rests. As the carriage is moved, the monitor camera mounted on the upper part of the carriage is also transported along the rails.

In the transporting means for moving the carriage, the slit of the pipe is closed by the sealing wire, which is inserted into the wire-retracting part; the connecting plate is passed through the slit, under which condition the internal moving body is inserted into the pipe, the carriage is connected to the connecting plate, and then the compressed air is introduced into the pipe, so that the internal moving body is propelled. At the same time, the carriage is

tracked and the monitor camera is transported. At a position over which the connecting plate passes, the sealing wire is retracted inwardly of the pipe into the wire-retracting part, thus avoiding the sealing wire blocking the movement of the internal moving body caused by the compressed air; thus the sealing wire
5 cannot be damaged by the movement of the internal moving body.

In the present invention, as shown in Figure 3, the carriage includes a carriage body having rollers which are provided at its front and rear ends to be rollingly moved on the rails, an auxiliary plate mounted in an upper part of the carriage body, a base plate on which the monitor camera is mounted,
10 and shock absorbers disposed between the auxiliary plate and base plate; the projection of the connecting plate is mounted onto the side face of the carriage body.

In this connection, the rollers cause smooth movement of the carriage along the rails, and the provision of the shock absorbers between the auxiliary plate and base plate prevents vibration of the carriage body from being
15 transmitted directly to the monitor camera.

In this case, as shown in Figure 2, a resilient member 12a is fixedly mounted on upper faces of the rails along which the rollers roll the full length.

20 Since the resilient member is fixedly mounted on the upper faces of the rails along the full length of the rails, noise generated by running of the carriage on the rails can be suppressed.

The above and other objects, features and advantages of the present invention will become apparent from the following detailed description
25 when taken with the accompanying drawings, in which:

Figure 1 is a front view of a monitor camera transporting apparatus utilizing compressed air in accordance with the present invention;

Figure 2 is a perspective view of a part of the apparatus, showing the relative positions of the rails and an adjacent pipe;

30 Figure 3 is an exploded perspective view of a carriage in the apparatus;

Figure 4 is a cross-sectional view taken along line A-A in Figure 6, showing a first driving shaft in an internal moving body;

Figure 5 is a cross-sectional view taken along line A-A in Figure 6, showing a second driving shaft in the internal moving body;

5 Figure 6 is a cross-sectional view taken along line B-B in Figure 4;

Figure 7 is a cross-sectional view taken along line C-C in Figure 4;

10 Figure 8 is a side view of the internal moving body and a connecting plate in the apparatus;

Figure 9 is a side view of two pipes in the apparatus, showing the interconnection of the pipes to each other;

Figure 10 is a cross-sectional view taken along line D-D in Figure 9; and,

15 Figure 11 is a cross-sectional view taken along line E-E in Figure 9.

An embodiment of the present invention will be explained in detail with reference to the accompanying drawings.

20 As shown in Figures 1 and 2, a monitor camera transporting apparatus 10 comprises a pair of rails 12 provided along a transportation path of a monitor camera 11, a carriage 21 having the monitor camera 11 mounted on its upper part and movable along the rails 12, and a transporting means 31 for moving the carriage 21 by means of compressed air. Previously laid along a full length of the transportation path of the monitor camera 11 is a block 13
25 made of concrete, on an upper surface of which a wooden plate 14 is fixedly mounted. The pair of rails 12 are laid on the wooden plate 14 inside a bracket 16 along the full length of the transportation path of the monitor camera so that the monitor camera is spaced by a predetermined distance from the rails. The monitor camera 11 has a receiver and a transmitter (not shown). The camera
30 11 is adapted to photograph a subject by signals received from a monitor station and to transmit photographed images to the monitor station.

The sides of the bracket 16 are a pair of upright parts 16a upper ends of which are bent mutually inwardly. A plurality of such brackets 16 (only one of which is illustrated in Figure 1) are provided on the wooden plate 14, spaced by a predetermined distance in a longitudinal direction. The pair of rails 12 are mounted on the brackets 16 by means of screw means (not shown) between the pair of upright parts 16a, and a pipe 32 of the transporting means 31 is fixedly mounted to an upper part of one of the upright parts 16a. As shown by an enlarged view in Figure 2, a grooved raw rubber sheet 12a is secured onto an upper face of each of the rails 12 along the full length of the rail 12 to suppress noise caused by running of the carriage 21 therealong.

As shown in Figures 1 and 3, the carriage 21 movable along the rails 12 includes a carriage body 22, an auxiliary plate 23 of a rectangular shape, and shock absorbers 24. The carriage body 22 is provided at its front and rear ends with a front end roller 26 and a rear end roller 27 which rollingly move on the rails 12. The carriage body 22 is made by assembling and welding steel members into a desired shape. The front end roller 26 is made up of a pair of small rollers 26a and 26b, while the rear end roller 27 is made up of a pair of small rollers 27a and 27b. The small rollers 26a, 26b, 27a and 27b are independently rotatably mounted for rolling movement on the respective rails 12. With such an arrangement, in a case where the rails 12 are laid along a bent transportation path, a rotational difference between the small rollers 26a, 26b, 27a and 27b during running of the carriage 21 can be accommodated or absorbed.

The auxiliary plate 23 is mounted on an upper part of the carriage body 22, and four shock absorbers 24 are attached onto an upper surface of the auxiliary plate 23 at its four corners (shown by chain-dotted lines in Figure 3). Mounted on upper faces of the shock absorbers 24 is a base plate 28 of a rectangular parallelepiped shape so that, as shown in Figure 1, the monitor camera 11 is mounted on the base plate 28 through a vibration-isolating device 29. In this way, since the shock absorbers 24 are disposed between the auxiliary plate 23 and the base plate 28, vibration of the carriage 21 during its

running can be prevented from being transmitted directly to the monitor camera 11. An accessory device (not shown), such as a battery, is accommodated in a space defined between the shock absorbers 24. Further, as shown in Figure 1, a projection 33a of a connecting plate 33 of the transporting means 31 is
5 mounted to a side face of the carriage body 22.

As shown in Figure 1 and Figures 4 to 7, the pipe 32 of the transporting means 31, fixed to the upper part of the upright part 16a, is formed in its lower part with a slit 32a which is extended along the full length of the pipe 32. Inserted in the interior of the pipe 32 is an internal moving body 34 which
10 can be moved by means of compressed air supplied into the pipe 32 and which is connected at its lower side with an upper end of the connecting plate 33 mounted to the side face of the carriage body 22. The connecting plate 33 extends downwardly of the pipe 32 and passes through the slit 32a. Disposed within the pipe 32 along the full length of the pipe 32 is a rubber sealing wire 36
15 of circular section which can block the slit 32a. The slit 32a has a first slit part 32b facing an outer bottom face of the pipe 32 and a second slit part 32c facing an inner bottom face of the pipe 32 (refer to Figures 6 and 7).

As shown in Figures 6 and 7, the first slit part 32b is made smaller than an outer diameter of the sealing wire 36 and is slightly larger in width than
20 the thickness of the connecting plate 33; whereas, the second slit part 32c is made to have a width that is slightly larger than the outer diameter of the sealing wire 36, so that a lower part of the sealing wire 36 can be accommodated into the second slit part 32c. In this connection, the sectional shape of the sealing wire is not limited to a circle but may be an ellipse,
25 rectangle or other polygon, while the section of the second slit part may have a shape corresponding to the sectional shape of the lower part of the sealing wire. Alternatively, the slit may have no second slit part and have a first slit part which is smaller in width than the outer diameter of the sealing wire. Alternatively, the depth of the second slit part may be made substantially equal
30 to the outer diameter of the sealing wire so that the entire sealing wire can be accommodated in the second slit part. Furthermore, the slit may be made by

machining simultaneously with molding of the pipe 32 or after molding of pipe 32. Or the pipe may be formed with a second slit part therein, and a plate having a first slit part may be fusedly bonded to the outer bottom face of the pipe.

