



(12)

EUROPEAN PATENT APPLICATION

(43)

Date of publication:
19.08.2020 Bulletin 2020/34

(51)

Int Cl.:
B41J 29/02 (2006.01)
B41J 11/00 (2006.01)

(21)

Application number: 19214417.8

(22)

Date of filing: 09.12.2019

(84)

Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
 Designated Extension States:
BA ME
 Designated Validation States:
KH MA MD TN

(71)

Applicant: **KONICA MINOLTA, INC.**
Tokyo
100-7015 (JP)

(72)

Inventor: **SOUDA, Shou**
Tokyo, Tokyo 100-7015 (JP)

(74)

Representative: **Higgs, Jonathan**
Urquhart-Dykes & Lord LLP
Altius House
1 North Fourth Street
Milton Keynes MK9 1DG (GB)

(30)

Priority: **18.02.2019 JP 2019026362**

(54)

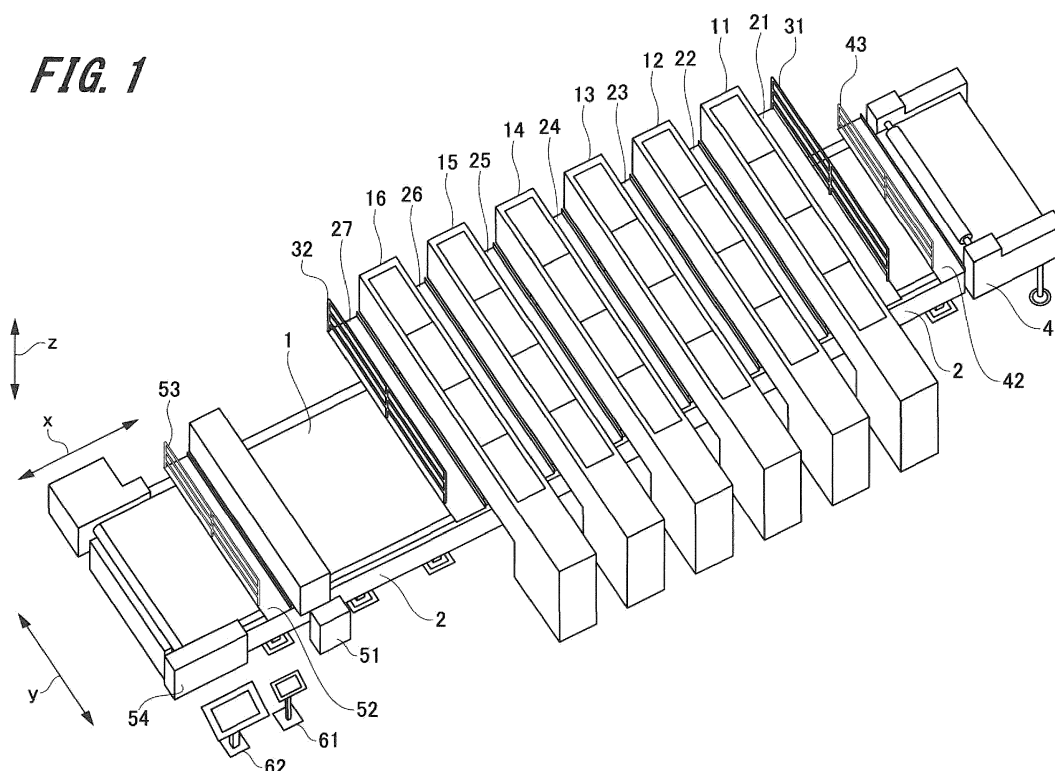
PRINTER

(57)

In a large printer including a work platform, the state of printing to a medium is preferably inspected without being interfered by the work platform. The printer includes a print unit 11 that performs a printing process to a medium 1, a conveying portion 2 that conveys the me-

dium 1 so that the medium 1 passes through the print unit 11, and a work platform 21 disposed adjacent to the print unit 11 and above the conveying portion 2. Here, the work platform 21 is provided with an opening and closing mechanism, and can be opened and closed.

FIG. 1



Description

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] The entire disclosure of Japanese Patent Application No. 2019-26362, filed on Feb. 18, 2019, is incorporated herein by reference in its entirety.

BACKGROUND

Technological Field

[0002] The present invention relates to a printer. More specifically, the present invention relates to a technology applied to a large printer including a work platform for maintenance and inspection.

Description of the Related art

[0003] Various large industrial printers that enable printing on very large media having a lateral width of several meters (cloths, sheets, and the like) have been developed. By using such large printers to perform printing on the cloths and the like, for example, various interior products on which desired design is printed can be manufactured. The products manufactured by using the large printers are often relatively expensive, and require high quality printing without printing failure and the like.

[0004] Therefore, for the large industrial printer, a work platform is disposed adjacent to the print unit to perform the maintenance of the apparatus. This work platform is typically installed so as to straddle over the conveying path of the medium to be printed. An operator mounts the work platform disposed adjacent to the print unit, and can execute the maintenance of the interior of the print unit, so that the operativity during the maintenance of the large printer is improved.

[0005] Patent Literature 1 (Japanese Unexamined Patent Application Publication No. 2016-2675) describes a large ink jet recording apparatus in which a work platform (stand) that an operator can mount is disposed adjacent to a head unit.

Citation List

Patent Literature

[0006] Patent Literature 1: Japanese Unexamined Patent Application Publication No. 2016-2675

Summary

[0007] By disposing the work platform adjacent to the print unit, the operativity of the inspection and adjustment of the interior of the print unit can be improved, but there is a problem that the work platform interferes with the visual inspection of the surface of the medium to be printed. That is, when the operator inspects the printed state,

it is important to visually inspect the surface of the medium immediately after the medium is printed by the print unit.

[0008] For example, when the operator performs some adjustment for the print unit and desires to inspect whether printing after the adjustment is properly performed, he/she inspects the medium surface on the downstream side of the conveying path of the printed medium. Here, when the printed state of the medium immediately after the medium is printed by the print unit can be inspected, re-adjustment can be immediately performed in the event that the adjusted state is not proper, so that the waste of the medium and the ink can be minimized.

[0009] However, when as described above, the work platform is disposed adjacent to the print unit, there is a problem that the inspection of the medium printed by the print unit is interfered by the work platform, and cannot be performed unless the medium is in the state where it is moved toward the downstream side to some degree.

When the distance from the printing position in the print unit to the position where the surface of the medium can be inspected is long, the entire printing from the printing position to the inspecting position is wasted in the event that the adjusted state is not proper.

[0010] An object of the present invention is to preferably inspect, in a large printer including a work platform, the state of printing to a medium without being interfered by the work platform.

[0011] To achieve at least the abovementioned object, according to one aspect of the present invention, a printer reflecting one aspect of the present invention comprises a print unit that performs a printing process to a medium, a conveying portion that conveys the medium so that the medium passes through the print unit, and a work platform disposed adjacent to the print unit and above the conveying portion and having an opening and closing mechanism.

BRIEF DESCRIPTION OF THE DRAWINGS

[0012] The advantages and features provided by one or more embodiments of the invention will become more fully understood from the detailed description given hereinbelow and the appended drawings which are given by way of illustration only, and thus are not intended as a definition of the limits of the present invention:

Fig. 1 is a perspective view illustrating the overall configuration example of a printer according to a first embodiment of the present invention;

Fig. 2 is a perspective view illustrating the configuration example of the essential part of the printer according to the first embodiment of the present invention;

Fig. 3 is a front view illustrating the configuration example of the essential part of the printer according to the first embodiment of the present invention;

Fig. 4 is a perspective view illustrating an example

of the state where a work platform of the printer is opened according to the first embodiment of the present invention;

Fig. 5 is a front view illustrating an example of the state where the work platform of the printer is opened according to the first embodiment of the present invention;

Fig. 6 is a perspective view illustrating an example of a gutter disposed near the work platform of the printer according to the first embodiment of the present invention;

Fig. 7 is a perspective view illustrating the configuration example of the essential part of the printer (the state where the work platform is in the closed state) according to a second embodiment of the present invention;

Fig. 8 is a perspective view illustrating the configuration example of the essential part of the printer (the state where the work platform is in the opened state) according to the second embodiment of the present invention;

Fig. 9 is a perspective view illustrating an example in which a driving mechanism is provided to the work platform of the printer (Example 1) according to the second embodiment of the present invention;

Fig. 10 is a perspective view illustrating an example in which a driving mechanism is provided to the work platform of the printer (Example 2: The work platform is in the closed state.) according to the second embodiment of the present invention;

Fig. 11 is a perspective view illustrating an example in which the driving mechanism is provided to the work platform of the printer (Example 2: The work platform is in the state where it is being driven.) according to the second embodiment of the present invention;

Fig. 12 is a perspective view illustrating an example in which the driving mechanism is provided to the work platform of the printer (Example 2: The work platform is in the opened state.) according to the second embodiment of the present invention;

Fig. 13 is a perspective view illustrating the configuration example of the essential part of the printer (The work platform is in the closed state.) according to a third embodiment of the present invention;

Fig. 14 is a front view illustrating the configuration example of the essential part of the printer (The work platform is in the opened state.) according to the third embodiment of the present invention;

Fig. 15 is a perspective view illustrating the configuration example of the essential part of the printer (One work platform is in the opened state.) according to a fourth embodiment of the present invention;

Fig. 16 is a perspective view illustrating the configuration example of the essential part of the printer according to a fifth embodiment of the present invention; and

Fig. 17 is a perspective view illustrating the config-

uration example of the essential part of the printer according to a sixth embodiment of the present invention.

5 DETAILED DESCRIPTION OF EMBODIMENTS

[0013] Embodiments of the present invention will be described below with reference to the accompanying drawings. However, the scope of the invention is not limited to the disclosed embodiments. In the respective embodiments described below, shared portions are indicated by the same reference numerals and the overlapped description thereof is omitted.

15 First Embodiment

[0014] First, a printer of a first embodiment will be described with reference to Figs. 1 to 6.

[0015] Fig. 1 illustrates the overall configuration of the printer of the first embodiment.

[0016] The printer of the present embodiment performs a printing process on the surface of a medium 1 that is very large to have a lateral length of several meters and a length in the vertical direction (conveying direction) in the range of several tens of meters to several thousands of meters, and is continuously conveyed. As the medium 1, for example, a cloth is used.

[0017] The medium 1 is conveyed through a conveying path (conveying portion) 2. An upstream side conveying unit 41 is disposed on one end side (upstream side) of the conveying path 2, and the medium 1 conveyed from an unwinding unit (not illustrated) is sequentially sent to a plurality of print units 11, 12, 13, 14, 15, and 16.

[0018] Also, a downstream side conveying unit 54 is disposed on the other end side (downstream side) of the conveying path 2, and the medium 1 that passes through the plurality of print units 11, 12, 13, 14, 15, and 16 is sent to another unit at the subsequent stage (a drying machine and the like).

[0019] Here, in the middle of the conveying path 2 on which the medium 1 is conveyed, the plurality of print units 11, 12, 13, 14, 15, and 16 are disposed at fixed intervals. In the respective print units 11 to 16, ink jet mechanisms with different colors are respectively disposed, and the printing process is performed on the surface of the medium 1 by the ink jet mechanisms. It should be noted that six print units 11 to 16 are disposed here, but the number of print units disposed is different according to the application of the printer.

[0020] Also, in the conveying path 2 between the print unit 16 on the most downstream side and a downstream side conveying unit 54, a medium inspection unit 51 is disposed. The medium inspection unit 51 reads and inspects the image printed on the medium 1.

[0021] Also, beside the conveying path 2, an operation panel 61 and a display panel 62 are disposed, and various settings related to the printed state can be performed by the operation panel 61. On the display panel 62, the

operated state and the like of the printer are displayed.

[0022] It should be noted that in the following description, the direction in which the medium 1 is traveled on the conveying path 2 is an x direction, the lateral width direction of the medium 1 is a y direction, and the perpendicular direction perpendicular to the medium 1 on the conveying path 2 is a z direction.

