

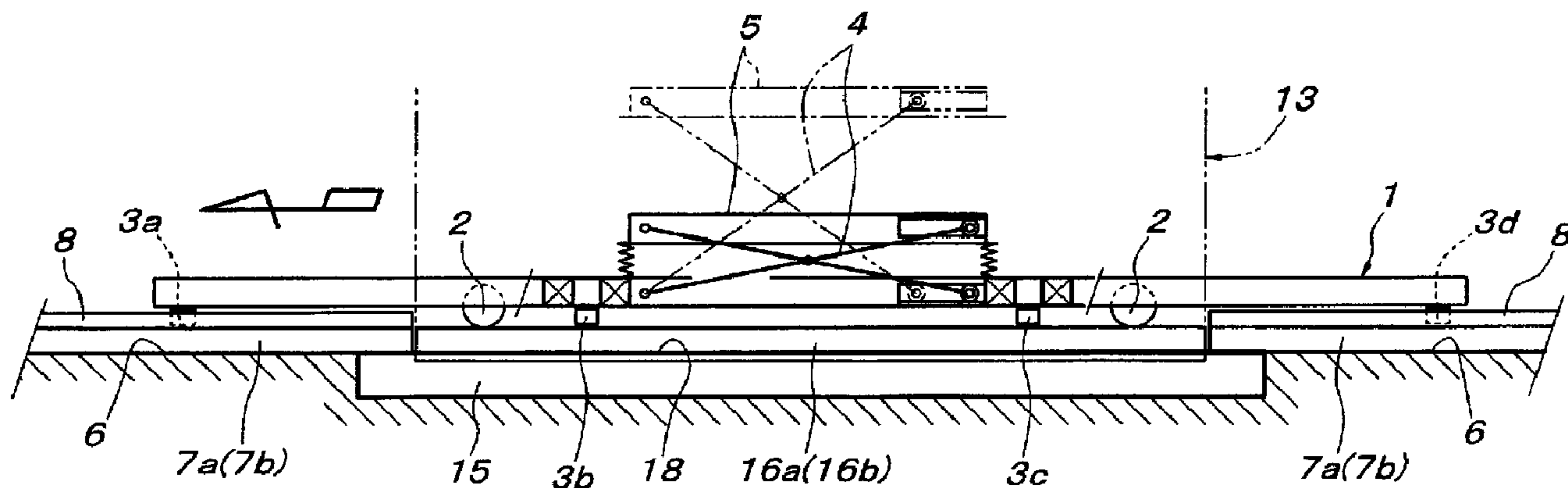


(86) Date de dépôt PCT/PCT Filing Date: 2008/03/17
 (87) Date publication PCT/PCT Publication Date: 2008/10/09
 (45) Date de délivrance/Issue Date: 2011/02/01
 (85) Entrée phase nationale/National Entry: 2009/01/06
 (86) N° demande PCT/PCT Application No.: JP 2008/054849
 (87) N° publication PCT/PCT Publication No.: 2008/120565
 (30) Priorité/Priority: 2007/03/27 (JP2007-081002)

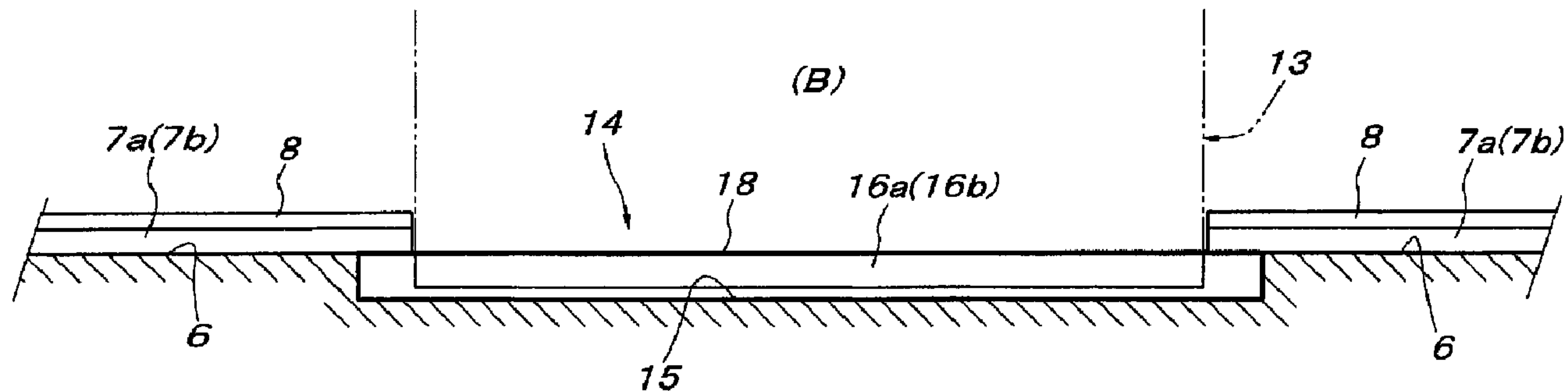
(51) Cl.Int./Int.Cl. *B61B 13/00* (2006.01),
B65G 47/52 (2006.01)
 (72) Inventeur/Inventor:
SUGIMOTO, KATSUHIRO, JP
 (73) Propriétaire/Owner:
DAIFUKU CO., LTD., JP
 (74) Agent: GOWLING LAFLEUR HENDERSON LLP

(54) Titre : INSTALLATIONS DE TRANSFERT DE TYPE CAMION
 (54) Title: CARRIAGE-TYPE CONVEYANCE SYSTEM

(A)



(B)



(57) Abrégé/Abstract:

The present invention makes it easy to employ a floor surface aisle crossing a conveyance path in a conveyance system using a conveyance carriage 1 which travels on guide rails 7a and 7b laid on a floor surface 6 along the conveyance path, wherein at an aisle crossing section 14 in the conveyance path that the aisle on the floor surface crosses, a pit 15 is provided by digging down

(57) **Abrégé(suite)/Abstract(continued):**

into the floor surface 6, and inside this pit 15, elevating guide rails 16a and 16b movable vertically parallel between a raised level at which the elevating guide rails connect the guide rails 7a and 7b before and after the pit 15 and a lowered level at which the upper surfaces of the elevating guide rails become flush with the floor surface 6 are disposed, and over the pit 15, a floor member 18 is laid so as to be flush with or substantially flush with the floor surface 8 while leaving elevating apertures for the elevating guide rails 16a and 16b.

ABSTRACT

The present invention makes it easy to employ a floor surface aisle crossing a conveyance path in a conveyance system using a conveyance carriage 1 which travels on guide rails 7a and 7b laid on a floor surface 6 along the conveyance path, wherein at an aisle crossing section 14 in the conveyance path that the aisle on the floor surface crosses, a pit 15 is provided by digging down into the floor surface 6, and inside this pit 15, elevating guide rails 16a and 16b movable vertically parallel between a raised level at which the elevating guide rails connect the guide rails 7a and 7b before and after the pit 15 and a lowered level at which the upper surfaces of the elevating guide rails become flush with the floor surface 6 are disposed, and over the pit 15, a floor member 18 is laid so as to be flush with or substantially flush with the floor surface 8 while leaving elevating apertures for the elevating guide rails 16a and 16b.

CARRIAGE-TYPE CONVEYANCE SYSTEM

[Technical Field]

The present invention relates to a carriage-type conveyance
5 system using a conveyance carriage which travels on guide rails
laid on a floor surface along a conveyance path.

[Background Art]

In such a carriage-type conveyance system, when a floor
surface aisle crossing section is included in the conveyance path,
10 generally, to allow a vehicle, etc., traveling on the floor surface
aisle crossing section to safely and easily get over the guide
rails on the conveyance path side, a crossing aisle floor member
is laid to be flush with the upper surfaces of the guide rails
and slopes for eliminating level differences from the floor
15 surface are formed on both ends of the crossing aisle floor member
although patent documents disclosing this construction cannot
be presented.

[Disclosure of the Invention]

20 [Problem to be Solved by the Invention]

As described above, in the conventional construction in
which a crossing aisle floor member having slopes on both ends
is laid on the floor surface, not only is extra labor required
to move a handcart or the like on the crossing aisle but also
25 the safety is lowered in comparison with a flat floor surface

on which no guide rails are laid.

[Means for Solving the Problem]

An object of the present invention is to provide a carriage-type conveyance system which can solve the conventional
5 problem described above, and a carriage-type conveyance system according to a first aspect which uses, shown with the reference numerals in parentheses of the embodiment described later, a conveyance path formed by guide rails (7a and 7b) laid on a floor surface and a conveyance carriage (1) which travels on the guide
10 rails (7a and 7b), and is provided with an aisle crossing section (14) which an aisle (13) on the floor surface crosses in the conveyance path, includes a pit (15); elevating guide rails (16a and 16b), and elevating drive devices (19A and 19B), wherein the pit (15) is formed by digging down into the floor surface (6)
15 of the aisle crossing section (14) and is covered by a floor member (18) laid to be flush with the floor surface (6), the elevating guide rails (16a and 16b) are disposed inside the pit (15) movably vertically parallel between a raised level at which they connect the guide rails (7a and 7b) before and after the pit (15) and
20 a lowered level at which their upper surfaces are flush with the floor surface (6), and the elevating drive devices (19A and 19B) elevate the elevating guide rails (16a and 16b) between the raised level and the lowered level, and in the floor member (18), elevating apertures (17) for the elevating guide rails (16a and 16b) are
25 made.

To carry out the present invention constructed as described above, in detail, as described in a second aspect, it is possible that the conveyance carriage (1) is provided with at least four guided portions (3a through 3d) at appropriate intervals in the traveling direction, and on the conveyance paths before and after the aisle crossing section (14), conveyance carriage guide rails (8) which engage with the guided portions (3a through 3d) are laid so that at least two of the guided portions (3a through 3d) always engage with the conveyance carriage guide rails (8) when the conveyance carriage (1) passes through the aisle crossing section (14).

As described in a third aspect, in the conveyance path, a carriage stopper (39a) and a switching means (46) are provided parallel, and the carriage stopper (39a) is provided on at least the upstream side of the conveyance carriage traveling direction of the aisle crossing section (14), and is freely switched between a working posture in which the carriage stopper stops the conveyance carriage (1) before the elevating guide rail (16a, 16b) and a nonworking posture in which it allows the conveyance carriage (1) to pass through, and the switching means (46) switches the carriage stopper (39a) into the working posture only when the elevating guide rail (16a, 16b) is at the lowered level in conjunction with the vertical movements of the elevating guide rail (16a, 16b).

Further, as described in a fourth aspect, it is possible

that the elevating drive devices (19A and 19B) are constituted by elevating support means (20A and 20B) and drive means (21), and the elevating support means (20A and 20B) is disposed at least at two positions before and after the elevating guide rails (16a and 16b) in the longitudinal direction, and is constituted each by cam rails (23) provided on either a movable body (22) movable in the longitudinal direction of the corresponding elevating guide rail (16a, 16b) below the elevating guide rail (16a, 16b) or the elevating guide rail (16a, 16b), and a cam follower roller (24) provided on the other, and the drive means (21) is constructed so as to reciprocate the movable bodies (22) of the elevating support means (20A and 20B) in conjunction with each other. In this case, as described in a fifth aspect, the elevating guide rail (16a, 16b) is provided with an elevating guide unit (33) parallel, and a pair of left and right cam follower rollers (24) are axially supported concentrically on both left and right sides of the elevating guide rail (16a, 16b), and the elevating guide unit (33) is provided at least two positions before and after in the longitudinal direction of the elevating guide rail (16a, 16b), and has a pair of left and right slide guides (36) sandwiching the elevating guide rail (16a, 16b), and each elevating support means (20A, 20B) is provided with elevating guide rollers (30) and elevating guide members (32), and the pair of elevating guide rollers (30) are axially supported on the left and right concentrically with the cam follower rollers (24) on the outer

sides of the pair of left and right cam follower rollers (24),
a pair of left and right elevating guide members (32) are provided
parallel so that the pair of left and right guide rollers (30)
engage with these movably vertically, and the movable body (22)
5 is disposed between the pair of left and right elevating guide
members (32), and on the movable body (22), a pair of left and
right cam rails (23) which support the pair of left and right
cam follower rollers (24), respectively, are laid.