5 As shown in Figure 8, the internal moving body 34 in the present embodiment includes three first, second and third moving shafts 37a, 37b and 37c formed to extend parallel to an axial center of the pipe 32; two first and second connecting shafts 41a and 41b linearly-connecting the moving shafts 37a, 37b and 37c; seals 38 fixedly mounted to contact with respective front and rear ends of the first and third moving shafts 37a and 37c, located at respective front and rear ends of the internal moving body 34 so as to keep the inside of the pipe 32 air tight; and rotors 39 rotatably mounted to the respective moving shafts 37a, 37b and 37c and rollingly movable along the inner bottom face of the pipe 32. Since the three first, second and third moving shafts 37a, 37b and 37c, as well as the two first and second connecting shafts 41a and 41b, have the same respective structures, explanation will be made of representative examples by referring to Figure 4 showing the first moving shaft 37a and a part of the first connecting shaft located at the front end, and by referring to Figure 5 showing the third moving shaft 37c and a part of the second connecting shaft; explanation of the second moving shaft 37b located in the middle thereof will be omitted.

 As shown in Figures 4 and 5, the moving shafts 37a and 37c are formed therein with an insertion bore 37d passed therethrough along their axial center. Fixedly mounted to the front and rear ends of the moving shafts 37a and 37c, located at the respective front and rear ends of the transporting means 31, are a pair of seal holding shafts 37e which close the respective front and rear ends of the insertion bore 37d and which are aligned with the axial center of the moving shafts 37a and 37c respectively. The seal 38 has a disk-shaped core 38a and a resident member 38b bonded to an outer peripheral face and one side of the core 38a. The resident member 38b is contacted at its outer peripheral face with the inner face of the pipe 32 so as to be slidably movable

air-tightly along the inner face of the pipe 32. The two seals 38 are fitted to the seal holding shaft 37e, and are retained thereon by two nuts 38c screwed to the seal holding shaft 37e. Usable as the resident member 38b is a soft or hard synthetic rubber, soft plastic, sponge or the like that can keep the interior of the pipe air-tight.

As shown in Figure 7, the seals 38 are each formed with a guide groove 38d which has a shape corresponding to an upper part of the sealing wire 36. Each guide groove 38d is formed in a lower end of the respective seal 38, that is, at a position facing the sealing wire 36 that has its lower part accommodated in the second slit part 32c. The upper part of the sealing wire 36 is accommodated in the guide groove 38d. In this conjunction, the number of the seals 38 to be fitted to the seal holding shaft 37e is not limited to two but may be one or three or more. Further, with respect to the seal 38, a composite plate may be obtained by alternately positioning a synthetic rubber and a sponge; the composite plate may be provided at both of its sides with iron plates and be fitted to the seal holding shaft 37e, and the nut 38c may be screwed and fastened to the seal holding shaft 37e.

As shown in Figures 6 and 8, the moving shafts 37a, 37b and 37c each have four first counter bores 37f formed in its one respective lower side face and set at predetermined spaced intervals in the longitudinal direction of the moving shaft; whereas, the moving shafts 37a, 37b and 37c each have four second counter bores 37g formed in its other respective lower side face and opposed to the respective first counter bores 37f. The opposing first and second counter bores 37f and 37g form four rotor holders 37h at the lower part of the moving shaft (refer to Figure 6). Formed in the center of each of the rotor holders 37h is a through-hole 37j (refer to Figures 4 and 5) which passes therethrough from the first counter bore 37f to the second counter bore 37g.

As shown in Figures 4 to 6 and Figure 8, the rotors 39 are four needle bearings rotatably fitted into four shafts 39a. The four rotors 39 are mounted in the lower part of each of the moving shafts 37a, 37b and 37c, by inserting the four shafts 39a into the four through-holes 37j so that the rotor 39

are alternately accommodated in the first and second counter bores 37f and 37g, and then by screwedly-tightening the nuts 39b thereto. The rotors 39 are arranged so that one outer peripheral edge of each rotor rollingly contacts the inner bottom face of the pipe 32 (refer to Figure 6). In this connection, the number of such rotors may be two, three, five or more, each rotor being fitted to both ends of a shaft passed through a respective through-hole. In order to increase a contact area between the rotor and the inner bottom face of the pipe, the inner bottom face of the pipe may be made flat. In this case, it becomes necessary to form the bottom part of the resilient member of the seal 38 to be flat so as to correspond to the inner bottom face of the pipe.

The connecting plates 33 are connected in pairs to the connecting shafts 41a and 41b by welding upper ends of the connecting plates 33 to lower faces of the associated connecting shafts 41a and 41b. The projections 33a of the pair of plates 33, projected downwardly of the pipe 32, are each formed with 4 engagement holes 33b therein (refer to Figure 8). The internal moving body 34 is formed with a wire-retracting part 37k therein (refer to Figures 4 to 6). The wire-retracting part 37k has: the insertion bores 37d, formed in the respective moving shafts 37a, 37b and 37c; through-bores 41d, formed in the respective connecting shafts 41a and 41b; and a pair of communication holes 37n and 37p, which are extended obliquely upwardly from lower parts of the front and rear ends of the moving shafts 37a and 37c located at the front and rear ends of the transporting means in mutually-approaching directions and which communicate with the insertion bore 37d. When the sealing wire 36 is inserted into the wire-retracting part 37k, the sealing wire 36 opposed to the connecting plate 33 is retraced inwardly of the pipe 32. In this connection, for the purpose of reducing the frictional resistance between the sealing wire 36 and the internal faces of the insertion bore 37d and communication hole 37n, 37p, the insertion bore and communication hole may be coated on their inside faces with a friction-reducing material such as fluorine resin, or balls or rollers may be rotably embedded as spaced by predetermined intervals in inside-bottom faces of the insertion bore and communication hole to be contacted with the sealing wire.

The pipe 32 can comprise a plurality of pipes connected to each other according to the transportation distance of the monitor camera 11. In this case, as shown in Figures 9 and 11, a pipe 32e is coupled at its tip end with a base end of a pipe 32d by means of a connecting pipe 42. The connecting pipe 42 is coupled with the pipes 32d and 32e so as to leave the slit 32a of the pipes 32d and 32e and to cover a seam 32f between both pipes 32d and 32e (refer to Figure 9). More specifically, the connecting pipe 42 has an open slit 42a that is formed therein along the full length of the connecting pipe 42 and that is larger in width than the slit 32a (refer to Figure 10). The slit 32a is positioned in the center of the open slit 42a, and then one end of the connecting pipe 42 is welded and connected to the base end of the pipe 32d. The connecting pipe 42 is provided on its other outer face with first pedestals 43, whereas, the pipe 32e is provided on its tip end outer face with second pedestals 44.