[0023] And, in the printer of the present embodiment, work platforms 21 to 27 are disposed adjacent to the respective print units 11, 12, 13, 14, 15, and 16 and above the conveying path 2.

[0024] Specifically, the work platform 21 is disposed adjacent to the upstream side of the print unit 11, and the work platform 22 is disposed between the print unit 11 and the print unit 12.

[0025] The work platform 23 is disposed between the print unit 12 and the print unit 13, and the work platform 24 is disposed between the print unit 13 and the print unit 14.

[0026] Also, the work platform 25 is disposed between the print unit 14 and the print unit 15, and the work platform 26 is disposed between the print unit 15 and the print unit 16.

[0027] Further, the work platform 27 is disposed adjacent to the downstream side of the print unit 16.

[0028] Among these work platforms 21 to 27, for the work platform 21 on the most upstream side, a handrail 31 is provided at the end of the work platform 21 away from the print unit 11, and among these work platforms 21 to 27, for the work platform 27 on the most downstream side, a handrail 32 is provided at the end of the work platform 27 away from the print unit 16.

[0029] Also, for the printer of the present embodiment, as illustrated in Fig. 1, a medium supply unit 41 includes a supply unit work platform 42, and the medium inspection unit 51 includes an inspection unit work platform 52. The supply unit work platform 42 also includes a handrail 43, and the inspection unit work platform 52 also includes a handrail 53.

[0030] The respective work platforms 21 to 27, 42, and 52 are stands that an operator mounts during the maintenance and inspection operation for the respective units 11 to 16, 41, and 51. Therefore, each of the work platforms 21 to 27, 42, and 52 has a width to the extent that one person mounts it (for example, approximately 60 cm).

[0031] The respective work platforms 21 to 27 disposed above the conveying path 2 include opening and closing mechanisms.

[0032] All the opening and closing mechanisms included in the work platforms 21 to 27 have the same configuration, and in the following description, the work platform 21 will be described as a representative example.

[0033] Fig. 2 is a perspective view illustrating the configuration of the work platform 21 disposed adjacent to an exterior cover side face 11a on one side of the print unit 11. Also, Fig. 3 is a diagram of two work platforms 21 and 22 disposed adjacent to the print unit 11, seen

from the front.

[0034] The work platform 21 illustrated in Figs. 2 and 3 is in the closed state, and the operator can mount the work platform 21. The work platform 22 illustrated in Fig. 3 is also in the closed state.

[0035] The exterior cover side face 11a of the print unit 11 is opened and closed in a portion thereof, an exterior cover side face 11b of the print unit 11 is opened and closed in a portion thereof, and the operator who mounts the work platform 21 or 22 can see the interior of the print unit 11. It should be noted that the illustration of the mechanisms in which the portion of the exterior cover side face 11a and the portion of the exterior cover side face 11b are opened is omitted.

[0036] The work platform 21 is installed on a frame configured of legs 21a, 21b, 21c, and 21d and beams 21e, 21f, 21g, and 21h. It should be noted that in Fig. 2, some legs and beams are hidden by the work platform 21, but in Fig. 4 illustrating the work platform 21 in the opened state, all the legs and beams are seen.

[0037] The lower ends of the respective legs 21a and 21b are coupled to a left edge 2a of the conveying path 2, and the lower ends of the respective legs 21c and 21d are coupled to a right edge 2b of the conveying path 2. Also, the handrail 31 is coupled to the legs 21a, 21b, 21c, and 21d and the beams 21e, 21f, 21g, and 21h, and is not coupled to the work platform 21. The work platform 22 has the same configuration as the work platform 21 and includes leg portions 22a and 22b.

[0038] Figs. 4 and 5 each illustrate an example when the work platform 21 is brought into the opened state. In Fig. 4, the illustration of the handrail 31 is omitted, but also when the work platform 21 is in the opened state, as illustrated in Fig. 5, the handrail 31 is disposed at the same position as the case where the work platform 21 is in the closed state.

[0039] The work platform 21 is coupled to the beam 21h by hinges 21i and 21j, and with the turning axes (not illustrated) of the hinges 21i and 21j as turning fulcrums, the work platform 21 can be moved from the position where the work platform 21 is disposed in the horizontal plane parallel to the plane of the medium 1 as illustrated in Fig. 2 (the closed state) to the position where the work platform 21 is disposed in the perpendicular plane perpendicular to the medium 1 (the opened state). The movement of the work platform 21 may be performed manually by the operator, but some driving mechanism may be mounted. An example in which the driving mechanism is mounted will be described in other embodiments described later.

[0040] As illustrated in Fig. 5, the work platform 21 brought into the opened state is at the position where the work platform 21 is almost erected right in front of the exterior cover side face 11a of the print unit 11.

[0041] Also, the work platform 22 adjacent to the exterior cover side face 11b on the opposite side of the print unit 11 can also be moved into the opened state, as illustrated in Fig. 5.

[0042] As illustrated in Fig. 4, when the work platform 21 is brought into the opened state, the medium 1 in the portion adjacent to the print unit 11 is exposed. Therefore, the operator can inspect the state of the surface of the medium 1.

[0043] It should be noted that on the beam 21g, a sensor 21q is mounted, and by this sensor 21q, the opening and closing of the work platform 21 is detected. The detection signal of this sensor 21q is sent to the operation control unit (not illustrated) of the printer, and the operation of the printer is controlled on the basis of the detection signal of the sensor 21q. Specifically, when the sensor 21q detects the closed state of the work platform 21, the printer is stopped, and when the sensor 21q does not detect the closed state of the work platform 21, the printer is brought into the operable state.

[0044] Fig. 6 enlargeably illustrates a portion of the work platform 21 brought into the opened state.

[0045] In the printer of the present embodiment, a gutter 63 is disposed to be close to an end face 21x on the lower side of the work platform 21 brought into the opened state. The gutter 63 is disposed to have a length almost equal to the length of the work platform 21, and functions to collect dust falling from the work platform 21 and foreign substances left during the operation by a dust reception portion 64 inside the gutter 63.

[0046] By disposing this gutter 63, the dust falling from the work platform 21 brought into the opened state can be prevented from falling onto the medium 1 on the conveying path 2.

[0047] As described above, according to the printer of the present embodiment, since the work platforms 21 to 27 are disposed adjacent to the print units 11 to 16, respectively, when the maintenance and inspection of the respective print units 11 to 16 are performed, the operator can perform the operation by mounting each of the work platforms 21 to 27, so that the operation efficiency can be improved.

[0048] And, the respective work platforms 21 to 27 can be opened and closed by including the opening and closing mechanisms, so that by bringing the work platforms 21 to 27 into the opened state, the operator can directly visually inspect the state printed by the print units 11 to 16. Therefore, for example, when the operator adjusts the print unit 11, the printed state after the adjustment can be immediately read from the medium 1 conveyed to the downstream side of the print unit 11, so that the printed state can be inspected without increasing the downtime of the apparatus and the loss of the medium.

Second Embodiment

[0049] Next, a second embodiment of the present invention will be described with reference to Figs. 7 to 12.

[0050] The overall configuration of the printer of the second embodiment is the same as the printer illustrated in Fig. 1 in the first embodiment, and the opening and closing mechanism of the work platform is different from

that of the first embodiment.

[0051] Figs. 7 and 8 each illustrate the detailed configuration of the exterior cover side face 11a of a print unit 11' and a work platform 21' of the printer of the second embodiment. Fig. 7 illustrates the case where the work platform 21' is in the closed state, and Fig. 8 illustrates the case where the work platform 21' is in the opened state.

[0052] The print unit 11' includes an opening 11c in the exterior cover side face 11a, which is different from the print unit 11 of the first embodiment. This opening 11c has a size that is almost equal to the size of the erected work platform 21'.

[0053] By providing the opening 11c in the exterior cover side face 11a in this way, when as illustrated in Fig. 7, the work platform 21' is in the closed state, an interior 11d of the print unit 11' is brought into the state where it is exposed from the opening 11c.

[0054] And, as illustrated in Fig. 8, the work platform 21' includes a mechanism in which it is opened and closed by being turned by the hinges 21i and 21j. Here, in the present embodiment, when being brought into the opened state to be brought into the erected state, the work platform 21' becomes the cover of the opening 11c.

[0055] It should be noted that here, only the configuration of the work platform 21' disposed adjacent to the print unit 11' has been described, but other work platforms included in the printer (the work platforms 22 to 27 illustrated in Fig. 1) are configured in the same manner.

[0056] By configuring the work platform 21' in this way, when as illustrated in Fig. 7, the work platform 21' is brought into the closed state to be brought into the state where the operator can mount the work platform 21', the opening 11c of the print unit 11' is brought into the opened state, so that the maintenance and inspection of the interior 11d of the print unit 11' can be performed.

[0057] On the other hand, when as illustrated in Fig. 8, being brought into the opened state, the work platform 21' becomes the cover of the opening 11c of the exterior cover side face 11a, and the exterior cover side face 11a is brought into the closed state.

[0058] Therefore, according to the printer of the present embodiment, by the opening and closing of the work platform 21', the state of the medium 1 can be inspected during the non-operation. Further, the opening 11c of the print unit 11' is changed between the opened state and the closed state in conjunction with the opening and closing of the work platform 21', and the interior of the print unit 11' can be automatically inspected by the operator.

[0059] The opening and closing of the work platform 21' may be manually performed by the operator, but may be opened and closed by additionally providing a driving mechanism.

[0060] Fig. 9 illustrates an example in which as the driving mechanism of the work platform 21', cylinders 71 and 72 are provided.

[0061] In the example illustrated in Fig. 9, the beam

21e and a coupling member 71b on the back face of the work platform 21' are coupled by the cylinder 71, and the beam 21g and a coupling member 72b on the back face of the work platform 21' are coupled by the cylinder 72. And, by the straight extension and contraction of a shaft 71a of the cylinder 71 and a shaft 72a of the cylinder 72, the work platform 21' is moved from the opened state into the closed state, or from the closed state into the opened state.

[0062] Figs. 10 to 12 each illustrate an example in which as the driving mechanism of the work platform 21', windup machines 91 and 92 and wire members 91a and 92a are provided. Fig. 10 illustrates the state where the work platform 21' is closed, and Fig. 12 illustrates the state where the work platform 21' is opened. Also, Fig. 11 illustrates the state while the work platform 21' is moved from the closed state into the opened state.

[0063] In the example illustrated in Fig. 10, at the left end of the work platform 21', a guide member 81 disposed in an L-shaped state along the moving path of the work platform 21' is provided, and at the right end of the work platform 21', a guide member 82 disposed in an L-shaped state along the moving path of the work platform 21' is provided. The inside of the guide member 82 has a guiding groove 82a, and the end of the work platform 21' is restricted to the movement along the guiding groove 82a. The other guide member 81 has the same guiding groove (not illustrated).

[0064] As illustrated in Fig. 10, the work platform 21' is coupled to the windup machine 91 via the wire member 91a, so that the wire member 91a is wound up by the windup machine 91, and the work platform 21' is coupled to the windup machine 92 via the wire member 92a, so that the wire member 92a is wound up by the windup machine 92, whereby as illustrated in Fig. 11, the work platform 21' is gradually pulled upward. And, finally, as illustrated in Fig. 12, the work platform 21' is moved to the position where it is fitted in the opening 11c of the exterior cover side face 11a of the print unit 11.

[0065] In the configuration illustrated in Figs. 10 to 12, when the work platform 21' is in the opened state (Fig. 12), a surface 21u of the work platform 21' is located outside the exterior cover side face 11a. Therefore, in the event that there is dust on the work platform 21', the dust can be inhibited from entering into the print unit 11.

Third Embodiment

[0066] Next, a third embodiment of the present invention will be described with reference to Figs. 13 to 14.

[0067] The overall configuration of the printer of the third embodiment is the same as the printer illustrated in Fig. 1 in the first embodiment, and the opening and closing mechanism of the work platform is different from that of the first embodiment.

[0068] Figs. 13 and 14 each illustrate the detailed configuration of the work platform of the third embodiment.