[Effects of the Invention]

10 According to the carriage-type conveyance system of the
present invention described in the first aspect, although the
conveyance carriage can be made to smoothly travel at a
predetermined level via the elevating guide rails raised to the
raised level when the conveyance carriage passes through the aisle
15 crossing section, the elevating guide rails are lowered to the
lowered level when the conveyance carriage does not travel on
the aisle crossing section, and accordingly, a flat crossing aisle
flush with the floor surface around it is formed by the floor
member covering the pit and the upper surfaces of the elevating
20 guide rails at the lowered level, so that a handcart, etc., can
be safely moved on this crossing aisle without extra labor.

 According to the construction described in the second aspect,
even without using flanged wheels that engage with guide rails
as wheels of the conveyance carriage, the orientation of the
25 conveyance carriage to pass through the crossing aisle can be

reliably restricted and the conveyance carriage can be prevented from unexpectedly deviating from the conveyance path when passing through the crossing aisle.

According to the construction described in the third aspect,
5 there is no possibility that the conveyance carriage is made to enter the aisle crossing section by mistake in the state that the elevating guide rails disposed on the aisle crossing section are lowered to the lowered level, so that the safety can be increased.

10 Further, according to the construction described in the fourth aspect, it is only required that below the elevating guide rails lowered to the lowered level, a space which allows the movable bodies having cam rails or cam follower rollers to move in the longitudinal direction of the elevating guide rails is secured,
15 so that the depth of the pit that must be formed by digging down into the floor surface at the aisle crossing section can be made comparatively shallow. In this case, according to the construction described in the fifth aspect, the elevating guide rails can be smoothly moved vertically parallel while movements
20 and falling in the left and right lateral direction and movements in the longitudinal direction of the elevating guide rails are reliably prevented, and the cam follower rollers and the elevating guide rollers can be axially supported by a common support shaft, so that the number of parts can be reduced and the system can
25 be constructed inexpensively.

[BRIEF DESCRIPTION OF THE DRAWINGS]

Fig. 1 is a schematic plan view showing an entire construction of an aisle crossing section;

5 Fig. 2A is a schematic longitudinal sectional side view showing a state when the conveyance carriage passes through the aisle crossing section, and Fig. 2B is a schematic longitudinal sectional side view showing a state when a crossing aisle is used;

Fig. 3A is a schematic front view showing a conveyance carriage
10 when traveling on a conveyance path, Fig. 3B is a schematic longitudinal sectional front view showing the conveyance carriage when traveling on the aisle crossing section, and Fig. 3C is a schematic longitudinal sectional front view showing a state when the crossing aisle is used;

15 Fig. 4 is a plan view showing an elevating guide rail at a raised level and an elevating drive device for the elevating guide rail;

Fig. 5 is an enlarged plan view of a main portion of Fig. 4;

Fig. 6 is an enlarged plan view of another main portion of Fig. 4;

20 Fig. 7A is a side view of a main portion of Fig. 4, and Fig. 7B is a side view of the main portion in a state that the elevating guide rails are switched to the lowered level;

Fig. 8 is an enlarged side view of a main portion of Fig. 7A;

Fig. 9 is an enlarged side view of another main portion of Fig. 7A;

25

Fig. 10 is an enlarged side view of a main portion of Fig. 7B;
Fig. 11 is an enlarged side view of another main portion of Fig.
7B;

Fig. 12 is a longitudinal sectional front view of a main portion
5 when the elevating guide rails are at the raised level;

Fig. 13 is a longitudinal sectional front view of the main portion
when the elevating guide rails are at the lowered level;

Fig. 14 is a longitudinal sectional front view of the main portion
when the elevating guide rails are at the raised level and a carriage
10 stopper is in a fallen-down nonworking posture; and

Fig. 15 is a longitudinal sectional front view of the main portion
when the elevating guide rails are at the lowered level and the
carriage stopper is in a standup working posture.

[Description of the Reference Numerals]

- 15 1: conveyance carriage
2: wheel
3a-3d: vertical axis roller
6: floor surface
7a, 7b: conveyance carriage supporting guide rail
20 8: conveyance carriage guiding groove-shaped guide rail
12: frictional driving means
13: floor surface aisle
14: aisle crossing section
15: pit
25 16a, 16b: elevating guide rail

- 17: aperture
- 18: floor member
- 19A, 19B: elevating drive device
- 20A, 20B: elevating support means
- 5 21: drive means
- 22: plate-shaped movable body
- 23: cam rail
- 24, 44: cam follower roller
- 25: substrate
- 10 26: slide guide rail
- 27: slide block
- 28, 41: bearing member
- 29, 42: support shaft
- 30: elevating guide roller
- 15 31: slot
- 32: elevating guide member
- 33: elevating guide unit
- 35: slip member
- 36: slide guide plate
- 20 37: cylinder unit
- 38: joint rod
- 39a, 39b: carriage stopper
- 40a, 40b: mount
- 45: operating plate
- 25 46: switching means

[Best Mode for Carrying Out the Invention]

Hereinafter, a detailed embodiment of the present invention will be described with reference to the accompanying drawings. In Fig. 1 through Figs. 3, the reference numeral 1 denotes a conveyance carriage which is provided with two front and rear pairs of left and right wheels 2 on the bottom and four vertical axis rollers 3a through 3d axially supported at appropriate intervals on a straight line parallel to a traveling direction, and an elevating rack 5 at an upper central portion which is supported so as to be elevated by a crosslink mechanism 4. This elevating rack 5 can be elevated by various conventionally known methods such as a motor driving method in which the crosslink mechanism 4 is raised and lowered by a motor-driven screw mechanism or a cam rail method in which the elevating rack 5 is raised by pushing-up elevating cam follower rollers interlocked with rising and lowering movements of the crosslink mechanism 4 by cam rails laid on the floor surface side and the elevating rack 5 is lowered by gravity.

On the traveling path of the conveyance carriage 1, that is, on the floor surface 6 as the conveyance path, a pair of left and right guide rails 7a and 7b which support wheels 2 so as to allow these to roll freely, and conveyance carriage guiding groove-shaped guide rails 8 consisting of a pair of left and right rail members in which four vertical axis rollers 3a through 3d arranged in series fit with play remaining are laid. The four

vertical axis rollers 3d through 3d arranged in series are disposed at positions near both front and rear ends and two intermediate positions of the conveyance carriage 1 on an imaginary straight line in the front and rear direction (traveling direction) adjacent to the inner side of left or right wheels 2. The traveling drive method for this conveyance carriage 1 is not especially limited, and for example, as shown by the imaginary lines in Fig. 1 and Fig. 3A, a frictional driving method can be used in which a frictional drive means 12 consisting of a frictional driving roller 9 and a backup roller 10 which sandwich the parallel left and right side surfaces 1a and 1b of the conveyance carriage 1 and a motor 11 which drives and rotates the frictional driving roller 9 is provided at positions at appropriate intervals on the conveyance path.

In the conveyance path of the conveyance carriage 1, an aisle 13 is provided on the floor surface to cross the conveyance path. On this aisle crossing section 14 in the conveyance path, the guide rails 7a and 7b and the conveyance carriage guide rails 8 are not laid. The width of the crossing aisle 13 is shorter than the distance between two vertical axis rollers 3a and 3d on both ends among the four vertical axis rollers 3a through 3d arranged in series but are longer than the distance between the two middle vertical axis rollers 3b and 3c so that, when the conveyance carriage 1 passes through the aisle crossing section 14, fitting with play remaining of only one vertical axis roller

3a at the front end or one vertical axis roller 3d at the rear
end among the four vertical axis rollers 3a through 3d arranged
in series in the conveyance carriage guiding groove-shaped guide
rails 8 is prevented, that is, at least two vertical axis rollers
5 among the four vertical axis rollers 3a through 3d in series always
fit with play remaining in either one of the conveyance carriage
guiding groove-shaped guide rails 8 before and after the aisle
crossing section 14 or fit with play remaining across both
conveyance carriage guiding groove-shaped guide rails 8 before
10 and after the aisle crossing section 14.

At the aisle crossing section 14 in the conveyance path
of the conveyance carriage 1, a pit 15 is provided by digging
down into the floor surface 6, and inside this pit 15, elevating
guide rails 16a and 16b which connect the guide rails 7a and 7b
15 before and after the aisle crossing section 14 are provided. These
elevating guide rails 16a and 16b are constructed so as to freely
move vertically parallel between a raised level at which they
connect the guide rails 7a and 7b and a lowered level at which
the upper surfaces of the elevating guide rails 16a and 16b are
20 flush with the floor surface 6 as shown in Fig. 2A, Fig. 3B, and
Fig. 3C. Over the pit 15, a floor member 18 flush with the floor
surface 6 is laid via a mount (not shown) while leaving apertures
17 in which the elevating guide rails 16a and 16b move vertically.

Hereinafter, an embodiment of the elevating drive device
25 of the elevating guide rail 16a, 16b will be described with

reference to Fig. 4 through Fig. 13. The elevating drive device 19A of the elevating guide rail 16a and the elevating drive device 19B of the elevating guide rail 16b have the same structure, and Fig. 5 through Fig. 13 show the elevating drive device 19B of the elevating guide rail 16b. These elevating drive devices 19A and 19B include drive means 21 and elevating support means 20A and 20B disposed at two positions near both longitudinal ends of the elevating guide rails 16a and 16b. The elevating support means 20A and 20B have the same structure, and each includes a plate-shaped movable body 22 disposed below the elevating guide rail 16a, 16b, a pair of left and right cam rails 23 provided on the plate-shaped movable body 22, and two front and rear pairs of left and right cam follower rollers 24 placed on the cam rails 23 so as to roll freely. As shown in Fig. 13 and Fig. 14, the plate-shaped movable body 22 is supported on the pair of left and right slide guide rails 26 on a substrate 25 laid on the bottom surface of the pit 15, movably in the longitudinal direction of the elevating guide rail 16a, 16b via slide blocks 27, and the pair of left and right cam rails 23 are disposed parallel to the elevating guide rail 16a, 16b on both left and right sides of the elevating guide rail 16a, 16b, and the pair of left and right cam follower rollers 24 are axially supported by a common support shaft 29 in a horizontal posture on both left and right sides of the bearing member 28 provided below the elevating guide rail 16a, 16b.

On the outer sides of the pair of left and right cam follower rollers 24, elevating guide rollers 30 are axially supported concentrically by using the common support shaft 29 axially supporting the cam follower rollers 24, and a pair of left and right elevating guide members 32 having vertical slots 31 in which the elevating guide rollers 30 fit with play remaining so as to roll and move vertically are attached onto the substrate 25 parallel to the elevating guide rail 16a, 16b on the outer sides of the pair of left and right cam rails 23.

Parallel to the respective elevating support means 20A and 20B, elevating guide units 33 are provided. As shown in Fig. 14 and Fig. 15, these elevating guide units 33 include slip members 35 attached to both left and right sides of the elevating guide rail 16a, 16b via an attaching member attached to the lower side of the elevating guide rail 16a, 16b, and a pair of left and right slide guide plates 36 attached onto the substrate 25 so as to sandwich movably vertically the elevating guide rail 16a, 16b via the pair of left and right slip members 35.

The drive means 21 consists of, as shown in Fig. 4, a cylinder unit 37 which is interposed between the plate-shaped movable body 22 and the substrate 25 of one elevating support means 20A and reciprocates the plate-shaped movable body 22 of the elevating support means 20A, and a joint rod 38 which interlocks and joins the plate-shaped movable body 22 of the elevating support means 20A and the plate-shaped movable body 22 of the other elevating

support means 20B.