The first and second pedestals 43 and 44, which are each formed into a letter-U shape, are welded to the outer face of the connecting pipe 42 and to the outer face of the pipe 32e respectively. The first pedestal 43 has a pin 46 and a screw 47 which is pivotably connected at its base end thereto through the pin 46. The screw 47 has a length such that its tip end reaches the second pedestals 44 when the base end of the pipe 32d is connected to the tip end of the pipe 32e. In order to couple both pipes 32d and 32e with use of the connecting pipe 42, the pipe 32e is inserted into an open end of the connecting pipe 42 welded to the pipe 32d. Under such a condition that both pipes 32d and 32e are coupled to each other, the screws 47 are inserted from their tip ends into the second pedestals 44 to be bridged between the first and second pedestals 43 and 44, and then nuts 48 are screwed to the tip ends of the screws 47. When the nuts 48 are tightened, the pipes 32d and 32e are tightly coupled to each other so that there is no gap in the seam 32f. In this connection, the pipe to be joined may be provided on its other end outer face with a second pedestal, and the connecting pipe may be provided on its tip end outer face with a first pedestal having a screw whose base end is pivotably connected thereto.

Explanation will next be made as to how to use the monitor camera transporting apparatus having an arrangement such as mentioned above and using compressed air.

First, such a compressed air generating device as a compressor
5 (not shown) is disposed in the vicinity of a base end of the pipe 32, and air hoses (not shown) extended from the compressor are connected to both ends of the pipe 32 through an air adjustment valve (not shown). For transporting such a monitor camera 11 as shown in Figure 1, the air adjustment valve provided in the air hose connected to the base end of the pipe 32 is opened to
10 introduce compressed air from the base end side into the pipe 32. The introduction of the compressed air causes the internal moving body 34 to be propelled toward the tip end of the pipe under the pressure of the compressed air. As the internal moving body 34 is propelled, the carriage 21 is moved along the rails 12 by means of the connecting plate 33, so that the monitor camera 11
15 mounted on the carriage 21 is transported along the rails 12.

When the connecting plate 33 passes along the slit 32a, the sealing wire 36 passes through the wire-retracting part 37k, so that the sealing wire 36 is retracted inwardly of the pipe 32. For this reason, the connecting plate 33 can smoothly move along slit 32a without being hindered by the sealing
20 wire 36. It is only when the sealing wire 36 is positioned between the seals 38 of the internal moving body 34 that the sealing wire 36 is retracted inwardly of the pipe 32 to open the slit 32a. The sealing wire 36 retracted inwardly of the pipe is guided into the second slit part 32c by means of the guide groove 38d of the seals 38 so that the sealing wire 36, located at a position other than a
25 position between the seals 38, is brought into close contact with the slit 32a. Further, since the seam 32f between the pipes 32d and 32e is sealed by the connecting pipe 42 (refer to Figure 9), the compressed air will not leak outside the pipe 32. For this reason, during movement of the internal moving body 34, the pressure of the compressed air is kept at a constant level, so that the
30 internal moving body 34 can smoothly move forwards and the monitor camera 11 can be transported efficiently and safely.

Further, by changing the opening of the air adjustment valve and/or the pressure of the compressed air, the internal moving body 34 can be accelerated or decelerated to run the carriage 21 acceleratingly or deceleratingly, thereby the monitor camera 11 can be transported at a desired speed.

When it is desired to return the internal moving body 34 to the base end of the pipe 32, the air adjustment valve provided in the air hose connected to the base end of the pipe 32 is opened to introduce the compressed air from the tip-end side of the pipe 32 thereinto. In this way, by controlling the amount and pressure of compressed air to be introduced into the pipe 32, the monitor camera 11 can be transported at a desired speed or up to a desired position.

As has been explained in the foregoing, in accordance with the present invention, there is provided a monitor camera transporting apparatus which comprises rails laid along a transportation path of a monitor camera, a carriage having the monitor camera mounted thereon and movable along the rails, and transporting means for moving the carriage by means of compressed air, and wherein the transporting means moves the carriage along the rails by means of the compressed air to thereby transport the monitor camera mounted on the carriage along the rails. As a result, even at such dangerous places that no persons are allowed to enter and no electric motors can be used, the monitor camera can be transported efficiently and safely, even where an object is to be photographed moving at high speed; at the same time it avoids the sealing wire blocking the movement of the internal moving body under the influence of the compressed air, thus enabling reliable and strong appealing photographing.

Further, since the slit is made in the lower face of the pipe along the longitudinal direction thereof, the internal moving body movable within the pipe by means of the compressed air is inserted into the pipe, the carriage is mounted to the connecting plate connected to the internal moving body, the sealing wire capable of closing the slit is disposed inside the pipe, and the internal moving body or connecting plate is formed with the wire-retracting part

for retracting the sealing wire inwardly of the pipe; so that, at a connecting-plate passage position, the sealing wire can be retracted inwardly of the pipe by the wire-retracting part. As a result, the monitor camera can be transported efficiently and safely, even for an object being photographed as moving at high speed. At the same time it avoids the sealing wire blocking the movement of the internal moving body under the influence of the compressed air, thus enabling reliable and strong appealing photographing.

Furthermore, the carriage includes a carriage body having rollers which are provided at its front and rear ends to be rollingly moved on the rails, an auxiliary plate mounted in an upper part of the carriage body, a base plate on which the monitor camera is mounted, and shock absorbers disposed between the auxiliary plate and base plate. Therefore, when the projection of the connecting plate is mounted onto the side face of the carriage body, the rollers and thus the carriage can be smoothly moved on the rails. Since the shock absorbers are disposed between the auxiliary plate and base plate, it can be avoided that the vibration of the carriage body is transmitted directly to the monitor camera. As a result, it can be prevented that an image photographed by the monitor camera is blurred due to camera shake.

In addition, since the resilient member is fixedly mounted along the full length of the rails onto the upper faces of the rails on which the rollers are rolling, noise generated by the running of the carriage can be suppressed.

While the present invention has been described in connection with a certain preferred embodiment, it is to be understood that the subject matter encompassed by the present invention is not limited to the specific embodiment. On the contrary, it is intended to include all alternatives, modifications, and equivalents as can be included within the spirit and scope of the following claims.

THE EMBODIMENTS OF THE INVENTION IN WHICH AN EXCLUSIVE PROPERTY OR PRIVILEGE IS CLAIMED ARE DEFINED AS FOLLOWS:

1. A monitor camera transporting apparatus based on compressed air, comprising:

rails laid along a transportation path of a monitor camera;

a carriage having the monitor camera mounted thereon and movable along the rails; and,

transporting means for moving the carriage by means of compressed air;

wherein the transporting means includes:

a pipe provided parallel to the rails and having a slit formed in its lower part along a full length of the pipe;

an internal moving body inserted into said pipe and movable within the pipe by means of compressed air introduced into the pipe;

a connecting plate connected at its one end to the internal moving body within the pipe and projected as a projection at the other end externally of the pipe through the slit, said carriage being connected to the projection;

a sealing wire disposed within the pipe along the full length of the pipe to close the slit; and,

a wire-retracting part formed in the internal moving body or connecting plate for retracting inwardly of the pipe the sealing wire located at the connecting plate.

2. A monitor camera transporting apparatus based on compressed air as set forth in claim 1, wherein said carriage includes a carriage body having rollers which are provided at its front and rear ends to be rollingly moved on the rails, an auxiliary plate mounted in an upper part of said carriage body, a base plate on which the monitor camera is mounted, and shock absorbers disposed between the auxiliary plate and base plate, and wherein the

projection of the connecting plate is mounted onto the side face of the carriage body.