[0069] In the third embodiment, work platforms 21-1

and 21-2 that are made by dividing the work platform 21 into two are provided.

[0070] That is, as illustrated in Fig. 13, the work platforms 21-1 and 21-2 made by dividing the work platform 21 into two in the conveying direction of the medium 1 (the x direction illustrated in Fig. 1) are prepared, and the respective work platforms 21-1 and 21-2 can be individually opened and closed by the individual hinges (not illustrated).

[0071] Fig. 14 illustrates the case where the respective work platforms 21-1 and 21-2 are brought into the opened state. Fig. 14 also illustrates work platforms 22-1 and 22-2 between the print unit 11 and the print unit 12.

[0072] As illustrated in Fig. 14, the respective work platforms 21-1, 21-2, 22-1, and 22-2 are brought into the erected state, so that the surface of the medium 1 on the conveying path 2 can be inspected.

[0073] It should be noted that Fig. 14 illustrates the state where both of the work platforms 21-1 and 21-2 made by dividing the work platform 21 into two are opened, but only one of the work platforms 21-1 and 21-2 may be brought into the opened state.

[0074] Also, when the work platforms 21-1 and 21-2 are made by dividing the work platform 21 into two, the driving mechanisms may be provided to both of the respective work platforms 21-1 and 21-2.

Fourth Embodiment

[0075] Next, a fourth embodiment of the present invention will be described with reference to Fig. 15.

[0076] The overall configuration of the printer of the fourth embodiment is the same as the printer illustrated in Fig. 1 in the first embodiment, and the opening and closing mechanism of the work platform is different from that of the first embodiment.

[0077] Fig. 15 illustrates the detailed configuration of the work platform of the fourth embodiment.

[0078] In the fourth embodiment, work platforms 21-11, 21-12, 21-13, and 21-14 made by dividing the work platform 21 into four are provided.

[0079] That is, as illustrated in Fig. 15, the work platform 21 is divided into two in the conveying direction of the medium 1 (the x direction illustrated in Fig. 1), and is then divided into two in the width direction of the medium 1 (the y direction illustrated in Fig. 1), the work platforms 21-11, 21-12, 21-13, and 21-14 made by dividing the work platform 21 into four in total are prepared, and the respective work platforms 21-11, 21-12, 21-13, and 21-14 can be individually opened and closed by individual hinges 21m and 21n and the like.

[0080] According to the configuration illustrated in Fig. 15, the size of the respective work platforms 21-11 to 21-14 is relatively small, and the operation in which the operator holds the work platforms 21-11 to 21-14 by hand and opens and closes them can be easily performed. Alternatively, when as illustrated in Fig. 15, only one work platform 21-12 is brought into the opened state, the op-

erator can visually inspect the surface of a portion of the medium 1 in the state where he/she mounts another work platform 21-11, 21-13, or 21-14.

Fifth Embodiment

[0081] Next, a fifth embodiment of the present invention will be described with reference to Fig. 16.

[0082] The overall configuration of the printer of the fifth embodiment is the same as the printer illustrated in Fig. 1 in the first embodiment, and the opening and closing mechanism of the work platform is different from that of the first embodiment.

[0083] Fig. 16 illustrates the detailed configuration of the work platform of the fifth embodiment.

[0084] In the fifth embodiment, opening windows 21o and 21p are provided in the work platform 21.

[0085] That is, as illustrated in Fig. 16, in the middle of the work platform 21, the opening windows 21o and 21p are provided, and can be opened and closed.

[0086] The example of Fig. 16 illustrates the opening window 21o in the closed state, and the opening window 21p in the opened state.

[0087] By providing the opening windows 21o and 21p in this way, while the operator mounts the work platform 21, he/she can visually inspect a portion of the surface of the medium 1 by the opening and closing of the opening windows 21o and 21p.

Sixth Embodiment

[0088] Next, a sixth embodiment of the present invention will be described with reference to Fig. 17.

[0089] The overall configuration of the printer of the sixth embodiment is the same as the printer illustrated in Fig. 1 in the first embodiment, and the supporting configuration of the work platform is different from that of the first embodiment.

[0090] Fig. 17 illustrates the detailed configuration of the work platform of the sixth embodiment.

[0091] In the sixth embodiment, legs 101, 102, and 103 supporting the work platform 21 are extended from the floor surface in the installation place of the printer. That is, the legs 101 and 102 supporting one of the ends of the work platform 21 are mounted on a base portion 110 installed on the floor. Also, the leg 103 supporting the other end of the work platform 21 is mounted on the base portion installed on the floor (not illustrated) in the same manner.

[0092] By configuring the work platform 21 in such a manner, the work platform 21 is supported on the floor surface on which the printer is installed.

Modifications

[0093] It should be noted that in the above-mentioned embodiments, the printer in which the plurality of print units 11 to 16 are disposed is provided. On the contrary,

the present invention may be applied to the printer in which only one print unit is disposed. When only one print unit is disposed, the work platforms including the opening and closing mechanisms are disposed adjacent to one exterior cover side face and the other exterior cover side face of the one print unit. Alternatively, the work platform including only one unit opening and closing mechanism is disposed adjacent to one of the exterior cover side faces of the one print unit.

[0094] Also, in the above-mentioned embodiments, all the work platforms 21 to 27 disposed adjacent to the respective print units 11 to 16 include the opening and closing mechanisms. On the contrary, some work platforms are not necessarily required to include the opening and closing mechanisms. For example, the work platform 21 disposed on the most upstream side of the conveying path 2 of the medium 1 is not necessarily required to be provided with the opening and closing mechanism, and the opening and closing mechanisms may be provided to other work platforms 22 to 17.

[0095] Also, in the first embodiment, the sensor 21q (Fig. 4) is provided, the opening and closing of the work platform 21 is detected by the detection signal of the sensor 21q, and when the work platform 21 is in the closed state, the operation of the printer is limited (stopped) to secure the safety of the operator. For this, also in the second to sixth embodiments, the same sensor may be provided to limit the operation of the printer by the detection signal of the sensor. In the example in which the work platform is divided into two or four (Fig. 13 and the like), the sensor is preferably provided to each divided work platform.

[0096] Also, when the work platform is driven by the driving mechanisms, such as the windup machines and the cylinders, the opening and closing position of the work platform may be detected from the driving state of these driving mechanisms.

[0097] Further, the driving mechanism of the work platform illustrated in the above-mentioned embodiments illustrates an example, and other driving mechanisms may be mounted. For example, instead of the cylinders, the driving mechanisms, such as racks and pinions, converting the movement of the motor to straight movement may be provided. For the driving source included in the driving mechanism, in addition to the electrically operated motor, various driving sources, such as an oil hydraulic motor, can be used.

[0098] Also, in the second embodiment, as illustrated in Fig. 9, the exterior cover side face 11a of the print unit 11' is disposed to be in the state where it is erected to be perpendicular to the conveying direction of the medium 1, but the exterior cover side face 11a may be located at the different disposing position where for example, it is slightly tilted from the vertical state. In this case, when the work platform is brought into the opened state to close the exterior cover side face 11a, the work platform is, to be exact, disposed at the position slightly shifted from the position where it is brought into the state perpendicular-

ular to the disposing plane of the medium 1, but is disposed at the position where it is brought into the state substantially perpendicular to the disposing plane of the medium 1. Also in other embodiments, the work platform is changed 90° in position by being opened and closed, but the 90° change of the work platform in position in this way is an example, and the work platform is changed approximately 90° in position.

[0099] Also, in the respective embodiments described so far, when the work platform is brought from the closed state into the opened state, the work platform is turned, but the work platform may be opened and closed by being slid in the up-down direction and the like. For example, a slide mechanism (opening and closing mechanism) in which the work platform can be raised and lowered in the up-down direction while holding the horizontal state parallel to the medium is provided, the state where the work platform is lowered by the slide mechanism to be close to the medium (the state where it is disposed in a first plane) may be the closed state, and the state where the work platform is raised to be away from the medium (the state where it is disposed in a third plane substantially parallel to the first plane and away from the medium) may be the opened state. That is, the mechanism in which the work platform is slid is also included in the opening and closing mechanism of the work platform described so far.

[0100] The opening and closing mechanism in which the work platform can be slid while holding the horizontal state is provided in this way, so that when the work platform is slid into the third plane away from the medium, the operator can visually inspect the conveying face of the medium.

[0101] Further, when as illustrated in Figs. 13 and 15, the work platform is divided, the mechanism in which each of the divided individual work platforms is opened and closed may be the opening and closing mechanism (slide mechanism) in which each of the work platforms can be slid while holding the horizontal state.

[0102] Still further, when as illustrated in Fig. 16, the windows are provided in each work platform, the mechanism in which the windows are opened and closed may be the opening and closing mechanism (slide mechanism) in which each work platform can be slid while holding the horizontal state. When the mechanism in which the windows are opened and closed is the opening and closing mechanism in which each work platform can be slid, the work platform can be raised and lowered by, for example, the windup of the wire member 91a by the windup machine 91 illustrated in Fig. 10 and the windup of the wire member 92a by the windup machine 92 illustrated in Fig. 10. Alternatively, the work platform may be slid in the up-down direction by other driving mechanisms. Also, alternatively, the work platform may be slid in the up-down direction by the driving mechanism, such as the cylinders, performing straight movement.

[0103] Also, in the above-mentioned embodiments, the printer performs printing by the ink jet mechanisms

as the respective print units 11 to 16, but may be of other various types.

[0104] According to the present invention, the work platform installed in the printer is brought into the closed state, so that the operator can mount the work platform to perform an operation, such as adjustment, and the work platform is brought into the opened state, so that the surface of the medium immediately after the medium is printed by the print unit can be visually inspected, whereby the operativity during the adjustment of the printer can be improved.

[0105] Although embodiments of the present invention have been described and illustrated in detail, the disclosed embodiments are made for purposes of illustration and example only and not limitation. The scope of the present invention should be interpreted by terms of the appended claims.

List of Reference Signs

[0106] 1 ... medium, 2 ... conveying path, 2a, 2b ... edge, 11 to 16, 11' ... print unit, 11a, 11b ... exterior cover side face, 11c ... opening, 11d ... interior, 21 to 27, 21', 21-1, 21-2, 22-1, 22-2, 21-11, 21-12, 21-13, 21-14 ... work platform, 21a, 21b, 21c, 21d ... leg, 21e, 21f, 21g, 21h ... beam, 21i, 21j, 21m, 21n ... hinge, 21o, 21p ... opening window, 21q ... sensor, 21x ... end face, 21u ... surface, 22a, 22b ... leg, 31, 32 ... handrail, 41 ... upstream side conveying unit, 42 ... supply unit work platform, 43 ... handrail, 51 ... medium inspection unit, 52 ... inspection unit work platform, 53 ... handrail, 54 ... downstream side conveying unit, 61 ... operation panel, 62 ... display panel, 63 ... gutter, 64 ... dust reception portion, 71, 72 ... cylinder, 71a, 72a ... shaft, 71b, 72b ... coupling portion, 81, 82 ... guide member, 82a ... guiding groove, 91, 92 ... windup machine, 91a, 92a ... wire member, 101 to 103 ... leg, 110 ... base portion

Claims

1. A printer comprising:

a print unit (11) that performs a printing process to a medium;
a conveying portion (2) that conveys the medium so that the medium passes through the print unit (11); and
a work platform (21) disposed adjacent to the print unit (11) and above the conveying portion (2) and having an opening and closing mechanism.

2. The printer according to claim 1, wherein when being brought into the closed state by the opening and closing mechanism, the work platform (21) is disposed in a first plane parallel to the medium conveyed through the conveying portion (2),

wherein when being brought into the opened state by the opening and closing mechanism, the work platform (21) is disposed in a second plane substantially perpendicular to the first plane.