As shown in Fig. 4, the elevating support means 20A and 20B of one elevating drive device 19B are provided with carriage stoppers 39a and 39b parallel. In each elevating drive device 5 19A, 19B, as shown in Fig. 8 through Fig. 11, mounts 40a and 40b for supporting the ends of the guide rails 7a and 7b adjacent to the elevating guide rails 16a and 16b are stood on the substrates 25, and the carriage stoppers 39a and 39b are axially supported on bearing members 41 attached to the mounts 40a and 40b by support 10 shafts 42 in left and right horizontal postures, and are constructed so as to swing vertically only between a standup working posture (see Fig. 10, Fig. 11, and Fig. 15) in contact with the vertical axis roller 3a (or 3d) moving within the conveyance carriage guiding groove-shaped guide rails 8 parallel 15 to the guide rail 7b and a fallen-down nonworking posture that is fallen in a direction apart from the aisle crossing section 14 with respect to the standup working posture and allows the vertical axis rollers 3a through 3d to pass through (see Fig. 8, Fig. 9, and Fig. 14), and are urged into the standup working 20 posture by gravity or a spring force. Further, as shown in Fig. 14 and Fig. 15, parallel to these carriage stoppers 39a and 39b, switching means 46 is provided. This switching means 46 consists of a cam follower roller 44 axially supported on the carriage stopper 39a, 39b via a projecting support shaft 43 in a left and 25 right horizontal posture projecting to the side of the elevating

guide rail 16b from the carriage stopper 39a, 39b, and an operating plate 45 which is attached to the side surface of the elevating guide rail 16a, 16b so as to switch the carriage stopper 39a, 39b from the standup working posture into the fallen-down nonworking posture via the cam follower roller 44 when the elevating guide rail 16b rises to the raised level.

In the above-described construction, the elevating guide rails 16a and 16b are prevented from falling in the left and right lateral direction by sandwiching the portions near both ends in the longitudinal direction by elevating guide units 33, and are prevented from moving in the longitudinal direction and are allowed to move only vertically by fitting, with play remaining, the elevating guide rollers 30 in slots 31 of the elevating guide members 32 of the elevating support means 20A and 20B. The cam rails 23 are formed so that the elevating guide rails 16a and 16b supported by the cam rails 23 move vertically parallel via the cam follower rollers 24 while maintaining their horizontal postures by actuating the cylinder units 37 of the drive means 21 of the elevating drive devices 19A and 19B and moving forward and rearward the cam rails 23 of both front and rear elevating support means 20A and 20B synchronously via the plate-shaped movable bodies 22. Specifically, the cam rail 23 is provided with a low-level horizontal support surface and a high level horizontal support surface for selectively supporting the cam follower roller 24, and according to the movements of the cam

rails 23 of both front and rear elevating support means 20A and 20B, the cam follower rollers 24 on the sides of the elevating guide rails 16a and 16b shift from one to the other of the low-level horizontal support surfaces and the high-level horizontal support surfaces of the cam rails 23 simultaneously.

Hereinafter, a usage will be described. Until the conveyance carriage 1 traveling on the conveyance path approaches the aisle crossing section 14, the elevating guide rails 16a and 16b are lowered to the lowered level as shown in Fig. 2B, Fig. 3C, Fig. 7B, Fig. 10, Fig. 11, Fig. 13, and Fig. 15. Specifically, the cam rails 23 of both front and rear elevating support means 20A and 20B of the elevating drive devices 19A and 19B are slid to the downstream side of the aisle crossing section 14 by the drive means 21 (cylinder units 37) and switched into a state that the low-level horizontal support surfaces of the cam rails 23 support the cam follower rollers 24. As a result, the elevating guide rails 16a and 16b lower from the raised level to the lowered level, and the upper surfaces of the elevating guide rails 16a and 16b become flush with the surface of the floor member 18 covering the pit 15, that is, the floor surface 6. In this state, the upper surface of the aisle crossing section 14 becomes a flat surface flush with the floor surface 6 of the crossing aisle 13, so that a handcart, etc., can be safely and smoothly moved on the crossing aisle 13.

In the state that the elevating guide rails 16a and 16b

are switched to the lowered level as described above, as shown in Fig. 10, Fig. 11, and Fig. 15, the operating plates 45 of the switching means 46 of the carriage stoppers 39a and 39b are lowered together with the elevating guide rails 16a and 16b and spaced downward from the cam follower rollers 44 of the carriage stoppers 39a and 39b, so that these carriage stoppers 39a and 39b are switched into a standup working posture by the urging force. Therefore, even if the conveyance carriage 1 is made to enter the aisle crossing section 14 by mistake in the state that the elevating guide rails 16a and 16b are lowered to the lowered level as described above, the forefront vertical axis roller 3a among the vertical axis rollers 3a through 3d of the conveyance carriage 1 is received by the carriage stopper 39a, 39b entering inside the terminal end of the conveyance carriage guiding groove-shaped guide rail 8 and the conveyance carriage 1 is prevented from entering the aisle crossing section 14. When the traveling direction of the conveyance carriage 1 is limited to one direction, only the carriage stopper 39a on the upstream side of the aisle crossing section 14 may be provided.

When the conveyance carriage 1 traveling reaches a point at a predetermined distance to the aisle crossing section 14, the drive means 21 (cylinder units 37) of the elevating drive devices 19A and 19B is actuated to slide the cam rails 23 to the upstream side of the aisle crossing section 14 as shown in Fig. 2A, Fig. 3B, Fig. 4 through Fig. 6, Fig. 7A, Fig. 8, Fig. 9, Fig.

12, and Fig. 14 via the plate-shaped movable bodies 22 of both front and rear elevating support means 20A and 20B, whereby the elevating guide rails 16a and 16b are raised to the raised level from the lowered level. Specifically, switching is made into
5 a state that the low-level horizontal support surfaces of the cam rails 23 of both front and rear elevating support means 20A and 20B support the cam follower rollers 24. As a result, the elevating guide rails 16a and 16b raised from the apertures 17 of the floor member 18 covering the pit 15 connect the guide rails
10 7a and 7b before and after the aisle crossing section 14 at the same level, and simultaneously, as shown in Fig. 8, Fig. 9, and Fig. 14, the operating plates 45 of the switching means 46 of the carriage stoppers 39a and 39b rise together with the elevating guide rails 16a and 16b and push up the cam follower rollers 44
15 of the carriage stoppers 39a and 39b, so that the carriage stoppers 39a and 39b are switched into a fallen-down nonworking posture and withdraw downward from the movement path of the vertical axis rollers 3a through 3d of the conveyance carriage 1. Therefore, the wheels 2 of the conveyance carriage 1 roll and move to the
20 guide rails 7a and 7b on the downstream side of the aisle crossing section 14 through the elevating guide rails 16a and 16b at the raised level from the guide rails 7a and 7b on the upstream side of the aisle crossing section 14, and accordingly, the conveyance carriage 1 can pass through the aisle crossing section 14 without
25 problems. At this time, as described above, at least two vertical

axis rollers among the four vertical axis rollers 3a through 3d
of the conveyance carriage 1 always fits, with play remaining,
in the conveyance carriage guiding groove-shaped guide rails 8
before and after the aisle crossing section 14 when moving, so
5 that the conveyance carriage 1 passing through the aisle crossing
section 14 reliably travels straight, and there is no possibility
that the orientation of the conveyance carriage 1 unexpectedly
changes during passing through the aisle crossing section 14 and
the wheels 2 come out of and fall off the elevating guide rails
10 16a and 16b and the guide rails 7a and 7b on the downstream side
of the aisle crossing section 14 and the vertical axis rollers
3a through 3d do not fit in the conveyance carriage guiding
groove-shaped guide rail 8 on the downstream side of the aisle
crossing section 14 and come out of it.

15 When the conveyance carriage 1 is a type that is propelled
by the frictional driving means 12, as shown by the imaginary
lines in Fig. 1, the frictional drive means 12 is disposed front
and rear adjacent to the aisle crossing section 14 so that the
conveyance carriage 1 to be sent into the aisle crossing section
20 14 by the frictional drive means 12 on the upstream side of the
aisle crossing section 14 is propelled successively by the
frictional drive means 12 on the downstream side of the aisle
crossing section 14 before separating from the frictional drive
means 12 on the upstream side. Before the aisle crossing section
25 14, by providing the frictional drive means 12 which can

temporarily stop the traveling conveyance carriage 1 and send
it out to the aisle crossing section 14 at an arbitrary timing,
the crossing aisle 13 can be used by temporarily stopping the
conveyance carriage 1 before the aisle crossing section 14 and
5 lowering the elevating guide rails 16a and 16b to the lowered
level only when a vehicle, etc., passes through the crossing aisle
13.

In the illustrated embodiment, a wide pit 15 covering the
entire aisle crossing section 14 is provided, however, it is also
10 allowed that two narrow and long pits for housing only the elevating
guide rails 16a and 16b and the elevating drive devices 19A and
19B separately are formed. It is also allowed that the cam follower
rollers 24 are axially supported on the plate-shaped movable
bodies 22 and the cam rails 23 are laid below the elevating guide
15 rails 16a and 16b.

[Industrial Applicability]

The carriage-type conveyance system according to the
present invention can be used as a car body conveyance system
in a car assembly line for attaching various parts to a car body
20 while conveying the car body.

WHAT IS CLAIMED IS:

1. A carriage-type conveyance system using a conveyance path formed by guide rails (7a and 7b) laid on a floor surface and a conveyance carriage (1) which travels on the guide rails (7a and 7b), and is provided with an aisle crossing section (14) which an aisle (13) on the floor surface crosses in the conveyance path, comprising: a pit (15); elevating guide rails (16a and 16b), and elevating drive devices (19A and 19B), wherein

the pit (15) is formed by digging down into the floor surface (6) of the aisle crossing section (14) and is covered by a floor member (18) laid to be flush with the floor surface (6),

the elevating guide rails (16a and 16b) are disposed inside the pit (15) movably vertically parallel between a raised level at which they connect the guide rails (7a and 7b) before and after the pit (15) and a lowered level at which their upper surfaces are flush with the floor surface (6), and

the elevating drive devices (19A and 19B) elevate the elevating guide rails (16a and 16b) between the raised level and the lowered level, where

elevating apertures (17) for the elevating guide rails (16a and 16b) are made in the floor member (18).

2. The carriage-type conveyance system according to Claim 1, wherein

the conveyance carriage (1) is provided with at least four guided portions (3a through 3d) at appropriate intervals in the

traveling direction,

on the conveyance paths before and after the aisle crossing section (14), conveyance carriage guide rails (8) which engage with the guided portions (3a through 3d) are laid so that

5 at least two of the guided portions (3a through 3d) always engage with the conveyance carriage guide rails (8) when the conveyance carriage (1) passes through the aisle crossing section (14).

3. The carriage-type conveyance system according to Claim 1,
10 wherein

in the conveyance path, a carriage stopper (39a) and a switching means (46) are provided parallel, where

the carriage stopper (39a) is provided on at least the upstream side of the conveyance carriage traveling direction
15 of the aisle crossing section (14), and is freely switched between a working posture in which the carriage stopper stops the conveyance carriage (1) before the elevating guide rail (16a, 16b) and a nonworking posture in which it allows the conveyance carriage (1) to pass through, and

20 the switching means (46) switches the carriage stopper (39a) into the working posture only when the elevating guide rail (16a, 16b) is at the lowered level in conjunction with the vertical movements of the elevating guide rail (16a, 16b).

4. The carriage-type conveyance system according to Claim 1,
25 wherein

the elevating drive devices (19A and 19B) are constituted by elevating support means (20A and 20B) and drive means (21), where

the elevating support means (20A and 20B) is disposed at least at two positions before and after the elevating guide rails (16a and 16b) in the longitudinal direction, and is constituted each by cam rails (23) provided on either a movable body (22) movable in the longitudinal direction of the corresponding elevating guide rail (16a, 16b) below the elevating guide rail (16a, 16b) or the elevating guide rail (16a, 16b), and a cam follower roller (24) provided on the other, and

the drive means (21) is constructed so as to reciprocate the movable bodies (22) of the elevating support means (20A and 20B) in conjunction with each other.