3. A monitor camera transporting apparatus based on compressed air as set forth in claim 2, wherein a resilient member is fixedly mounted on upper faces of the rails on which the rollers are adapted to roll along the full length of the rails.

FIG. 1

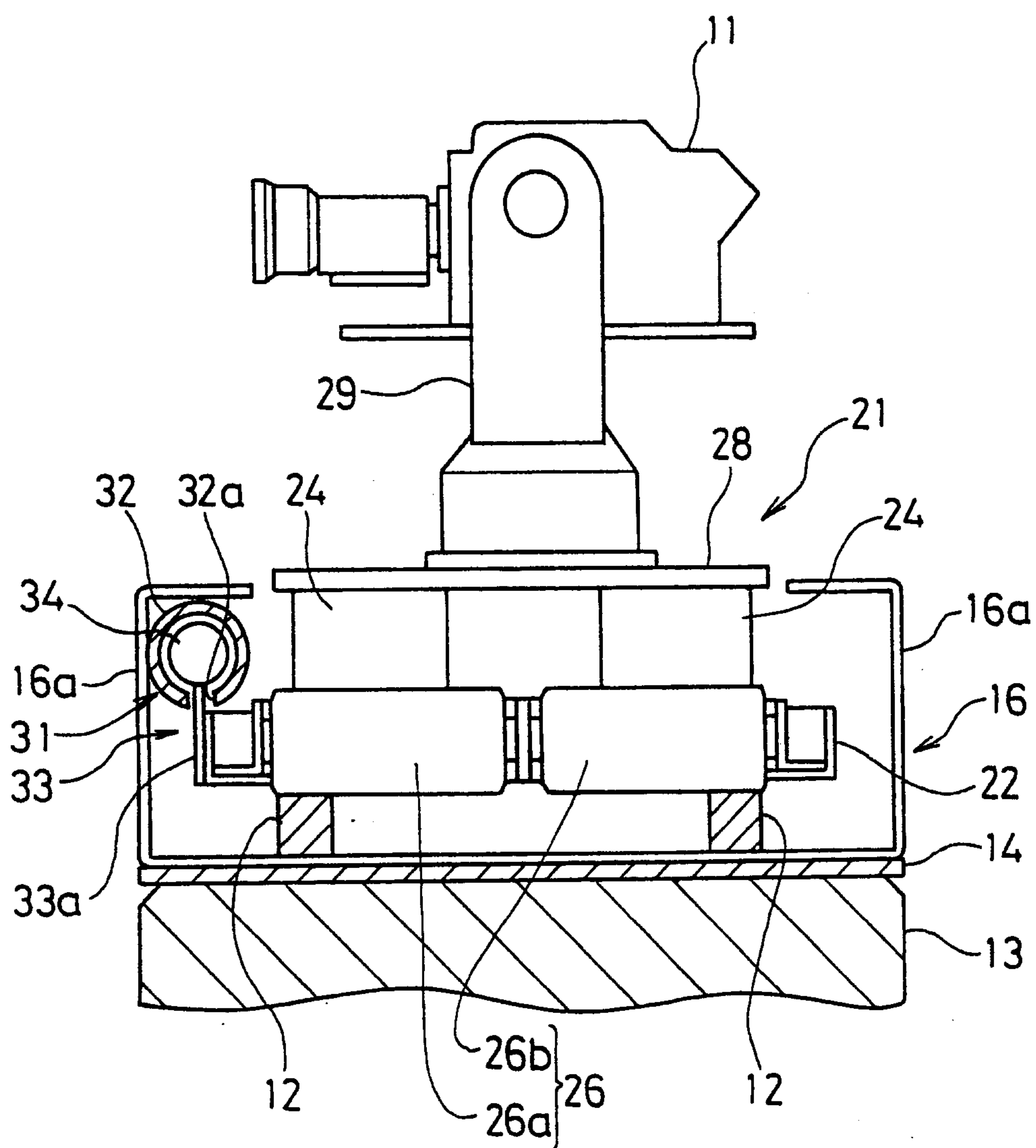
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FIG. 2