3. The printer according to claim 2,
wherein the turning shafts of the opening and closing mechanism are disposed at the portions in which the first plane and the second plane are substantially perpendicular to each other, and the work platform (21) is opened and closed about the turning shafts. 5
4. The printer according to claim 2,
wherein the opening and closing mechanism includes a guide member (81, 82) that slides the work platform (21) from the first plane into the second plane. 10
5. The printer according to claim 1,
wherein the opening and closing mechanism is a slide mechanism in which the work platform (21) is raised and lowered in the up-down direction,
wherein the state where the work platform (21) is lowered by the slide mechanism to be disposed in the first plane close to the medium is the closed state, and the state where the work platform (21) is raised to be disposed in a third plane substantially parallel to the first plane and away from the medium is the opened state. 20 25
6. The printer according to claim 4 or 5,
wherein the printer includes a wire member (91a, 92a) coupled to the end of the work platform (21),
wherein the printer includes a driving portion (91, 92) winding the wire member (91a, 92a),
wherein by the winding of the wire member (91a, 92a) by the driving portion (91, 92), the work platform (21) is slid from the first plane into the second plane or the third plane. 30 35 40
7. The printer according to claim 2,
wherein the printer includes a driving portion (71, 72) that moves the work platform (21) from the first plane into the second plane by straight movement. 45
8. The printer according to claim 2,
wherein when the work platform (21) is brought into the opened state by the opening and closing mechanism, the work platform (21) closes an opening (11c) of an exterior cover of the print unit (1). 50
9. The printer according to claim 8,
wherein when the work platform (21) is brought into the opened state, the surface of the work platform (21) is disposed on the surface side of the exterior cover. 55
10. The printer according to claim 1,

wherein the printer includes a detection portion detecting that the work platform (21) is in the opened state, and

wherein when the detection portion detects the opened state, the medium can be conveyed through the conveying portion (2).

11. The printer according to claim 1,
wherein a gutter (63) that is close to the lower end of the work platform (21) when the work platform (21) is brought into the opened state is disposed.
12. The printer according to claim 1,
wherein the work platform (21) is divided into a plurality of work platforms, and
wherein respective work platforms (21-1, 21-2) that are made by dividing the work platform (21) into the plurality of work platforms can be individually opened and closed or slid by the opening and closing mechanism.
13. The printer according to claim 1,
wherein the work platform (21) includes a window (21o, 21p), and
wherein the window (21o, 21p) can be opened and closed or slid.
14. The printer according to claim 1,
wherein when being brought into the closed state by the opening and closing mechanism, the work platform (21) is supported by a supporting member (21a, 21b, 21c, 21d) coupled to the conveying portion (2).
15. The printer according to claim 1,
wherein when being brought into the closed state by the opening and closing mechanism, the work platform (21) is supported by a supporting member (101, 102, 103) coupled to a floor surface.