5. The carriage-type conveyance system according to Claim 4, wherein

the elevating guide rail (16a, 16b) is provided with an elevating guide unit (33) parallel, and

a pair of left and right cam follower rollers (24) are axially supported concentrically on both left and right sides of the elevating guide rail (16a, 16b), where

the elevating guide unit (33) is provided at least two positions before and after in the longitudinal direction of the elevating guide rail (16a, 16b), and has a pair of left and right slide guides (36) sandwiching the elevating guide rail (16a,

16b), and

each elevating support means (20A, 20B) is provided with elevating guide rollers (30) and elevating guide members (32), where

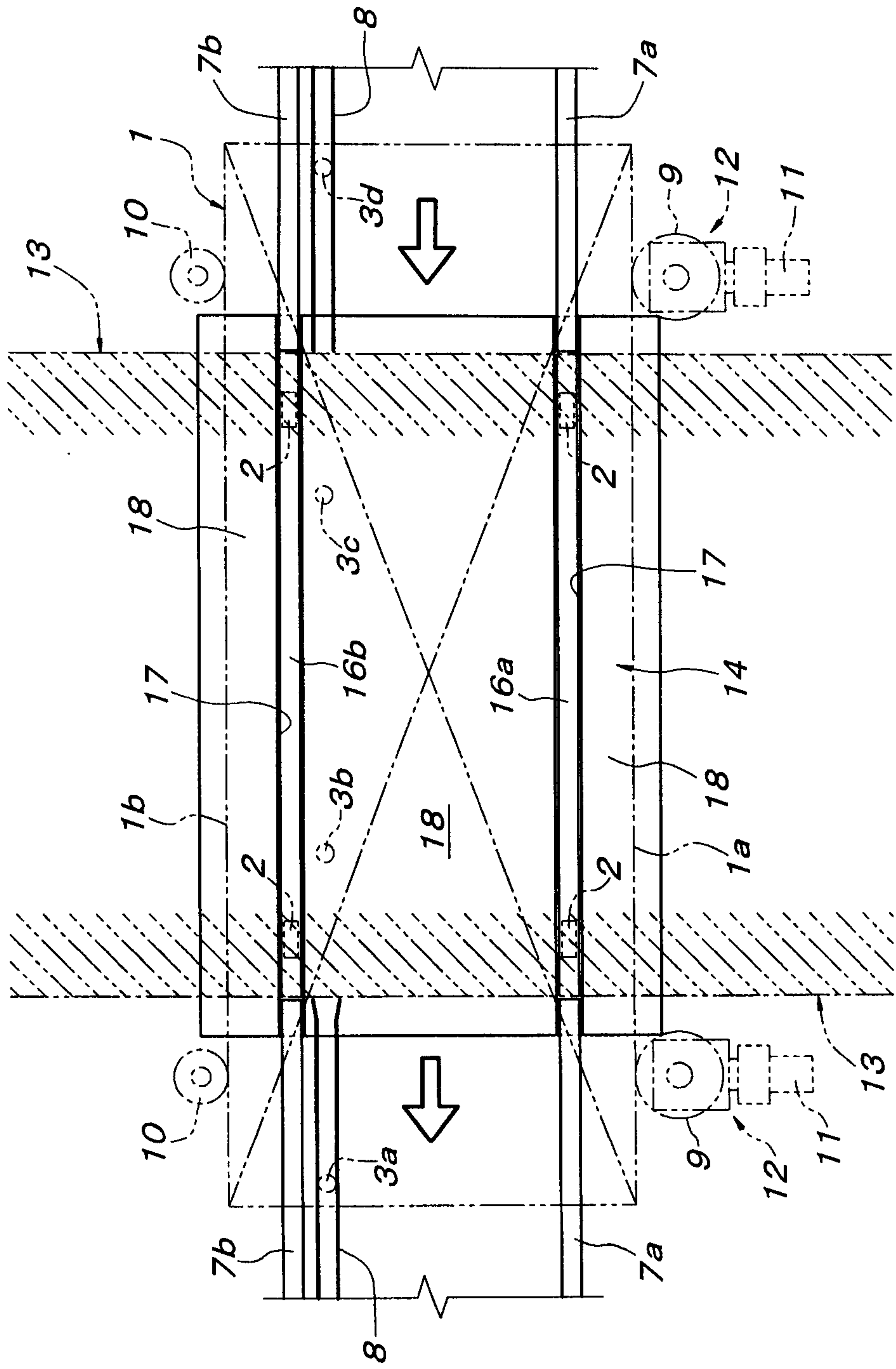
5 the pair of elevating guide rollers (30) are axially supported on the left and right concentrically with the cam follower rollers (24) on the outer sides of the pair of left and right cam follower rollers (24),

the pair of left and right elevating guide members
10 (32) are provided parallel so that the pair of left and right guide rollers (30) engage with these movably vertically, and

the movable body (22) is disposed between the pair of left and right elevating guide members (32), and

on the movable body (22), a pair of left and right
15 cam rails (23) which support the pair of left and right cam follower rollers (24), respectively, are laid.