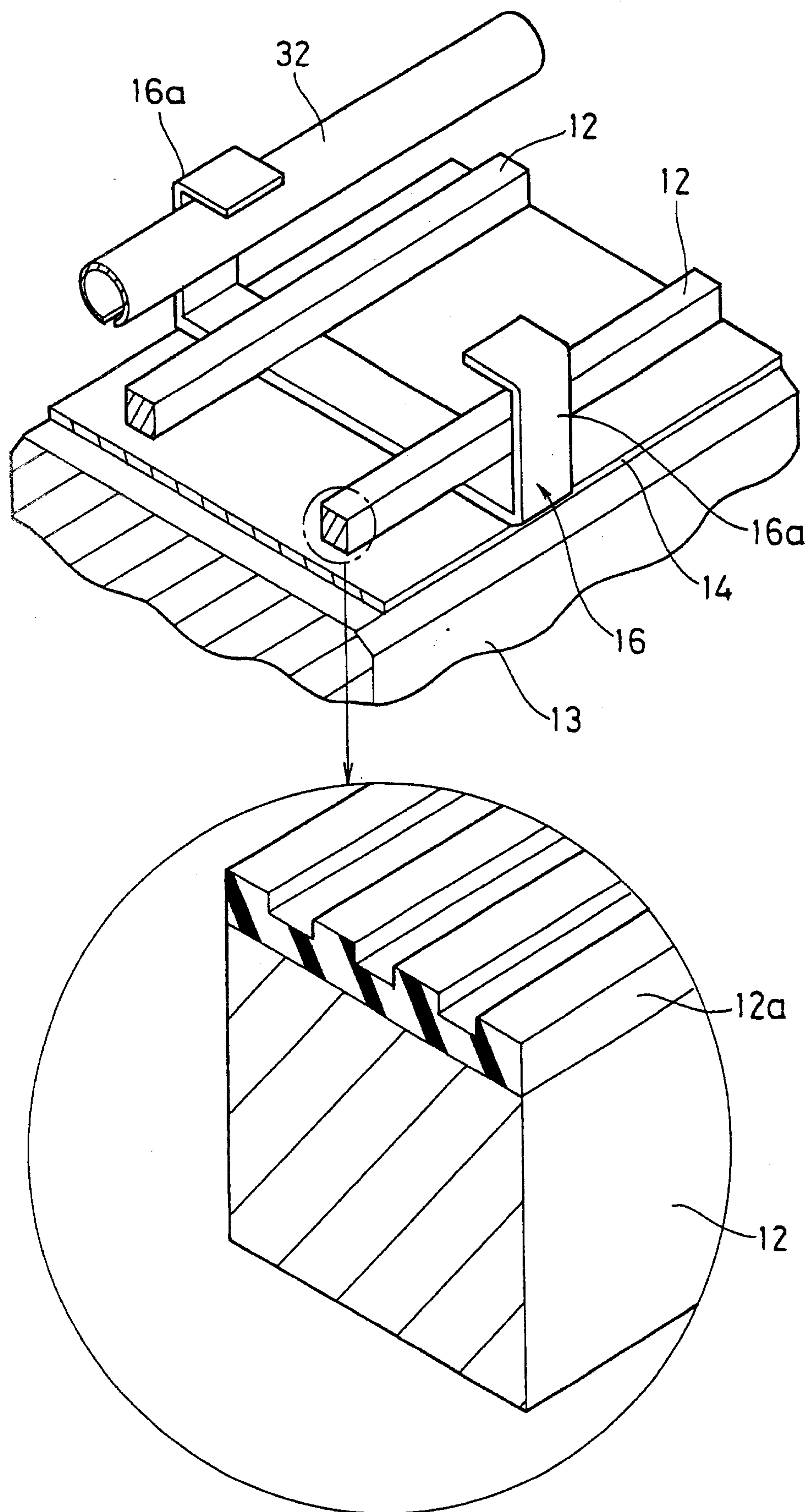


FIG. 3

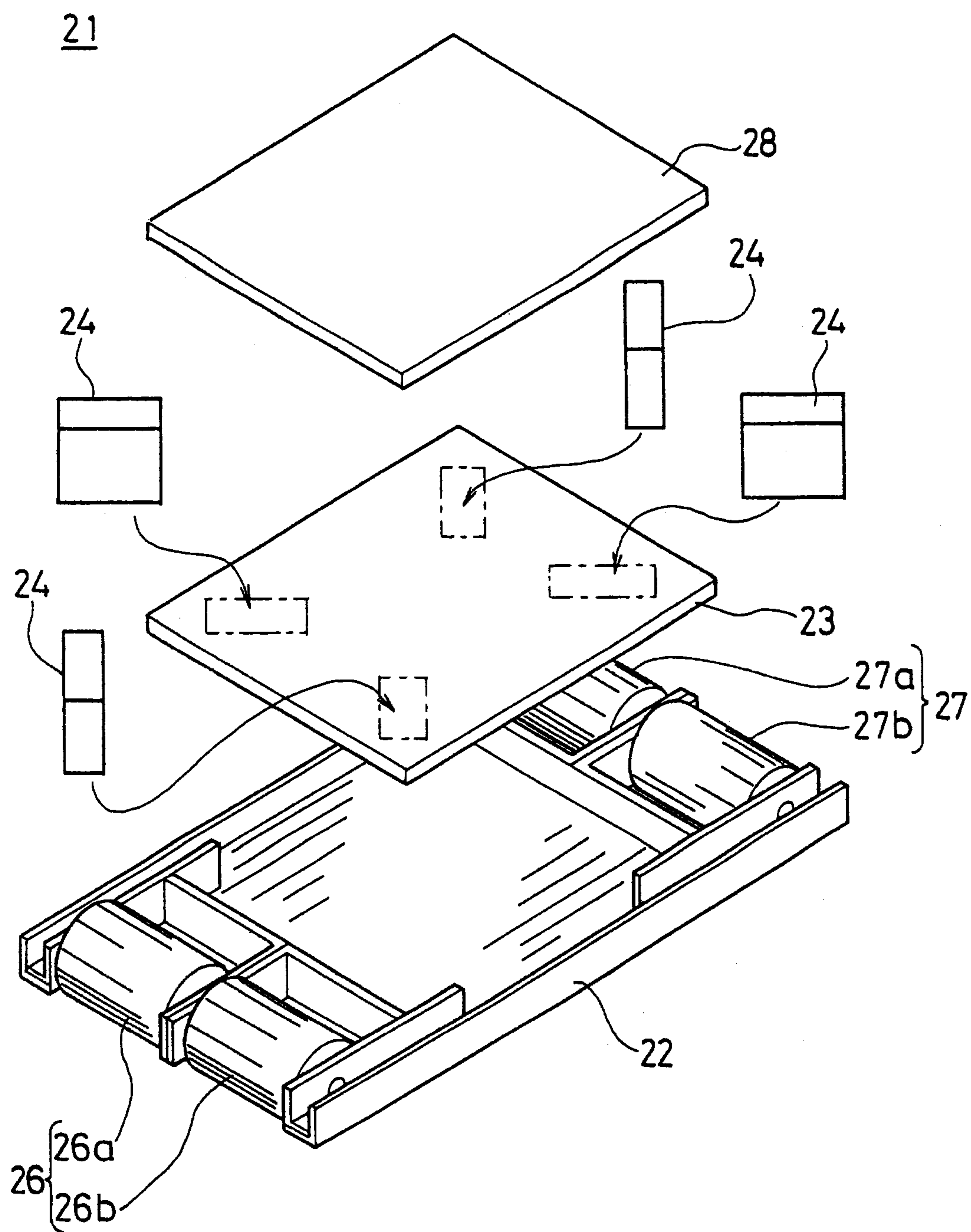


FIG. 4