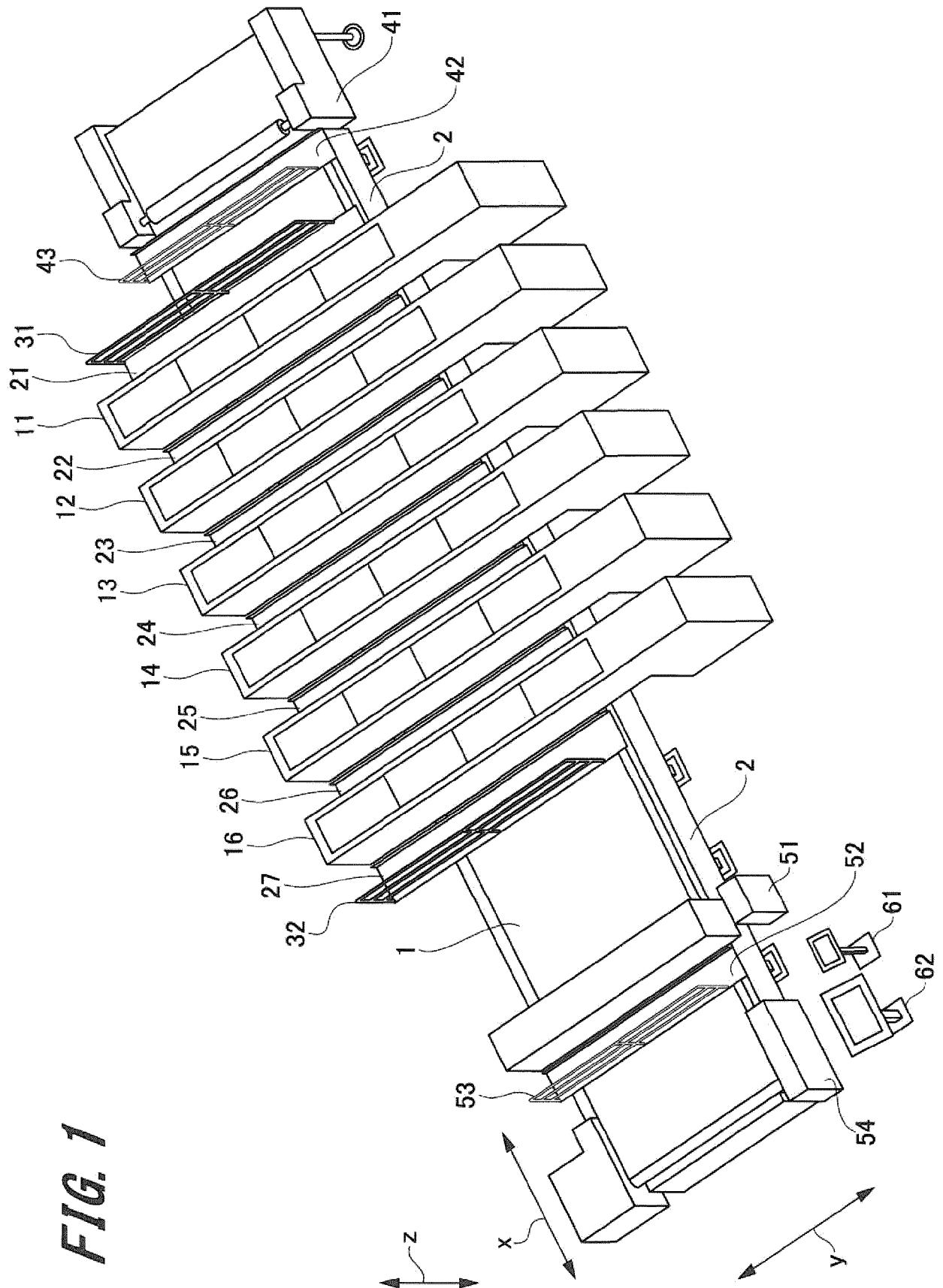


FIG. 2

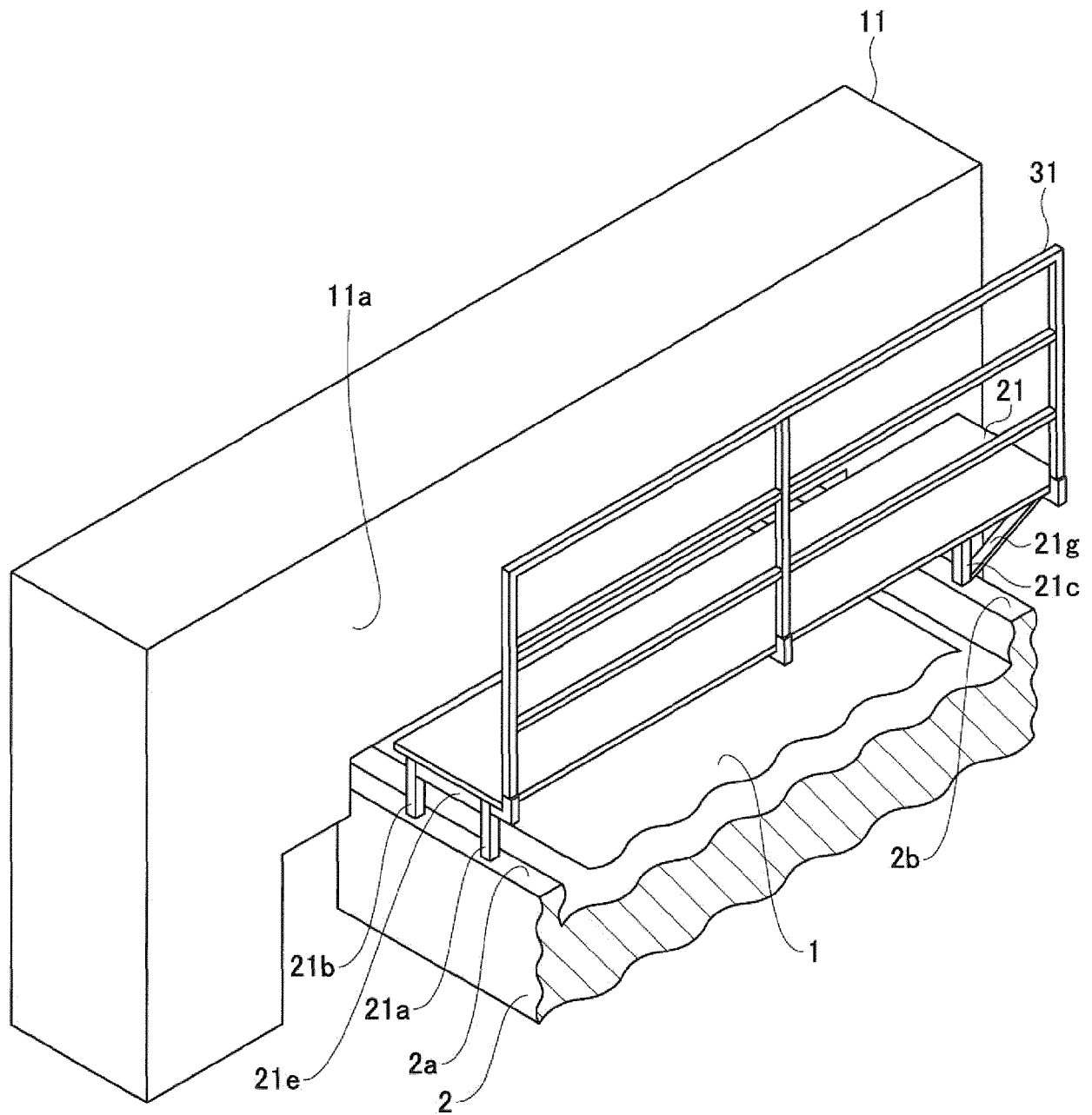


FIG. 3

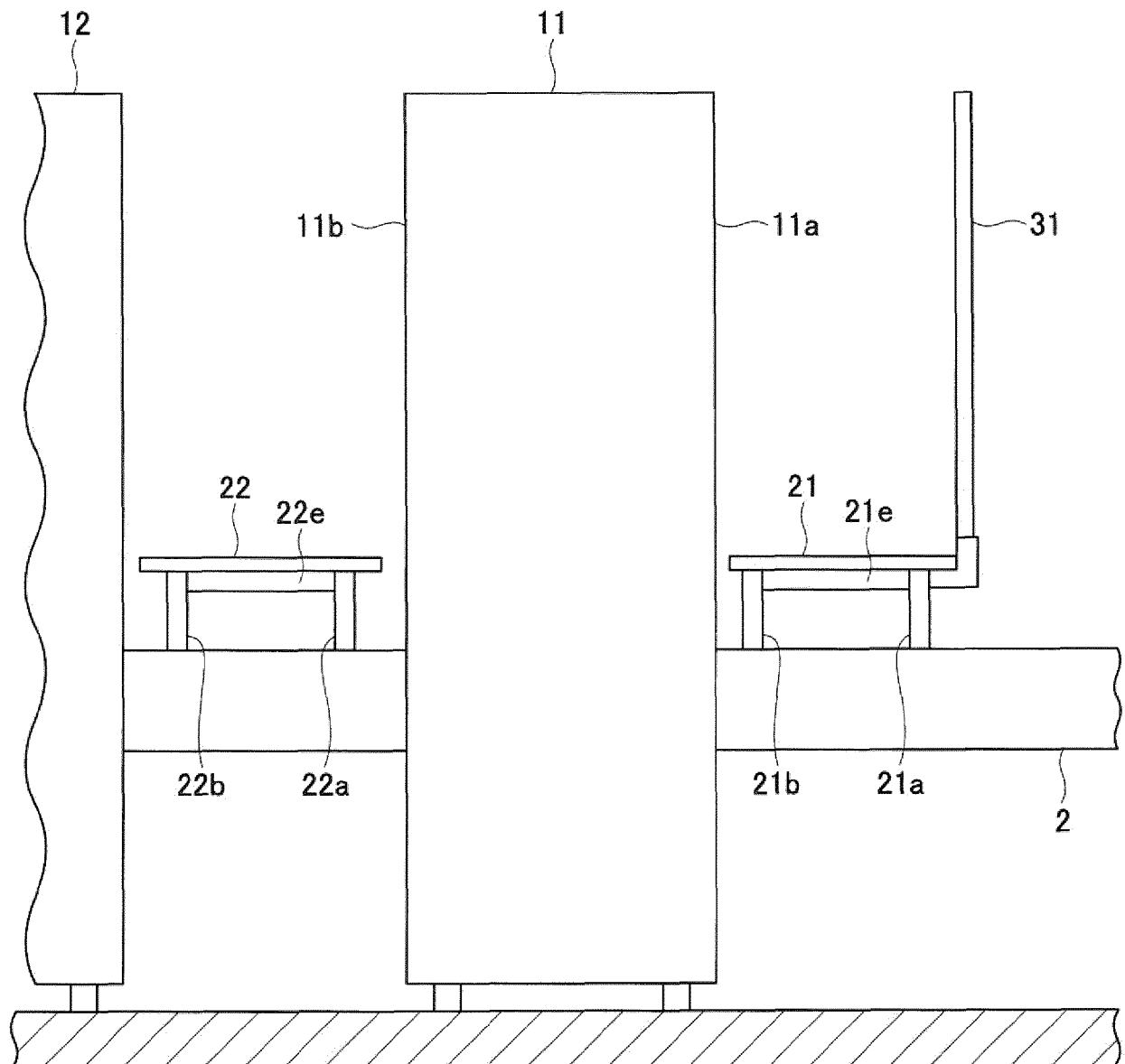


FIG. 4

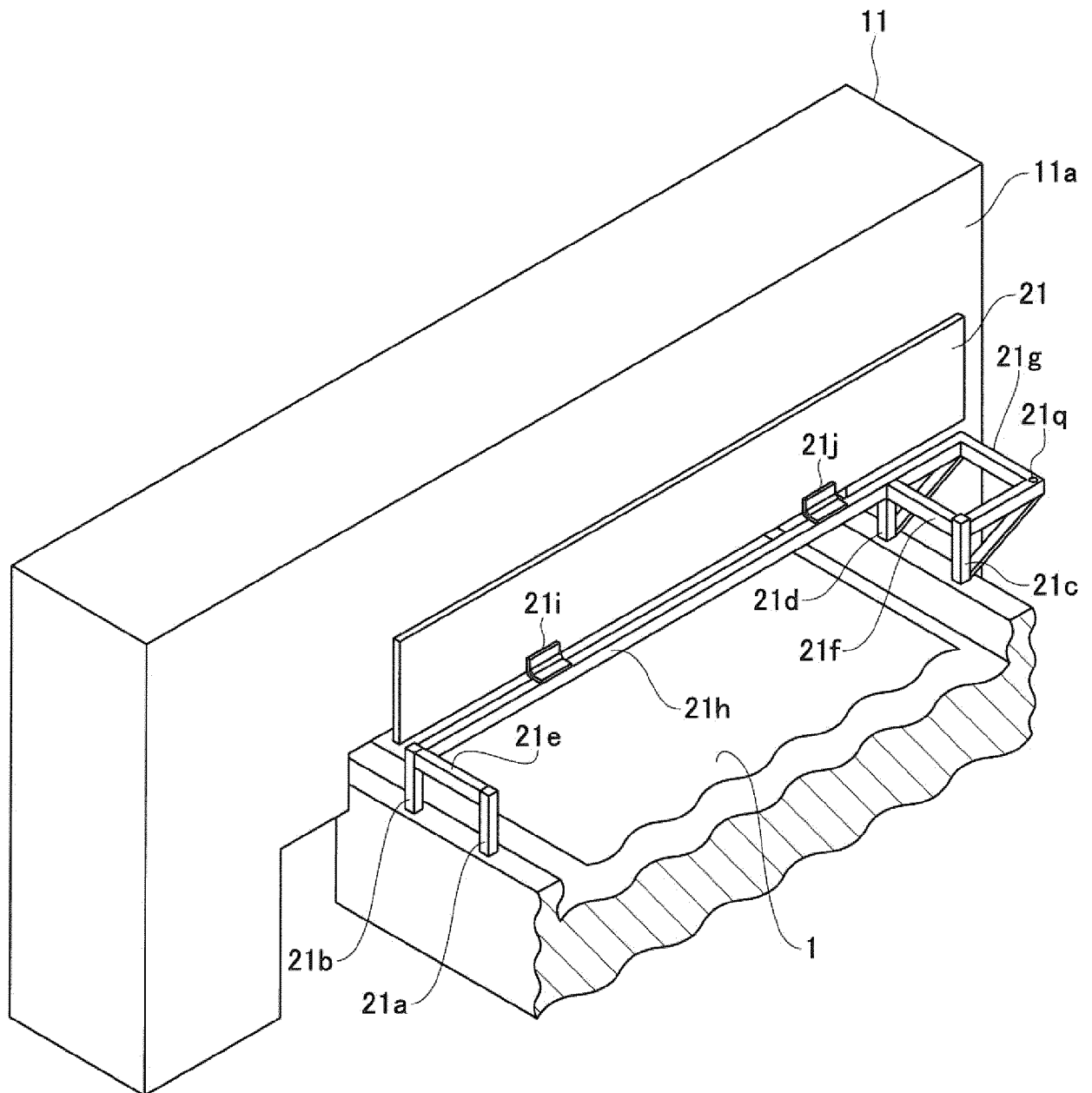