FIG. 1



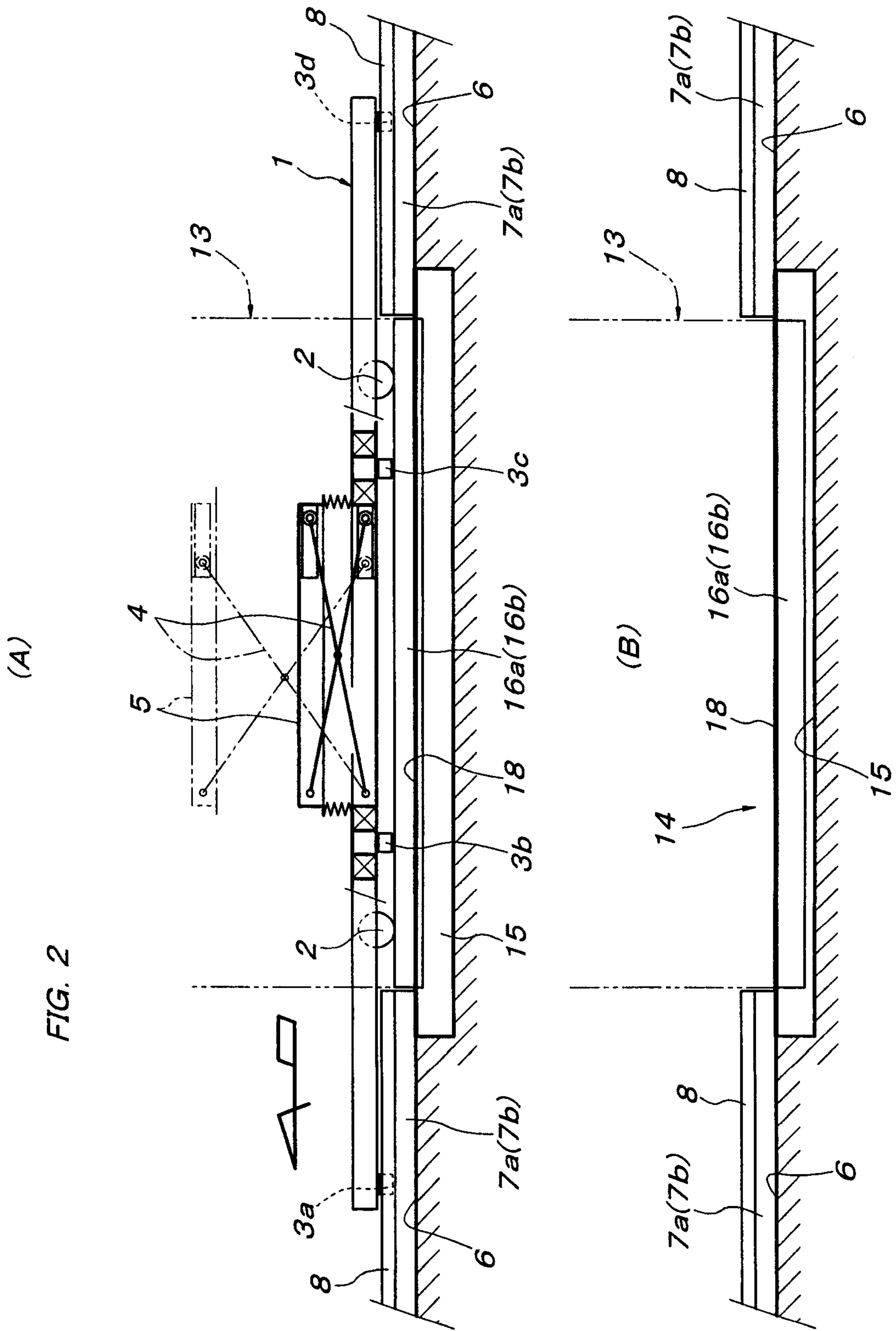


FIG. 3

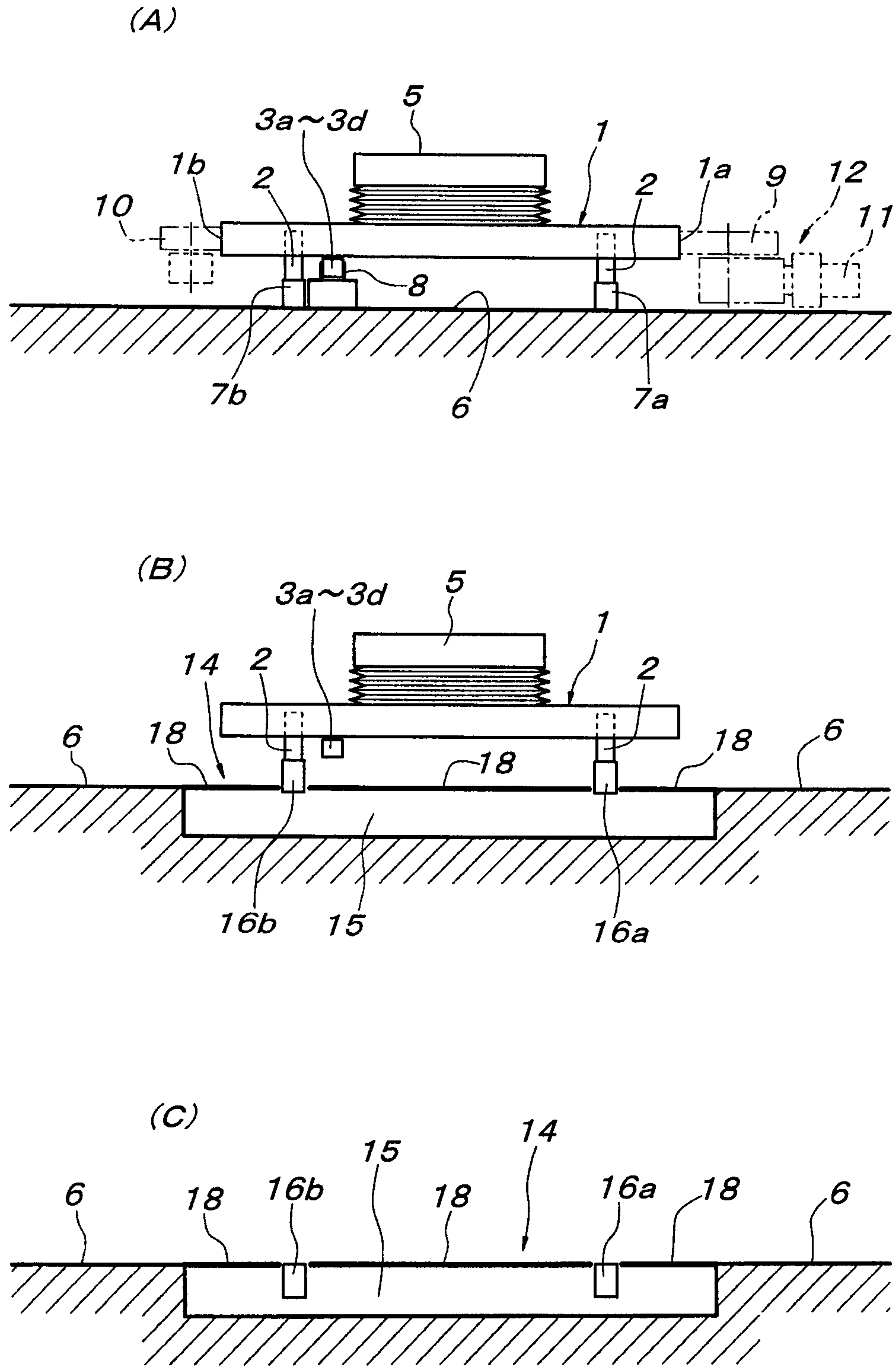


FIG. 4

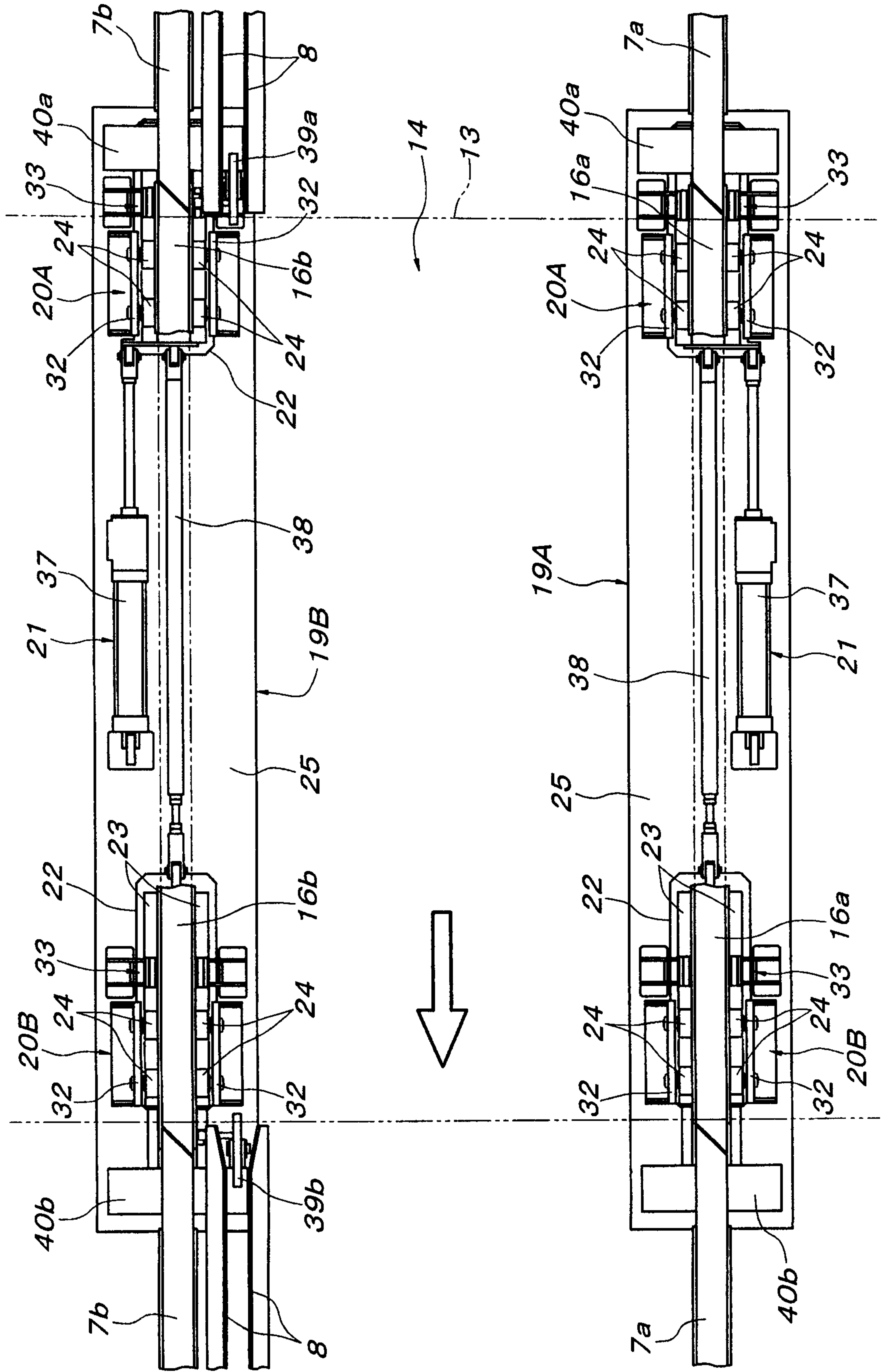


FIG. 5

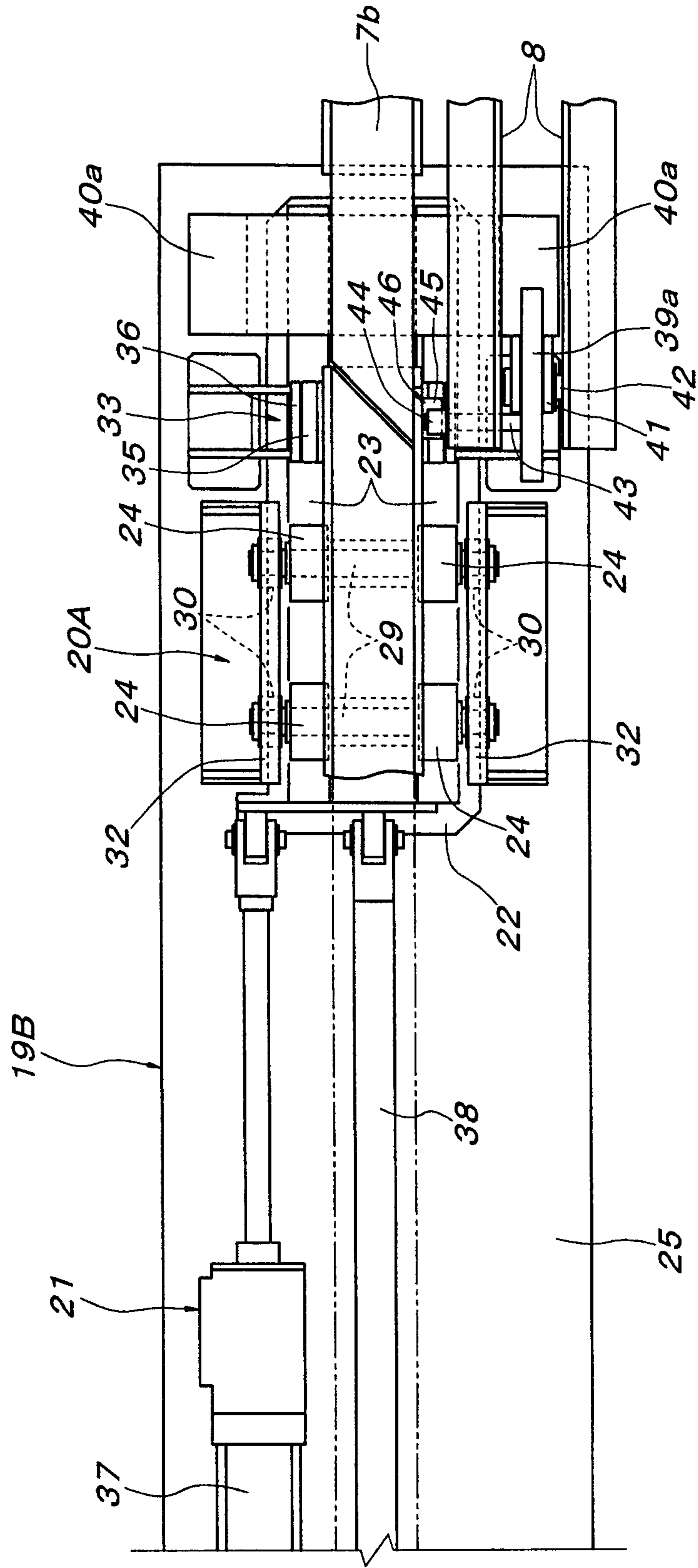


FIG. 6

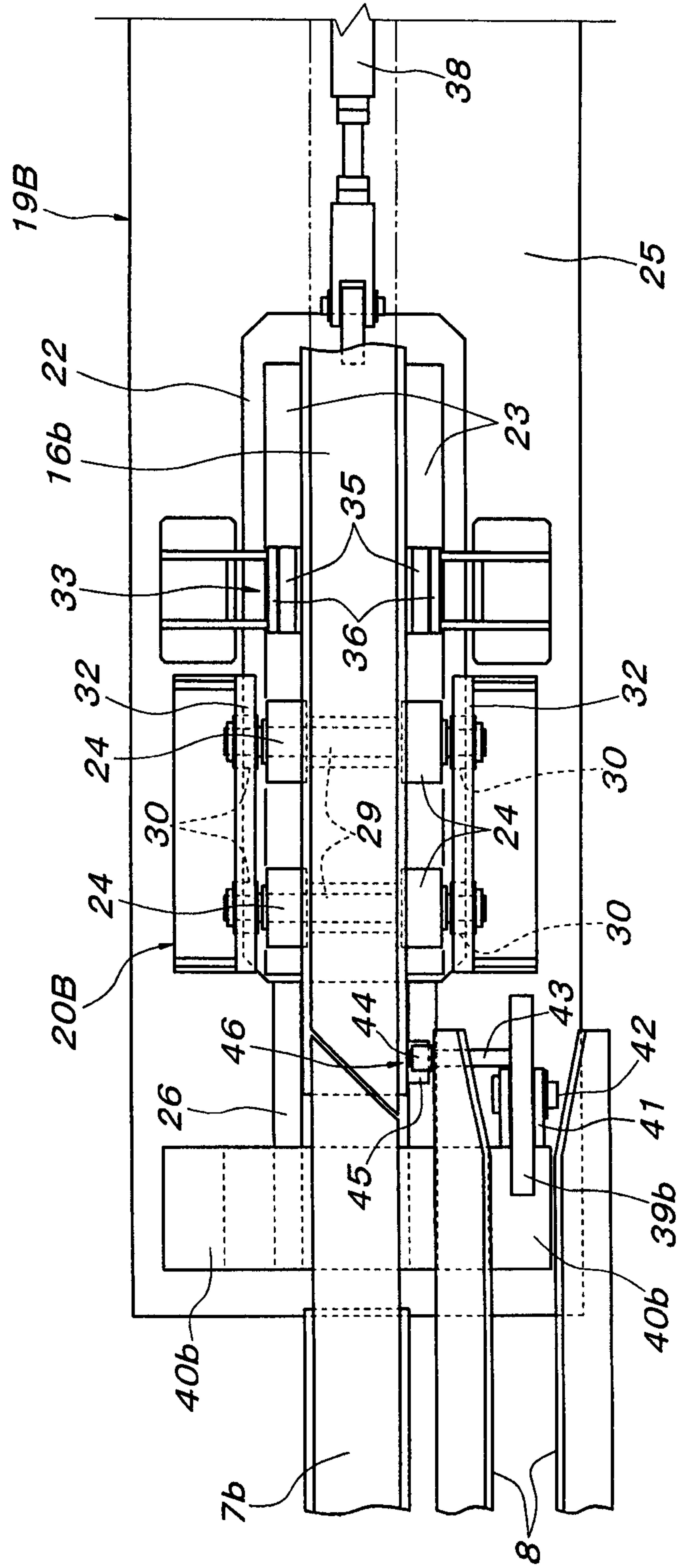
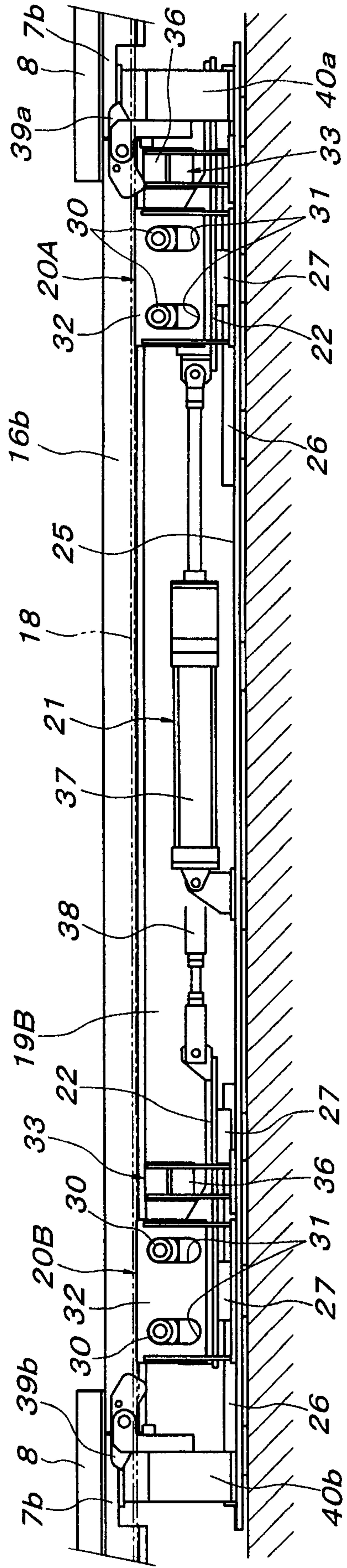