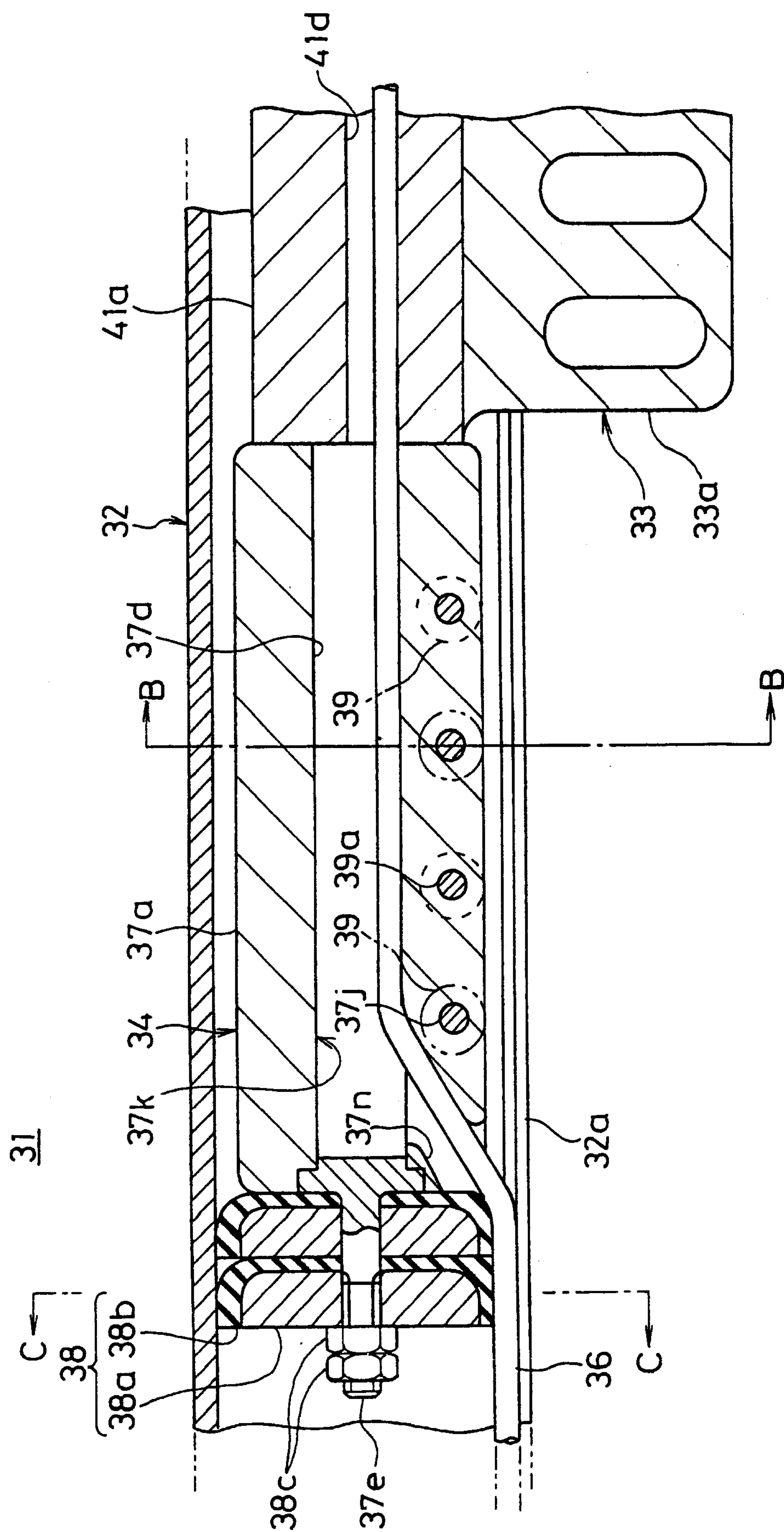


FIG. 5

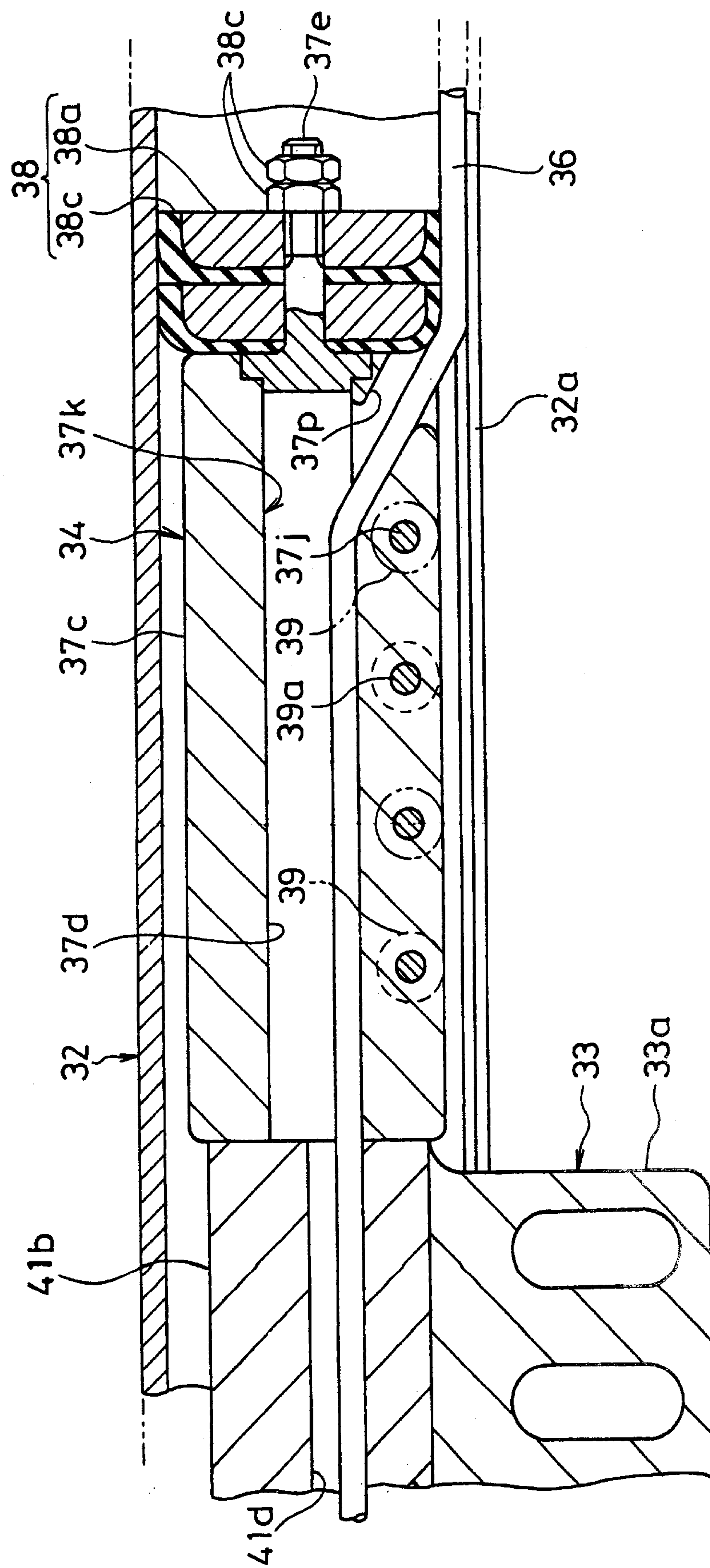


FIG. 6

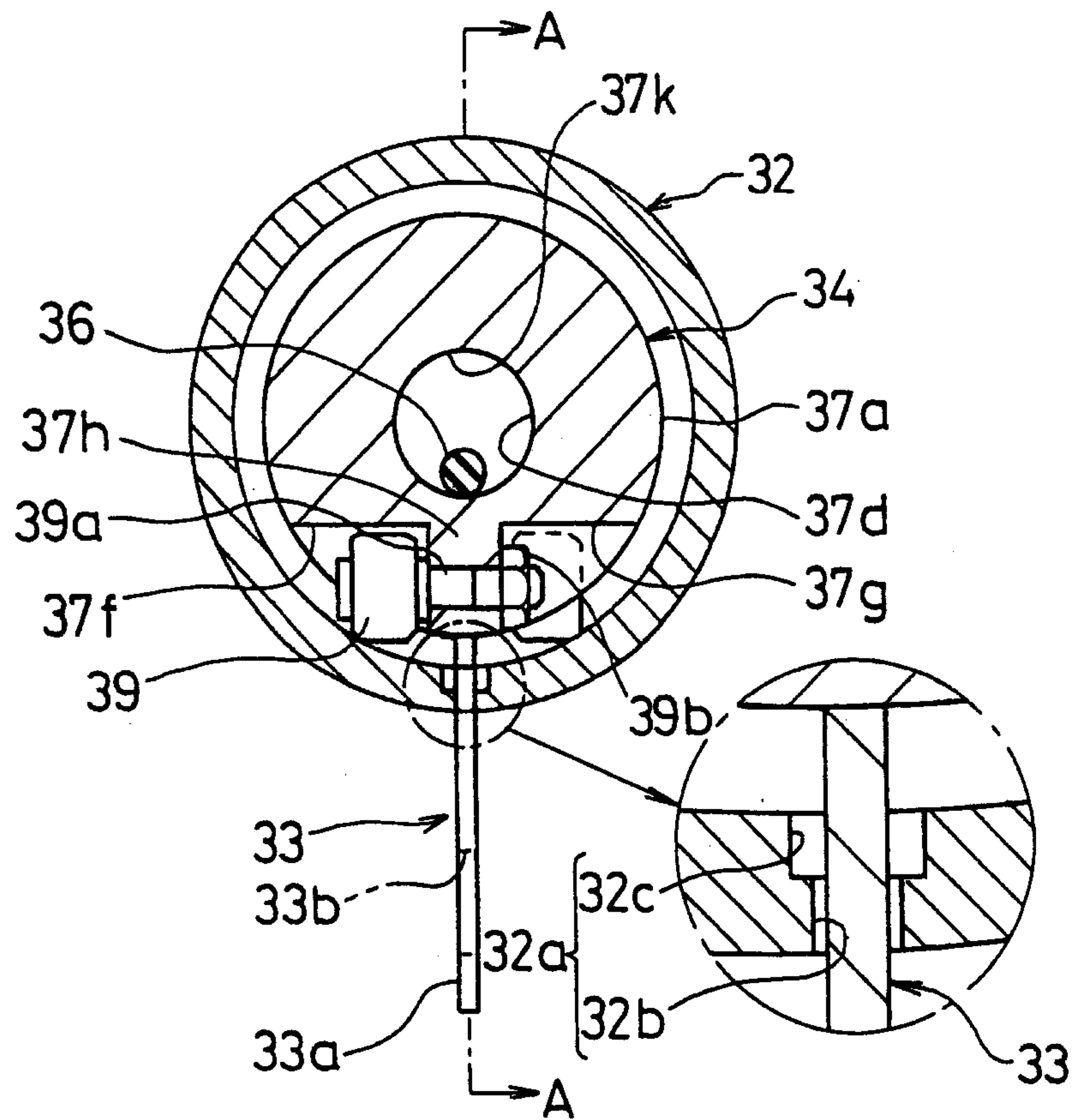