FIG. 5

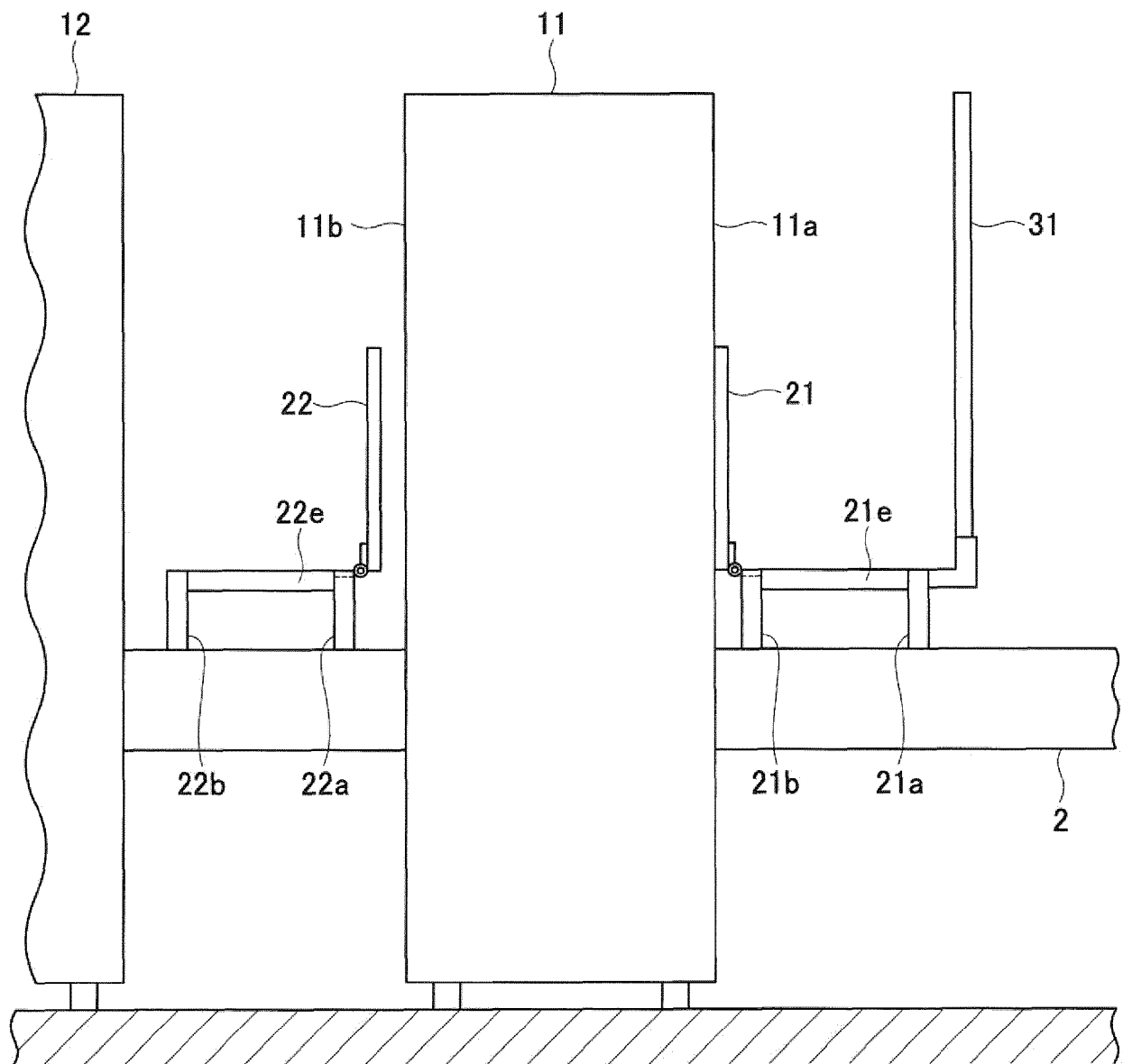


FIG. 6

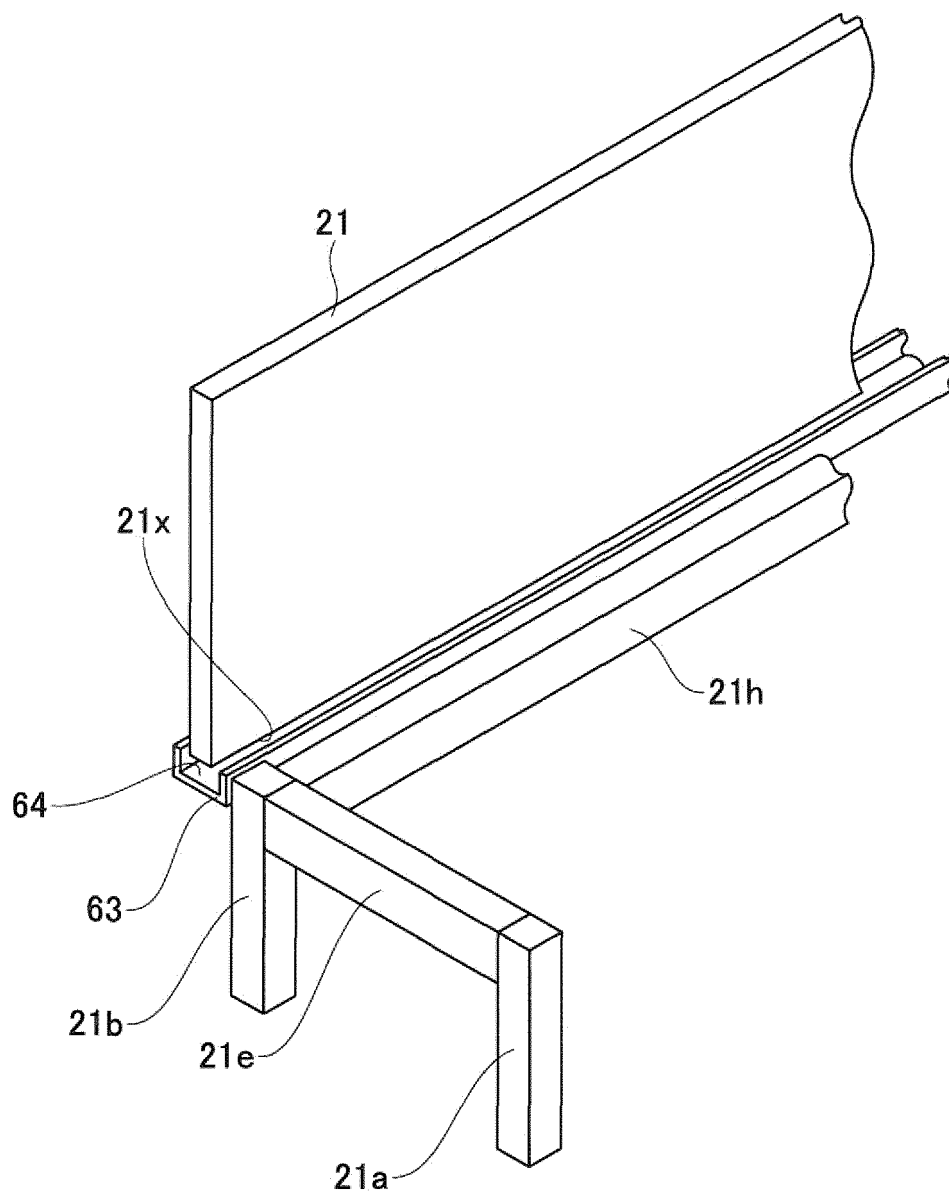


FIG. 7

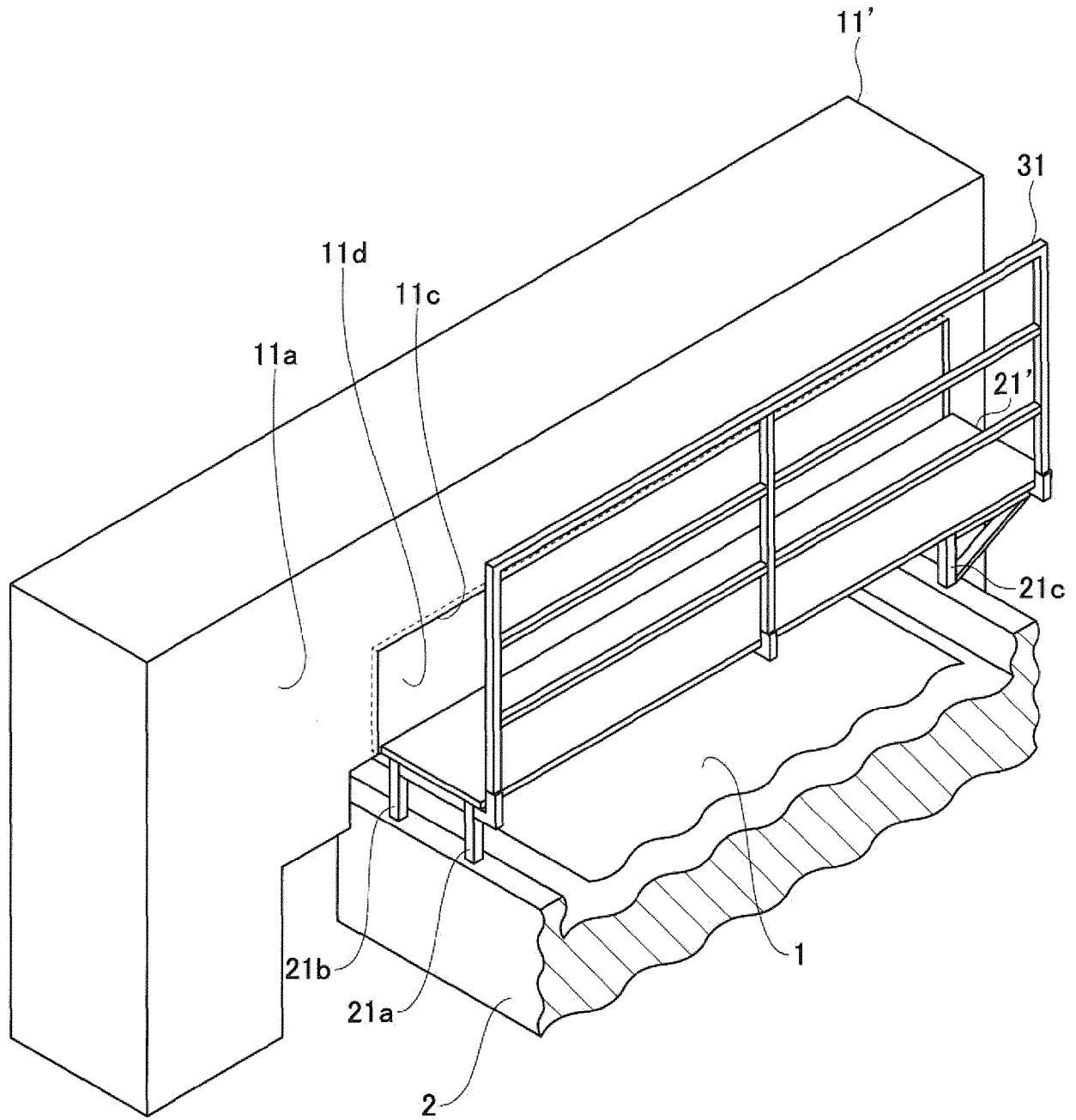


FIG. 8

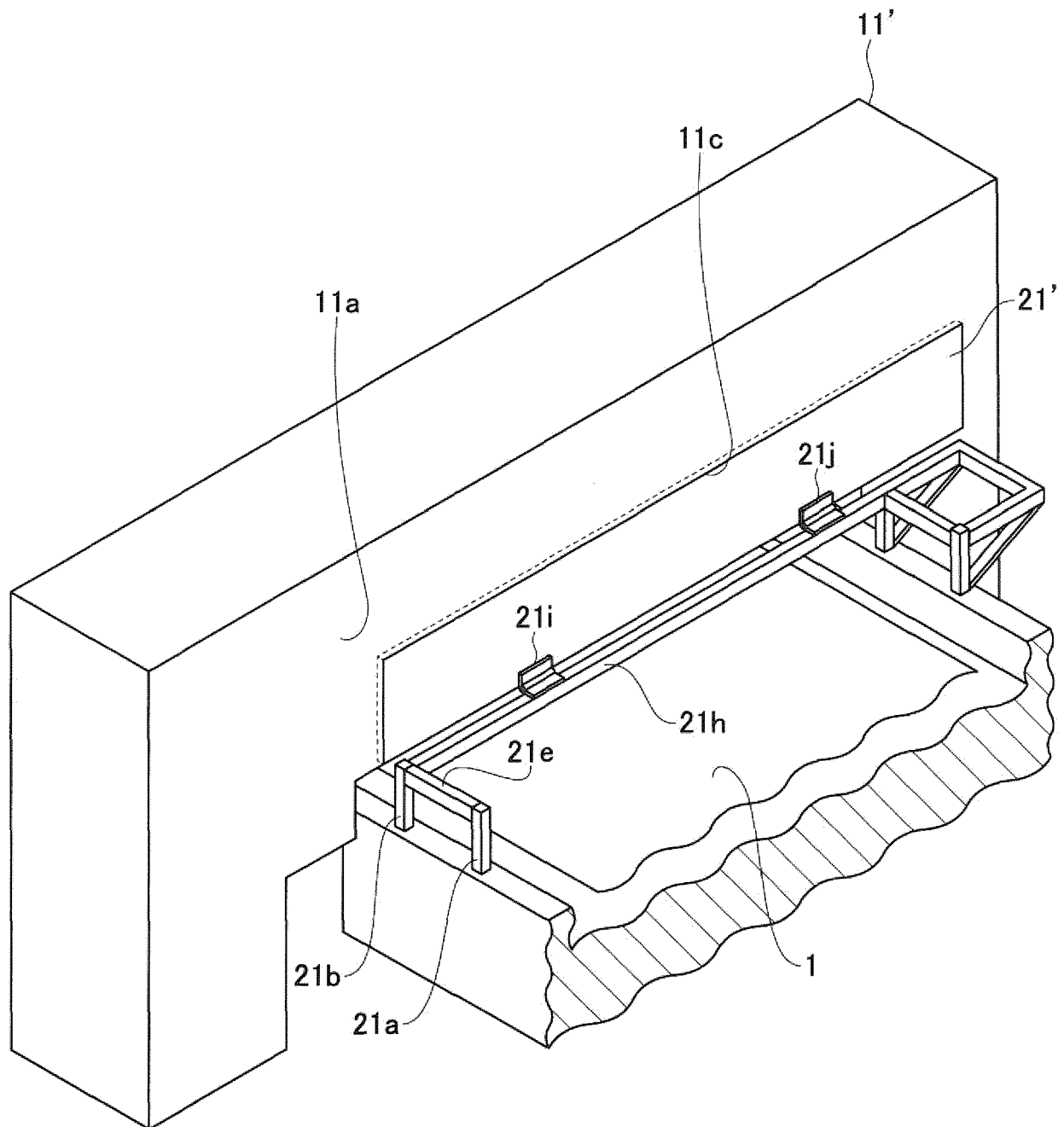