FIG. 7 (A)



(B)

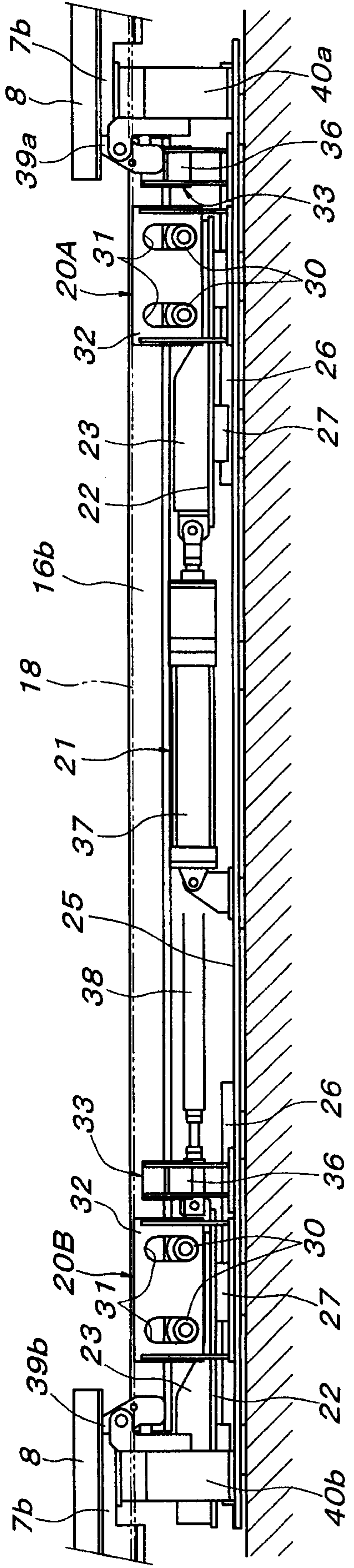


FIG. 8

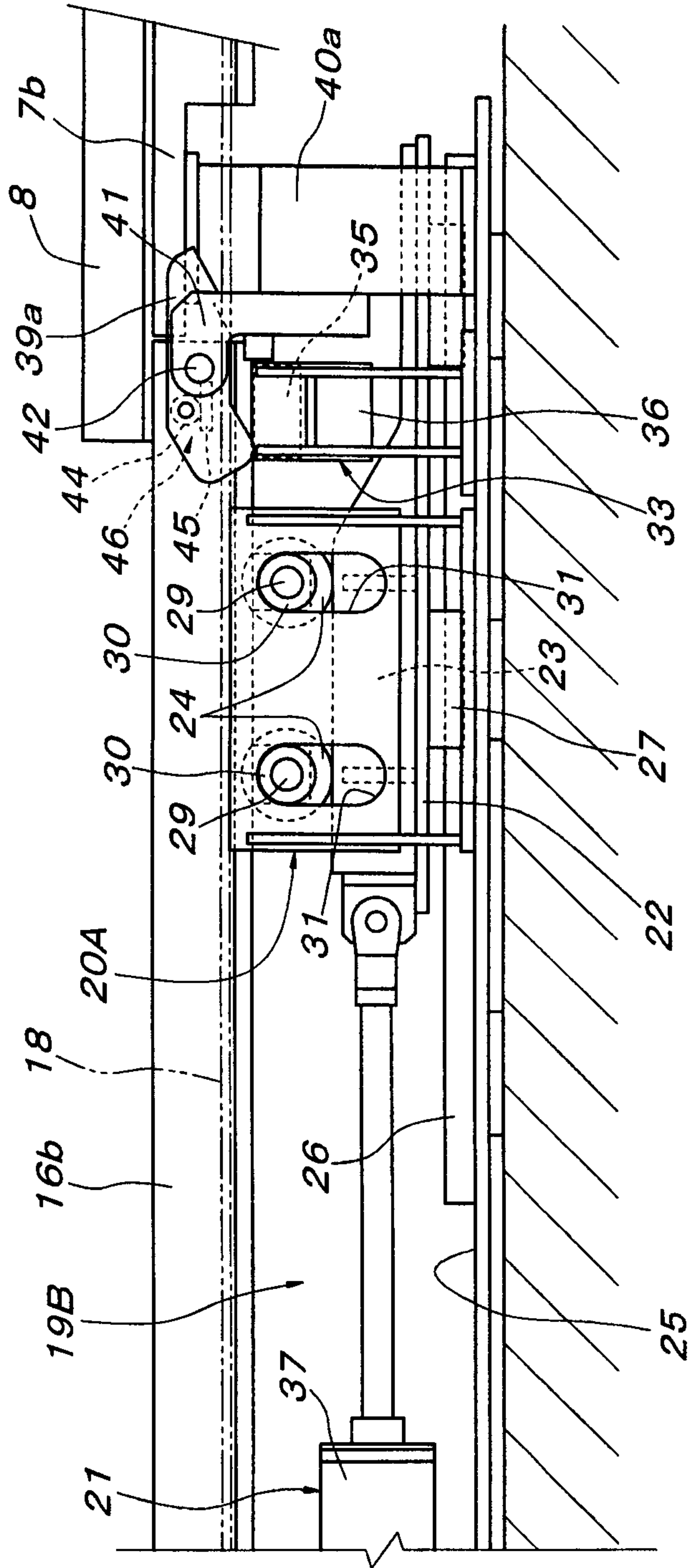


FIG. 9

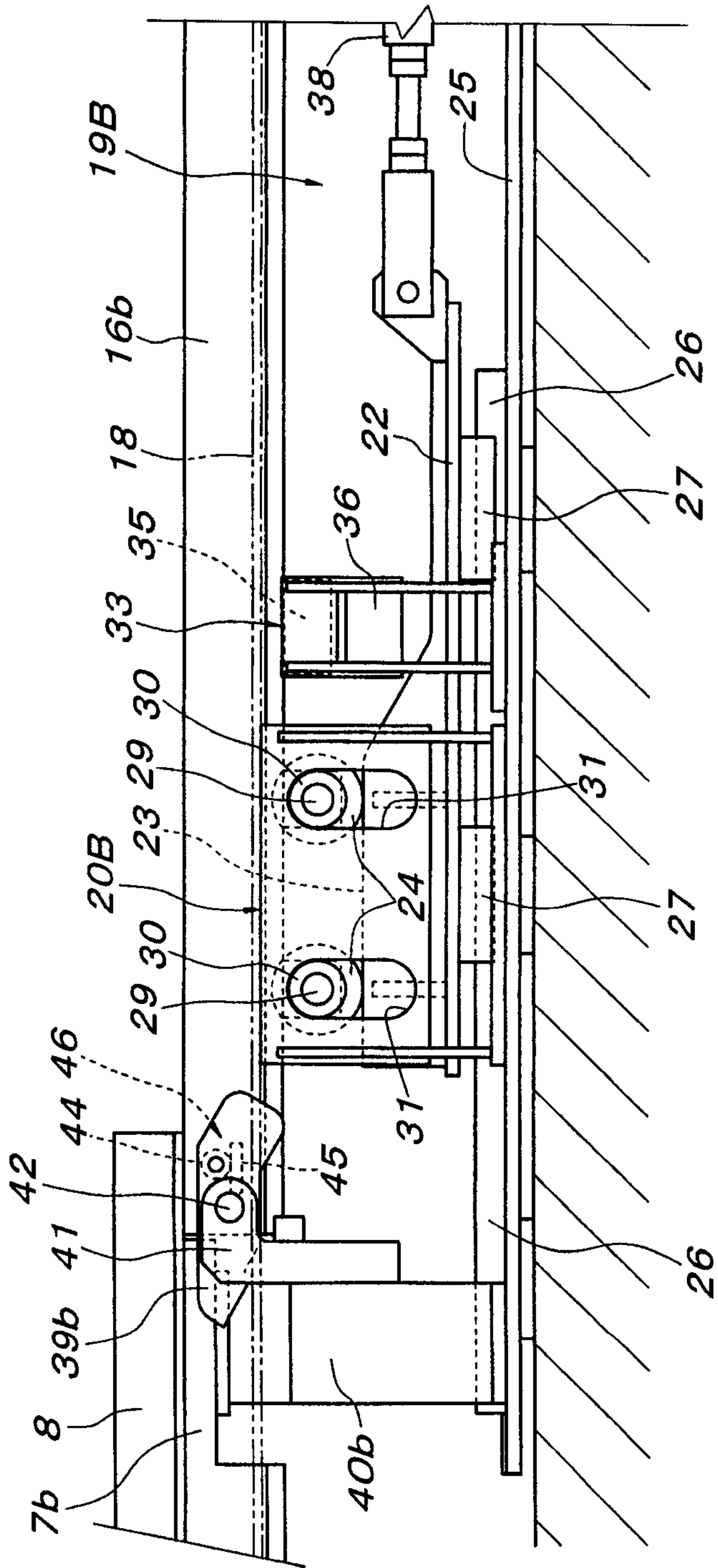


FIG. 10