FIG. 7

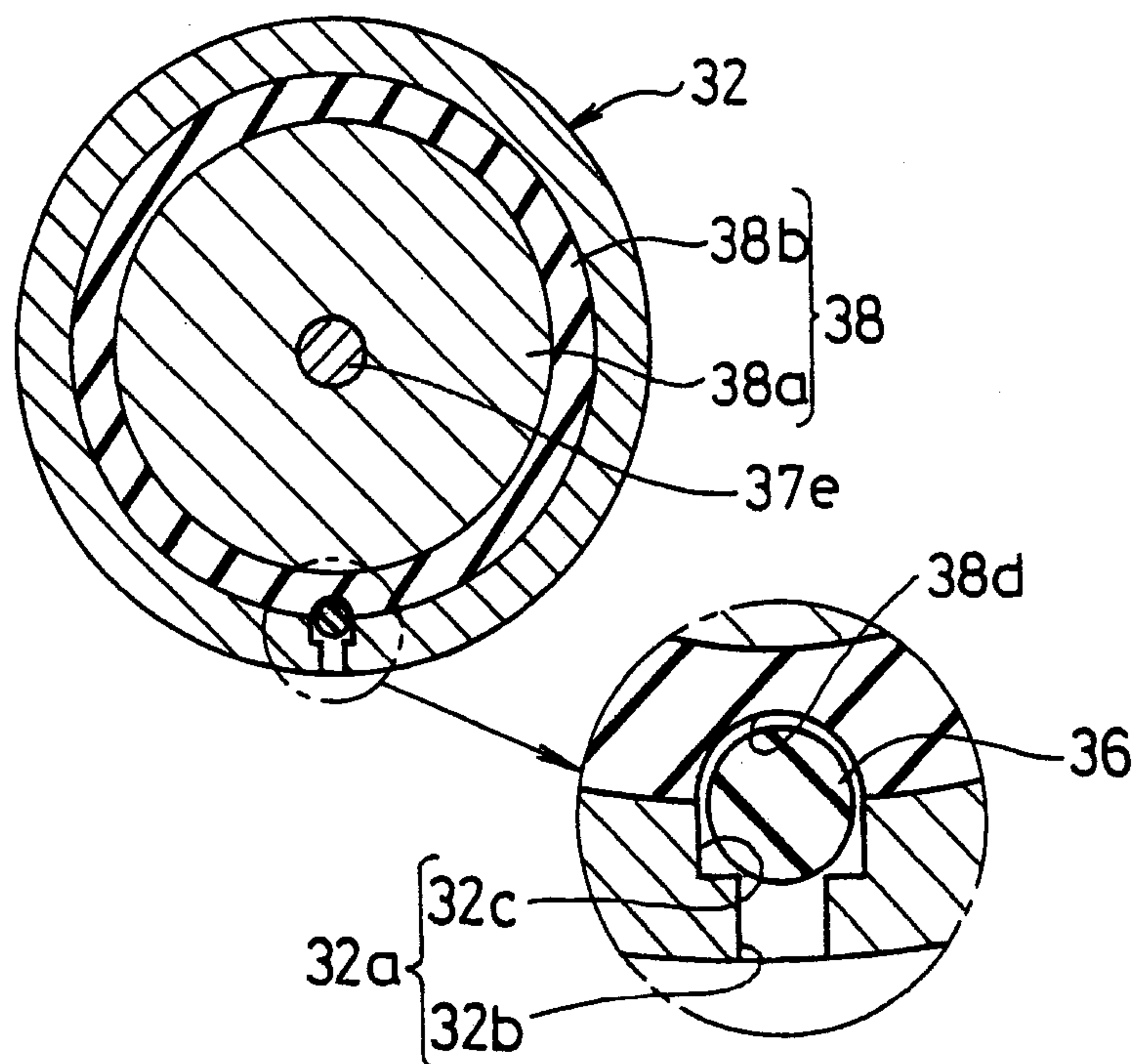


FIG. 8

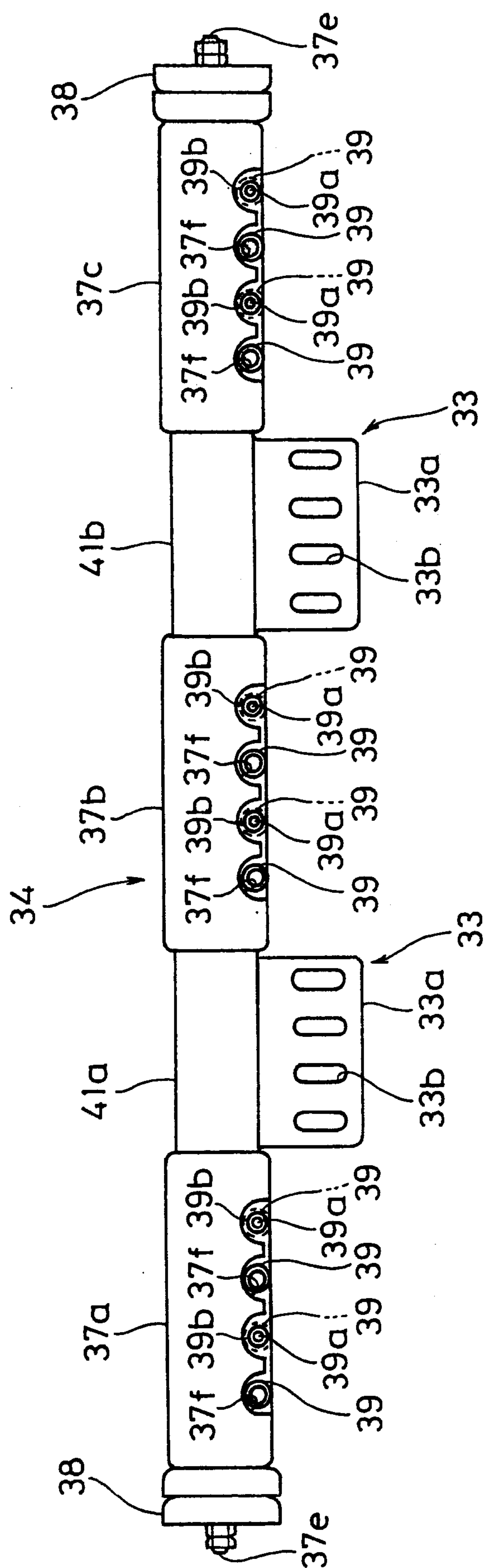