FIG. 9

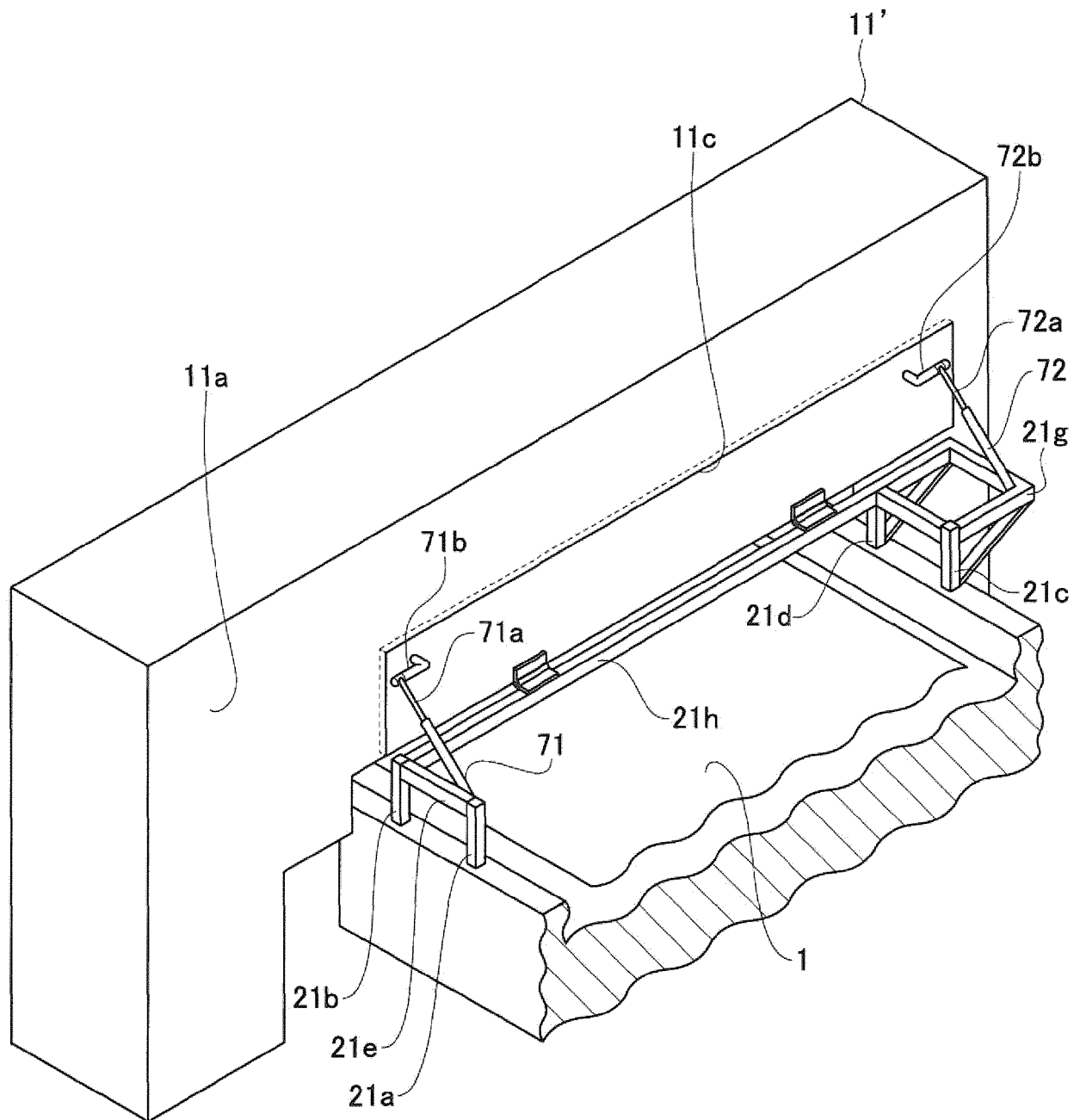


FIG. 10

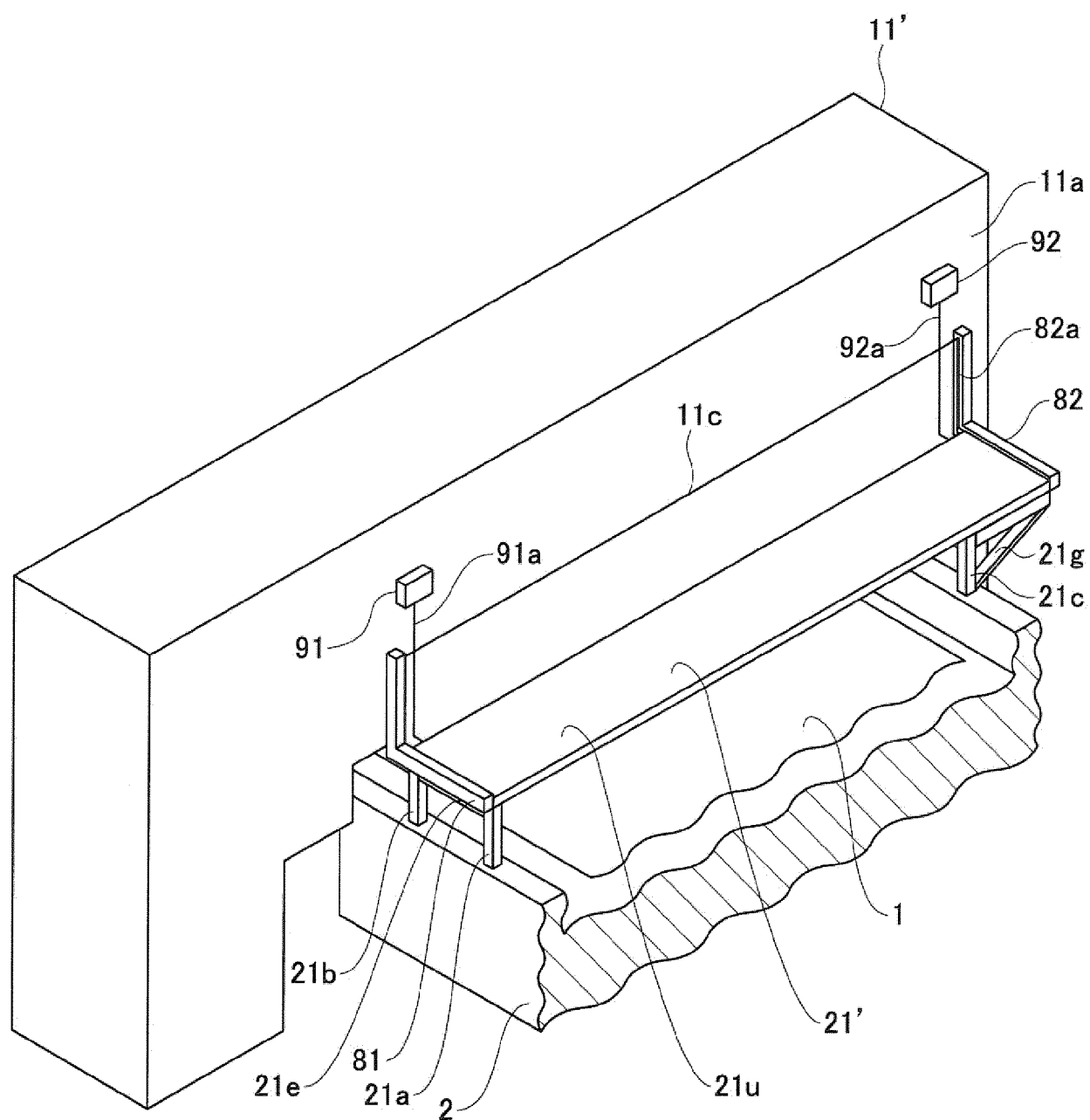


FIG. 11

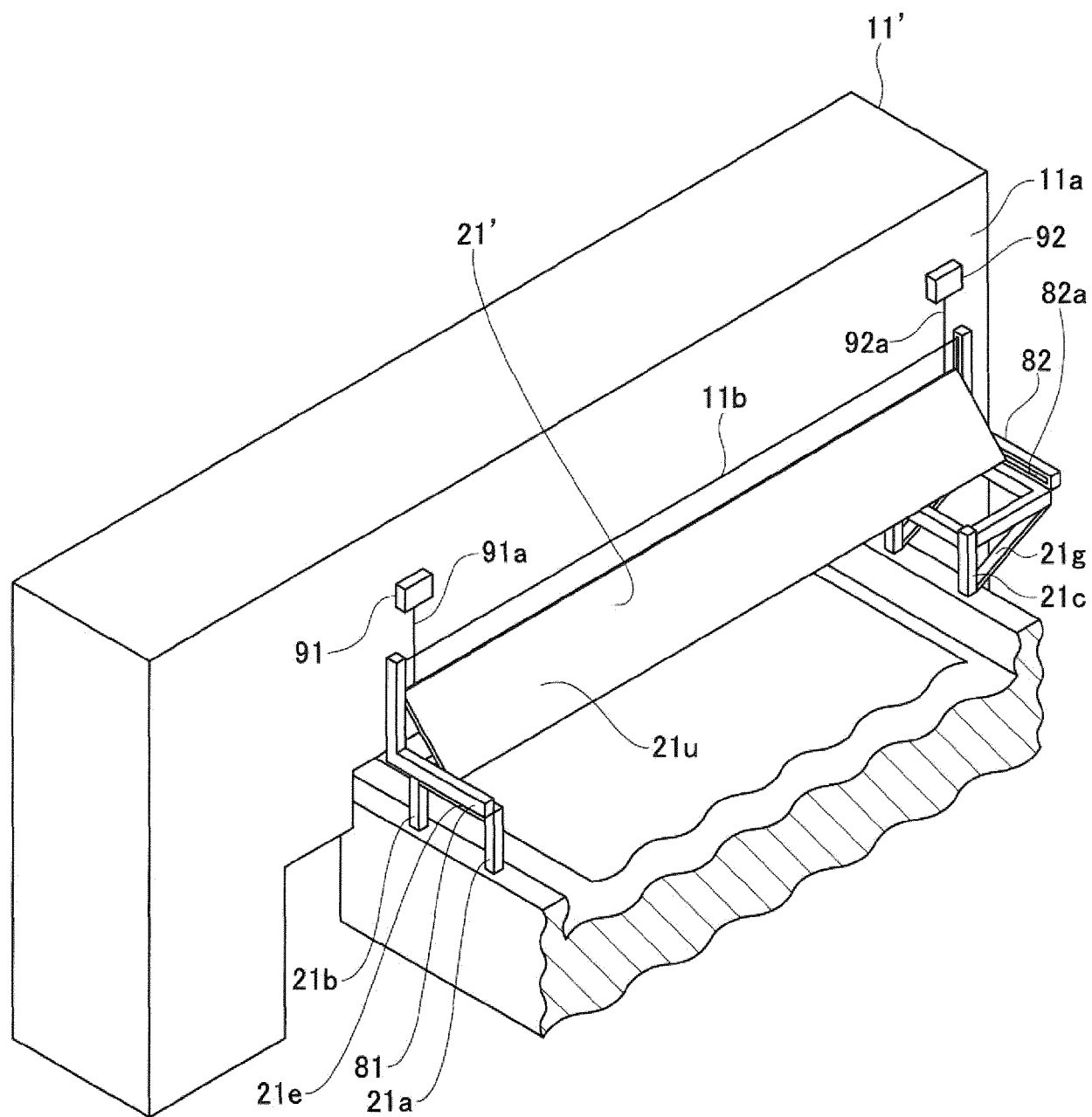


FIG. 12