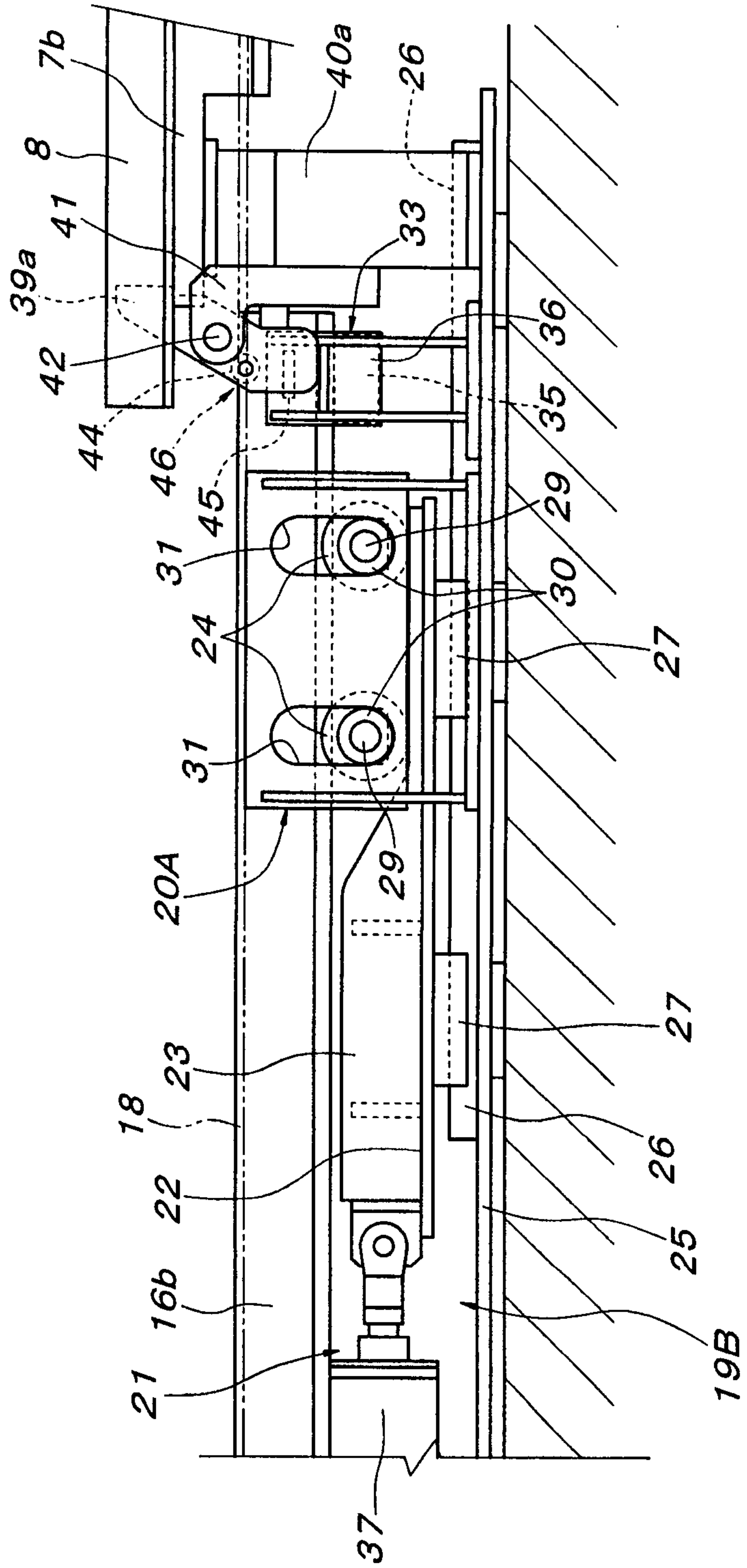


FIG. 11

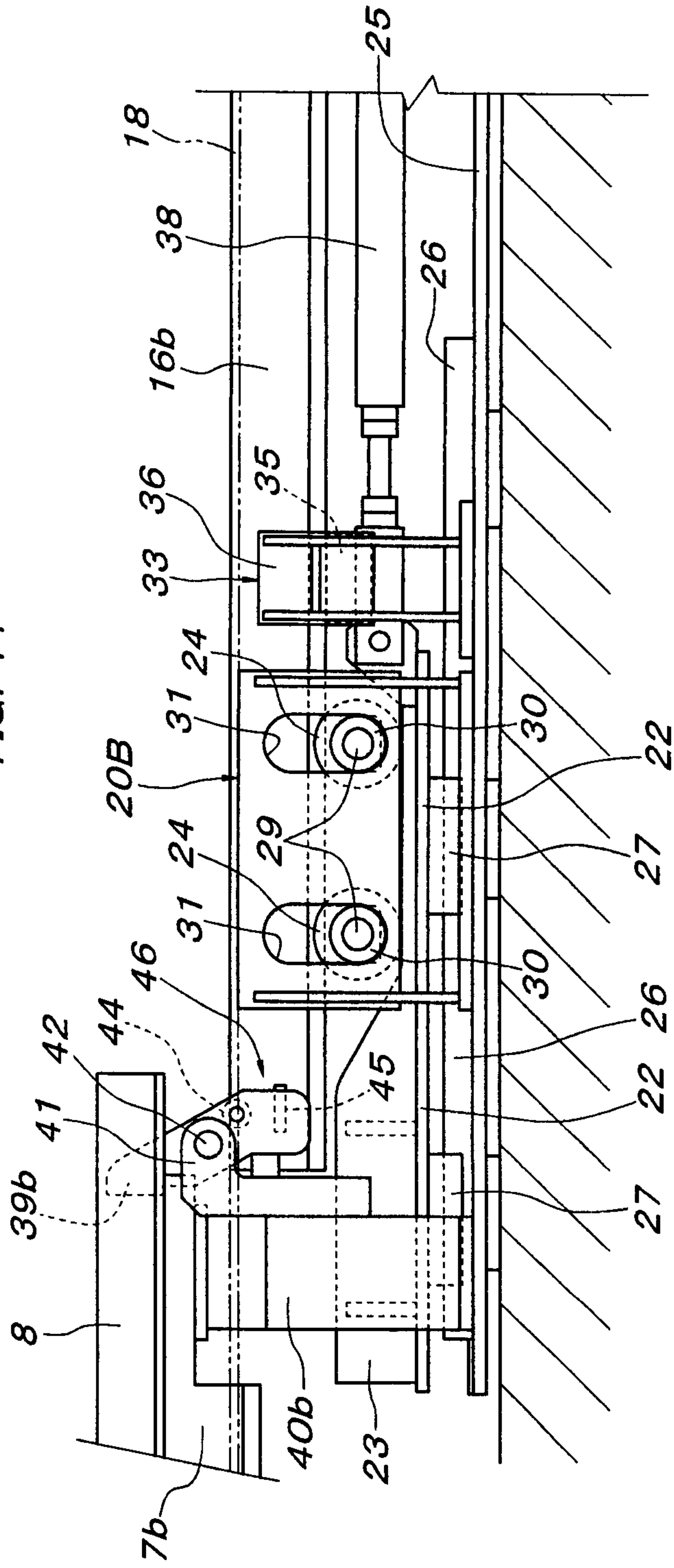


FIG. 12

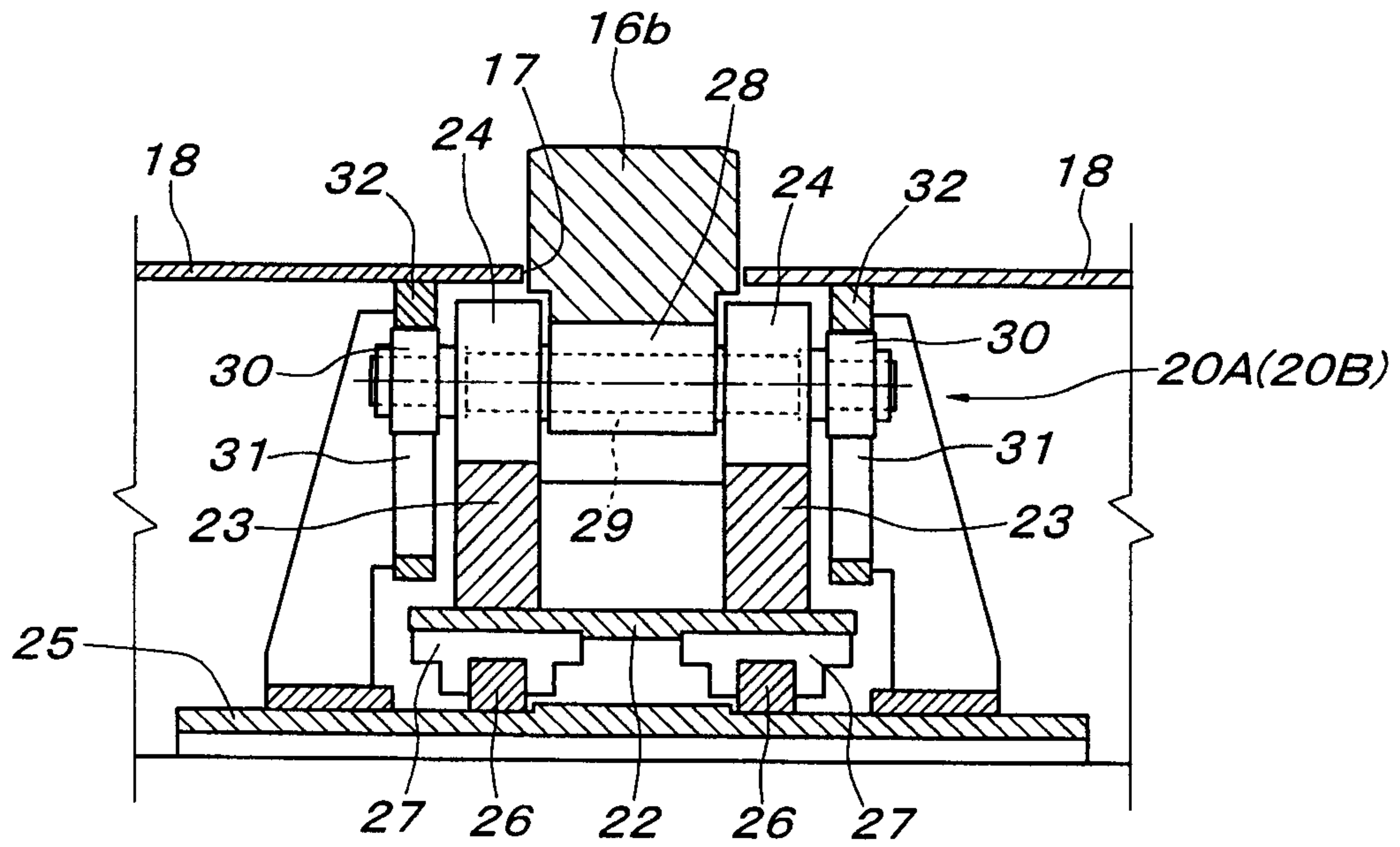


FIG. 13

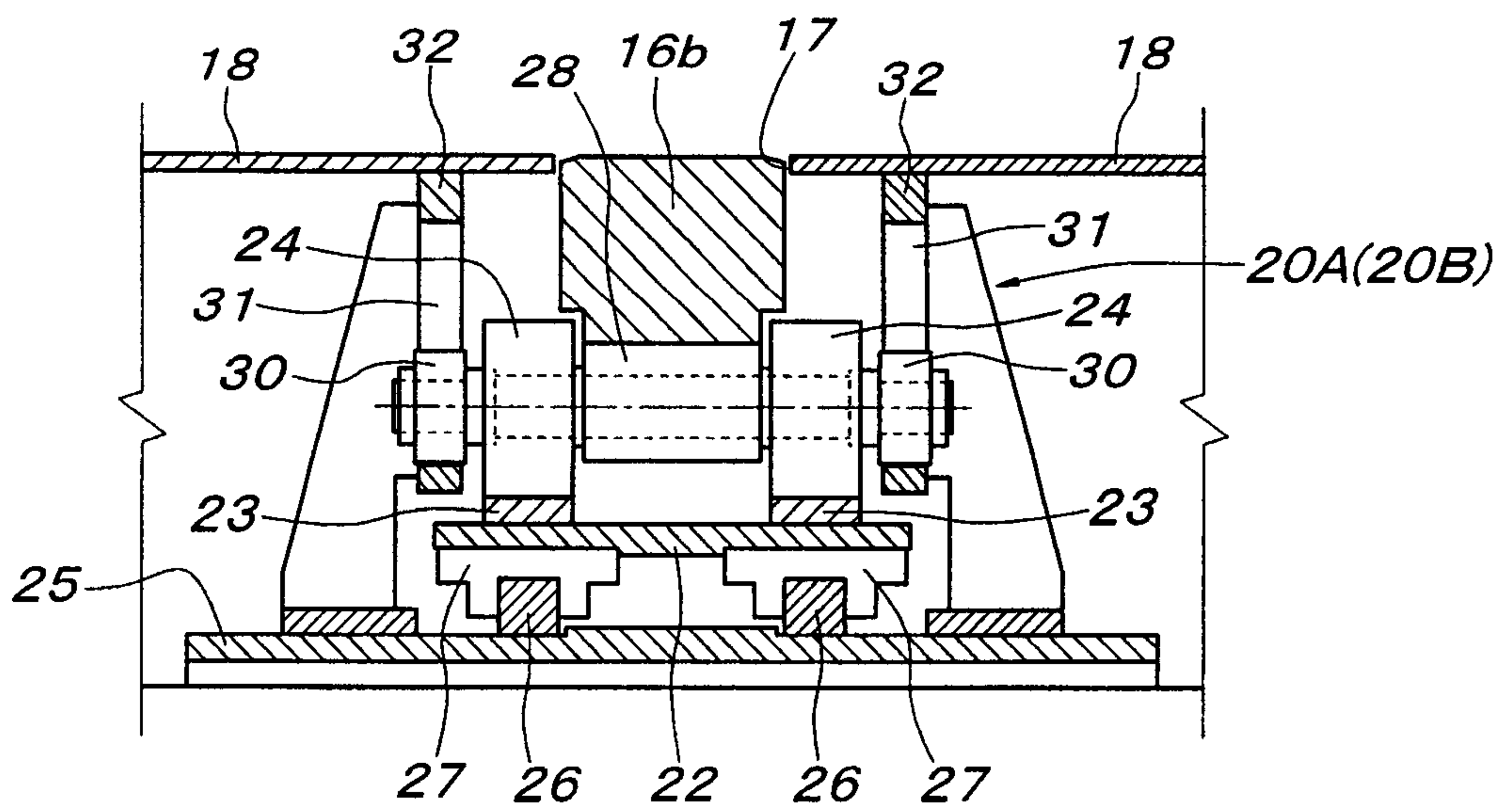