FIG. 9

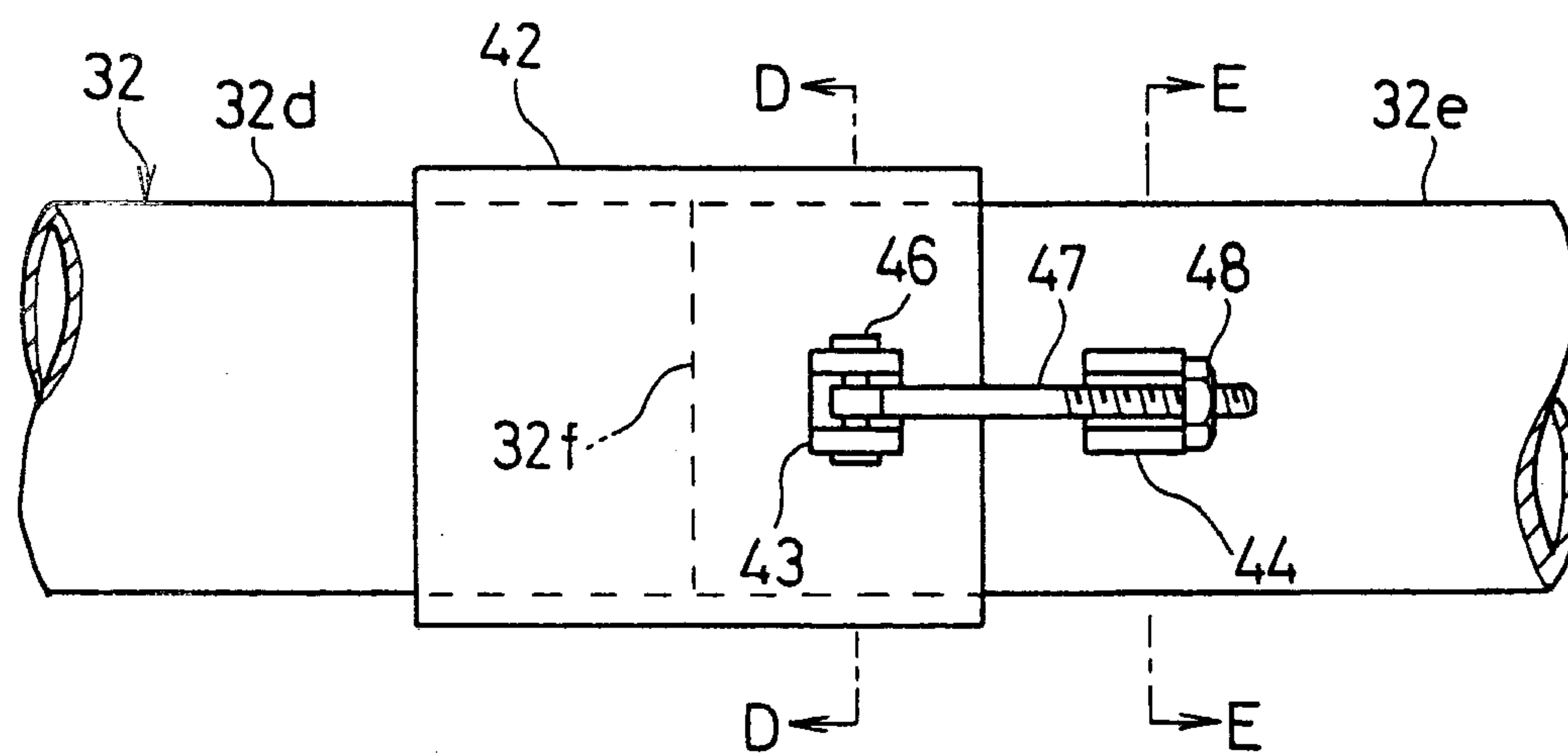


FIG. 10

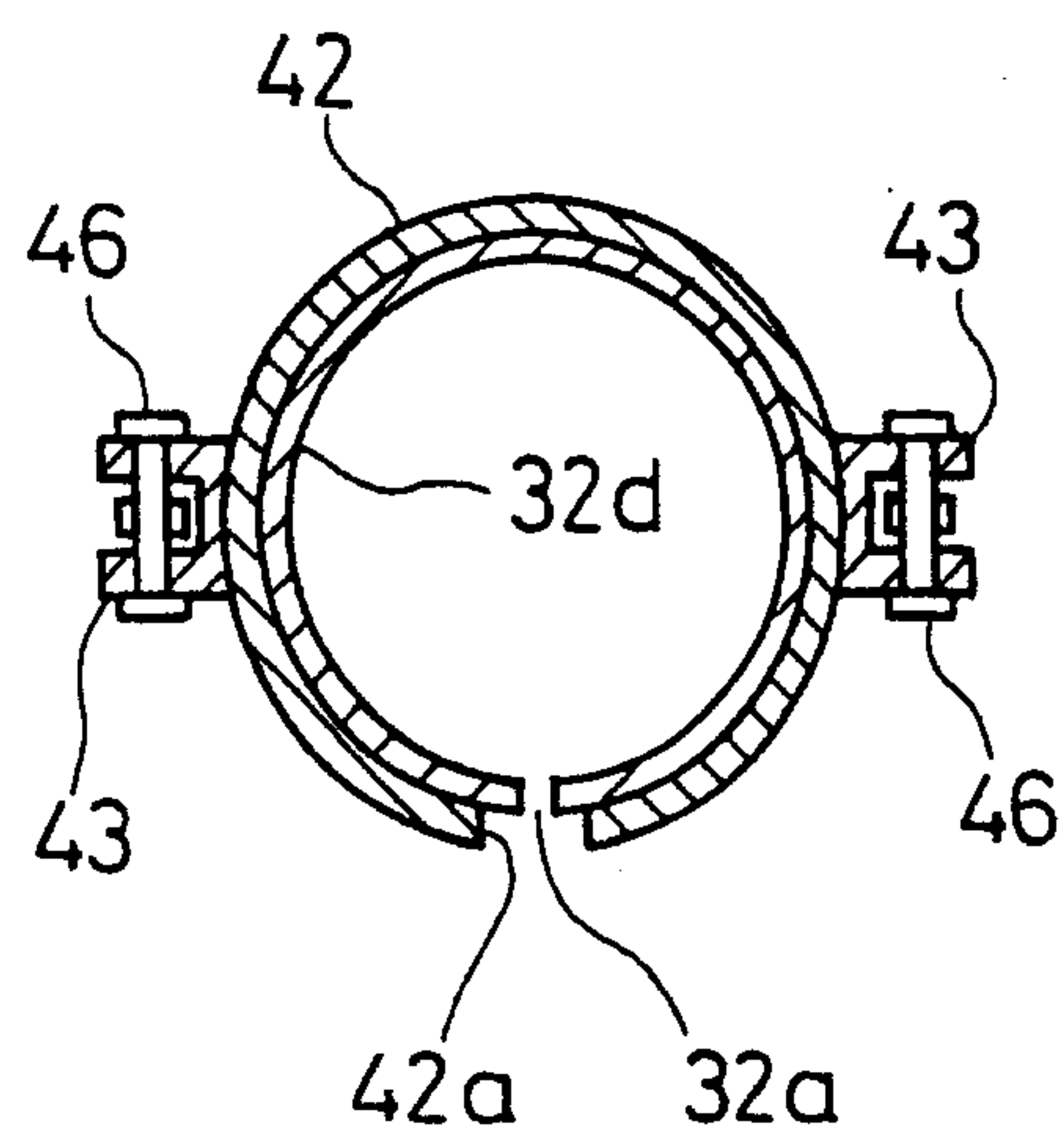


FIG. 11