FIG. 14

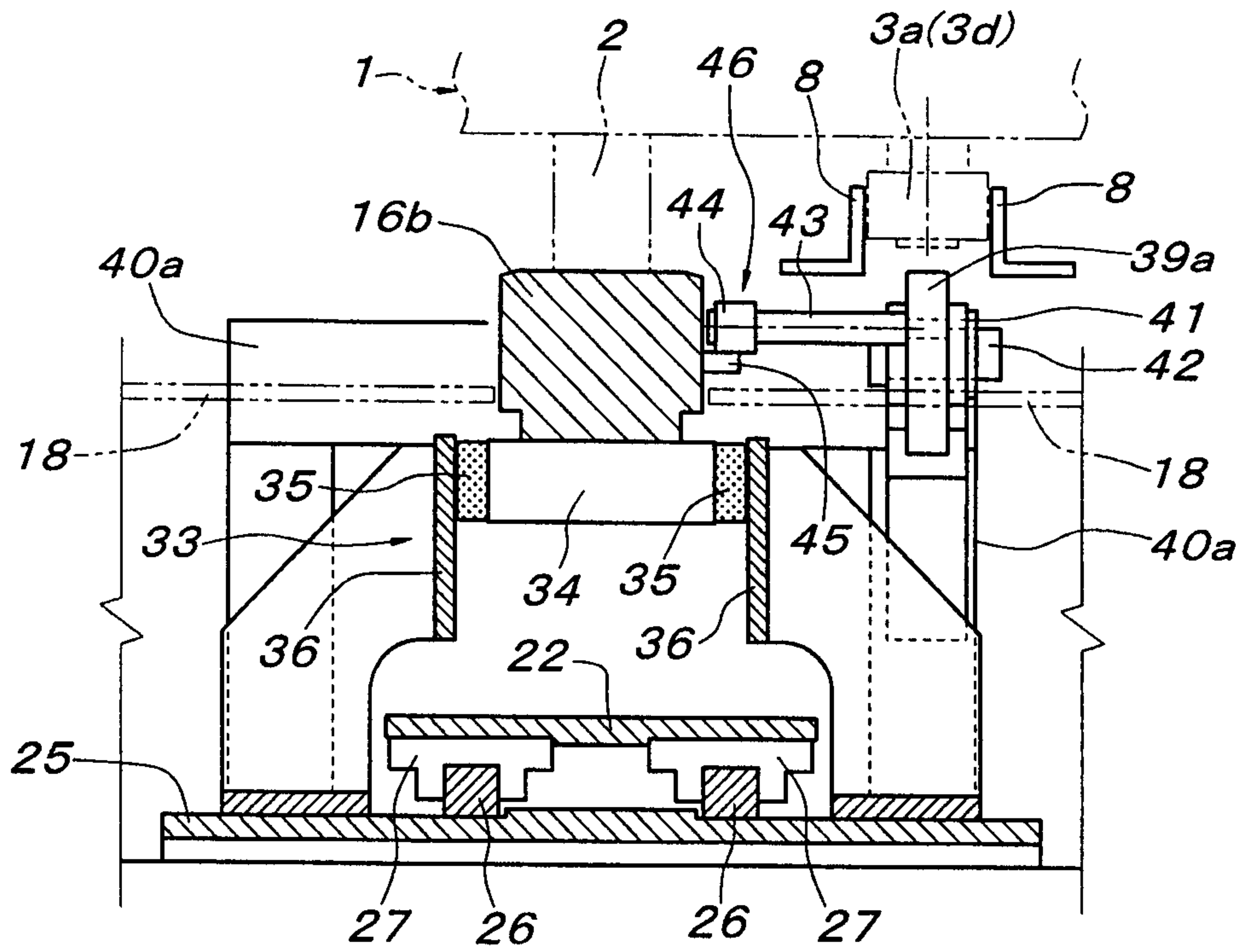
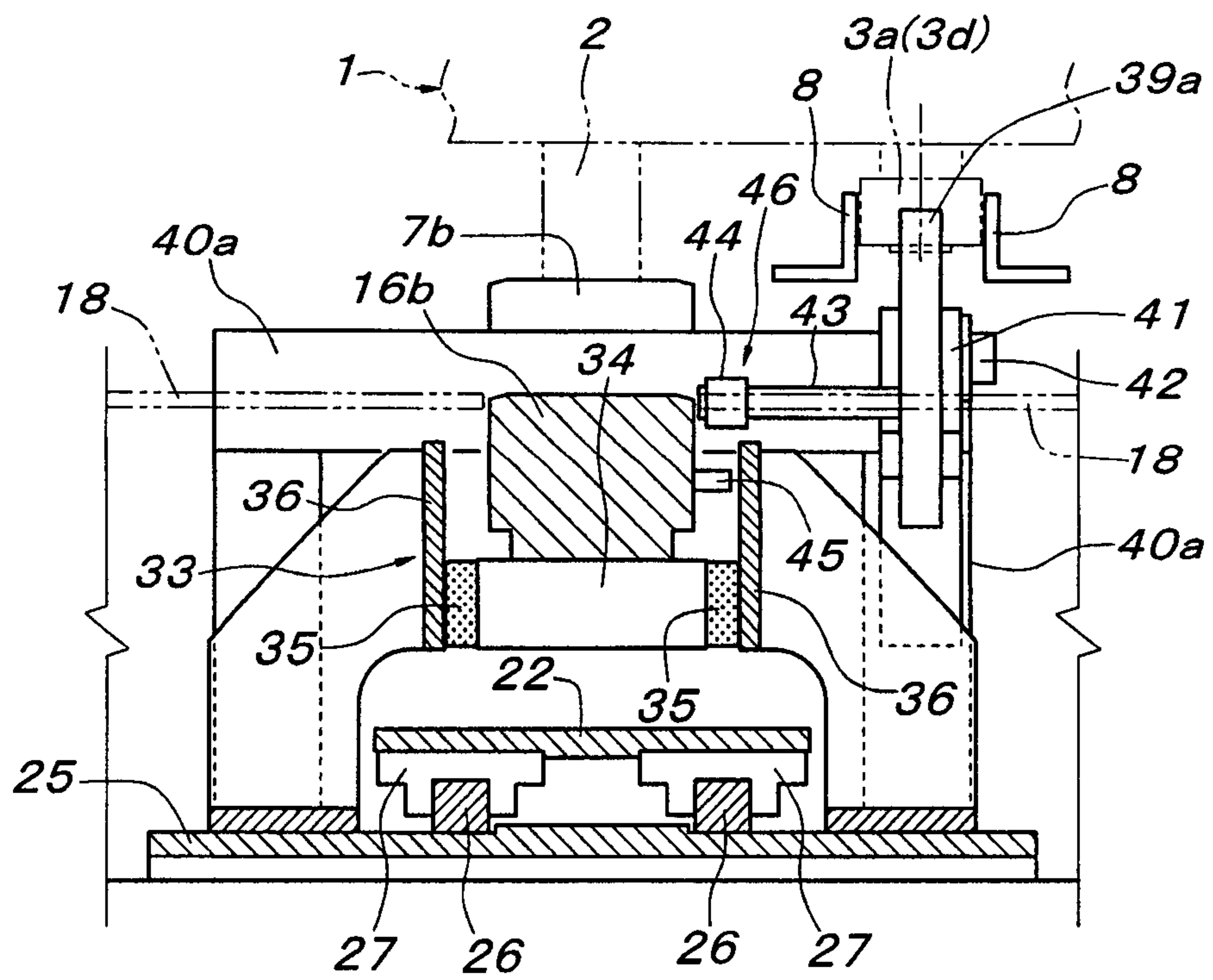
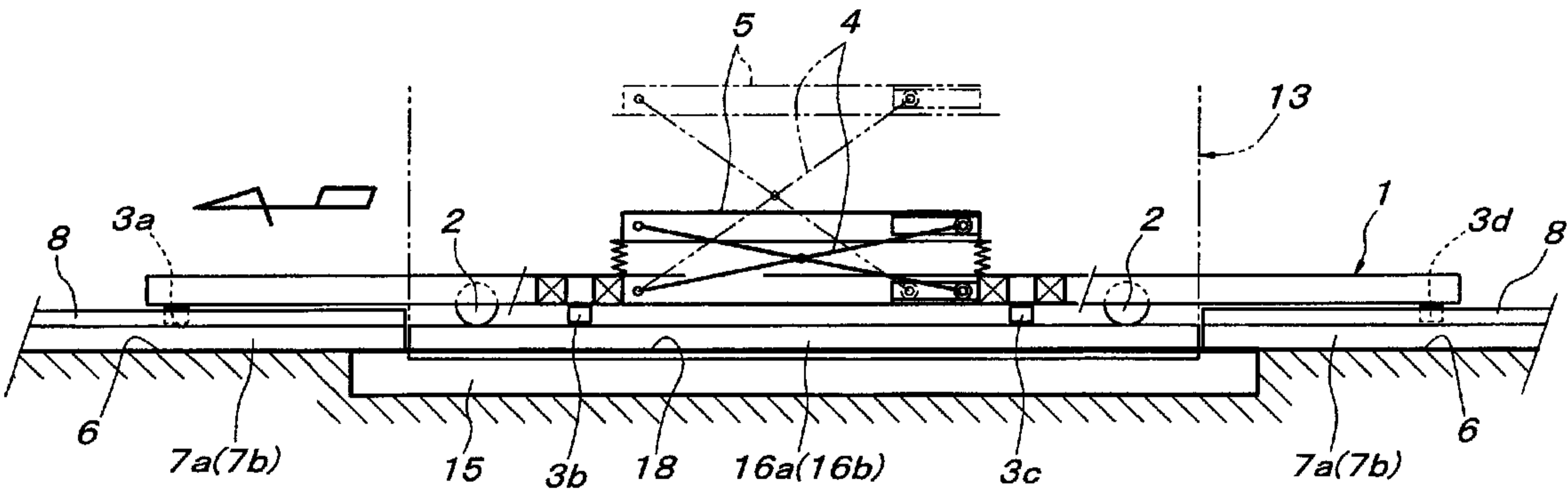


FIG. 15



(A)

FIG. 2



(B)