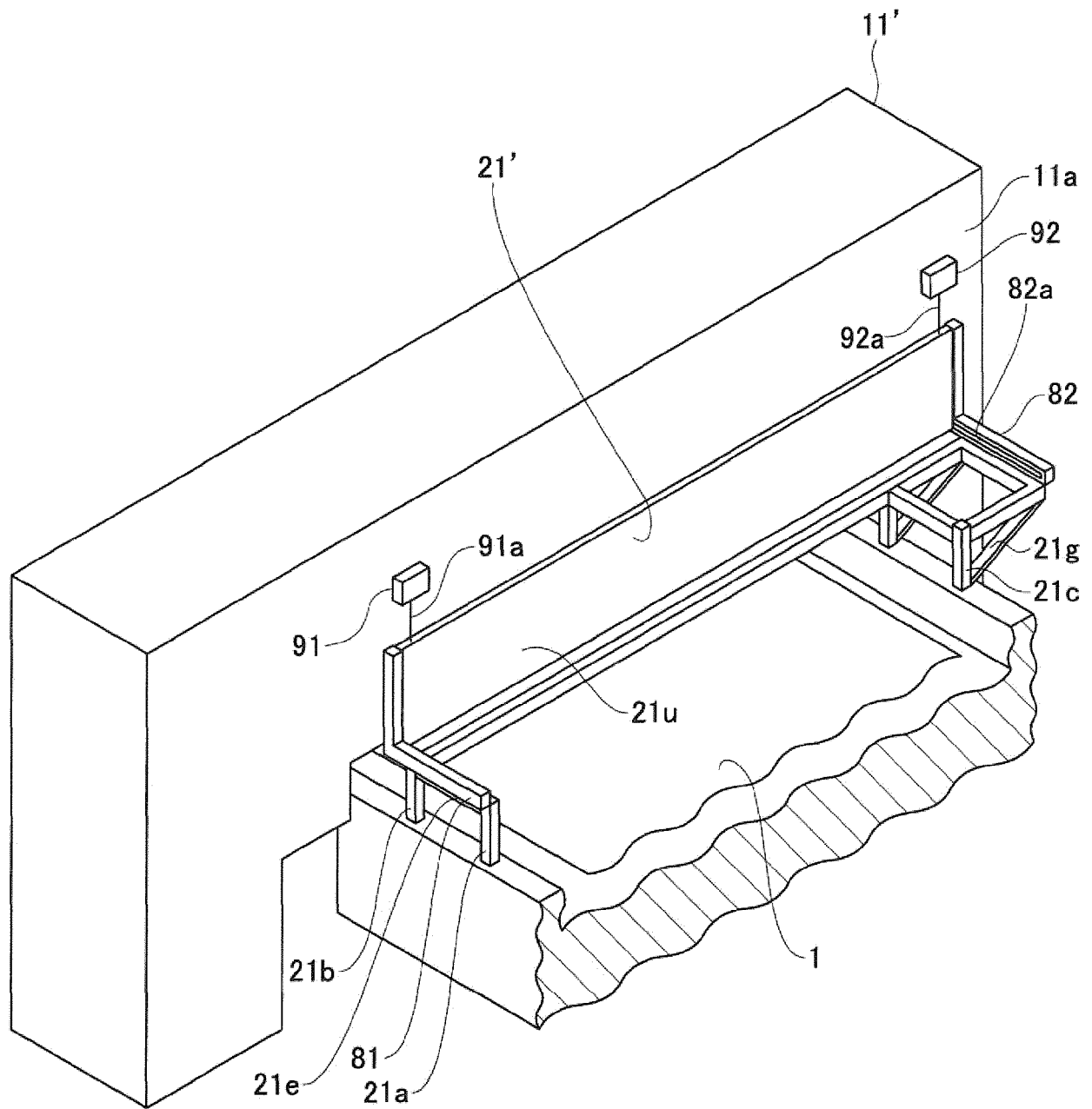


FIG. 13

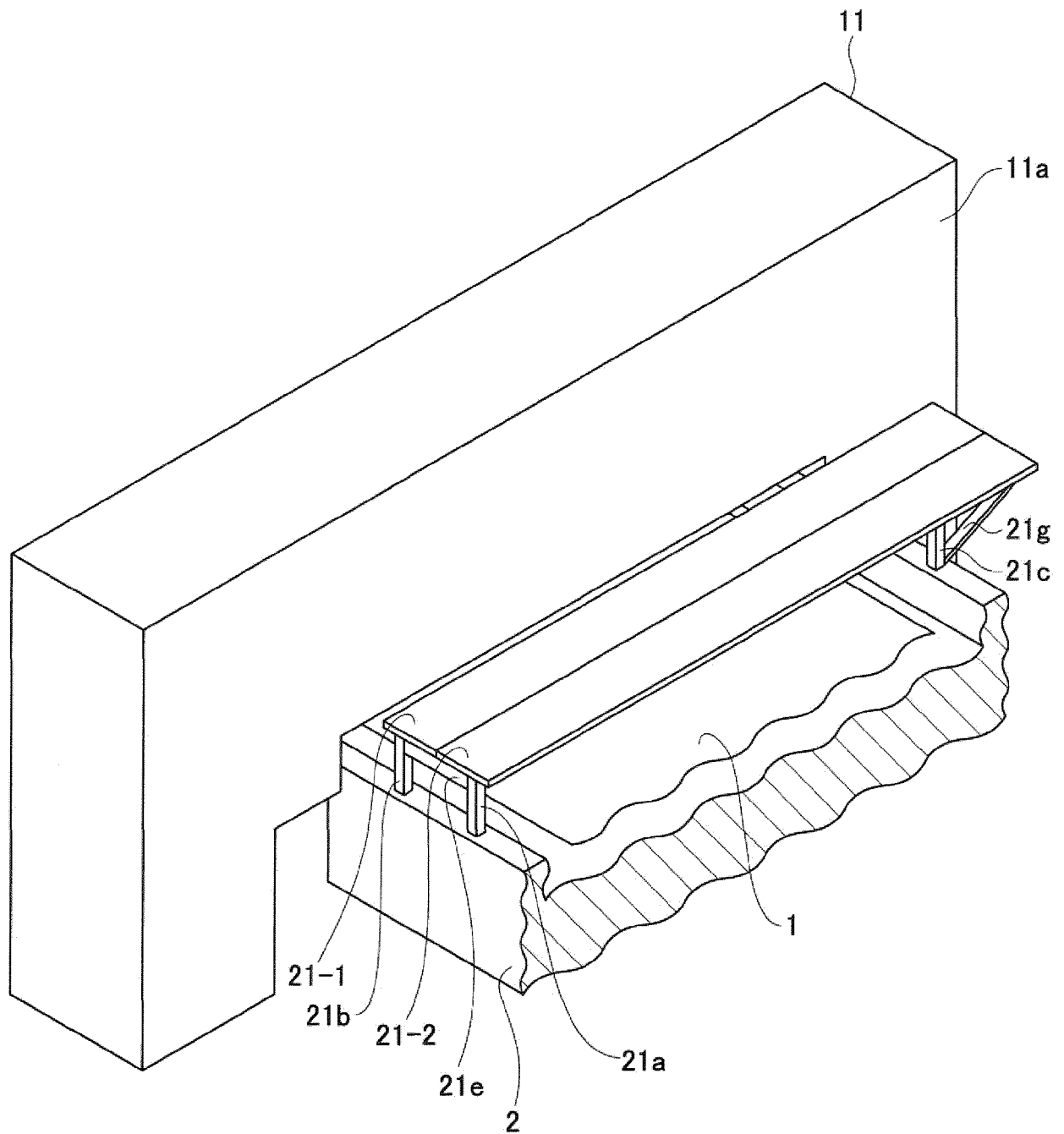


FIG. 14

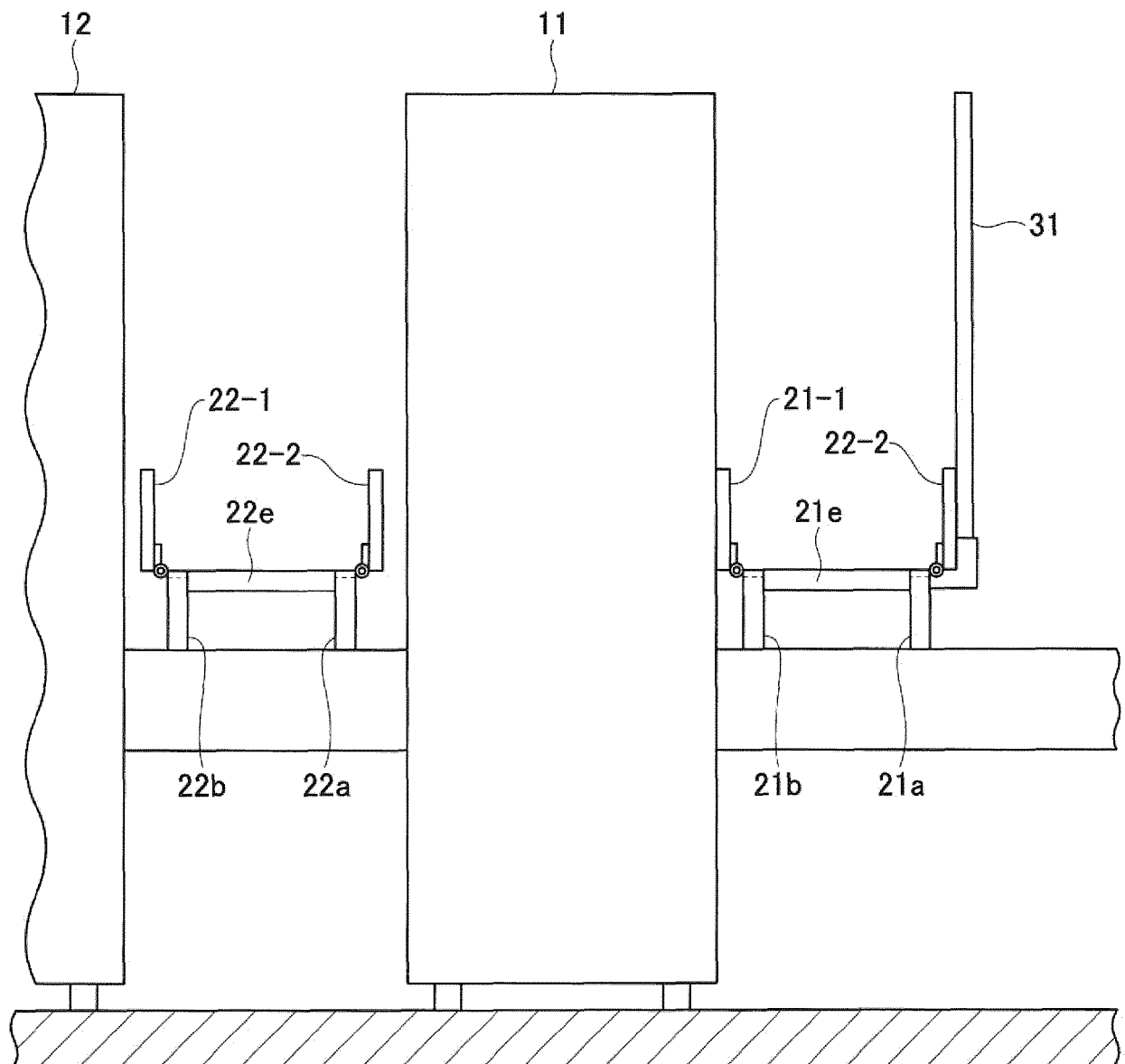


FIG. 15

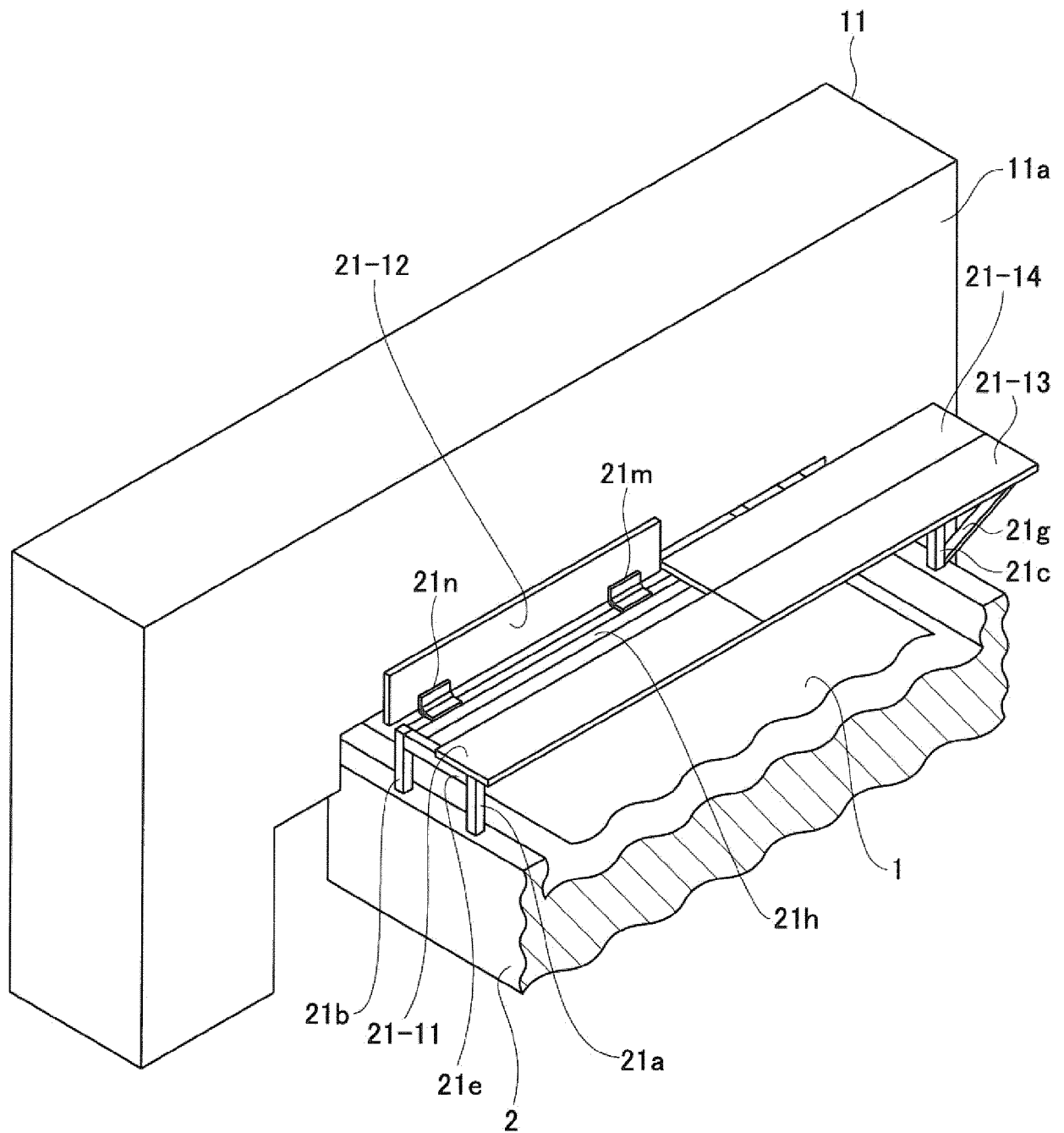


FIG. 16

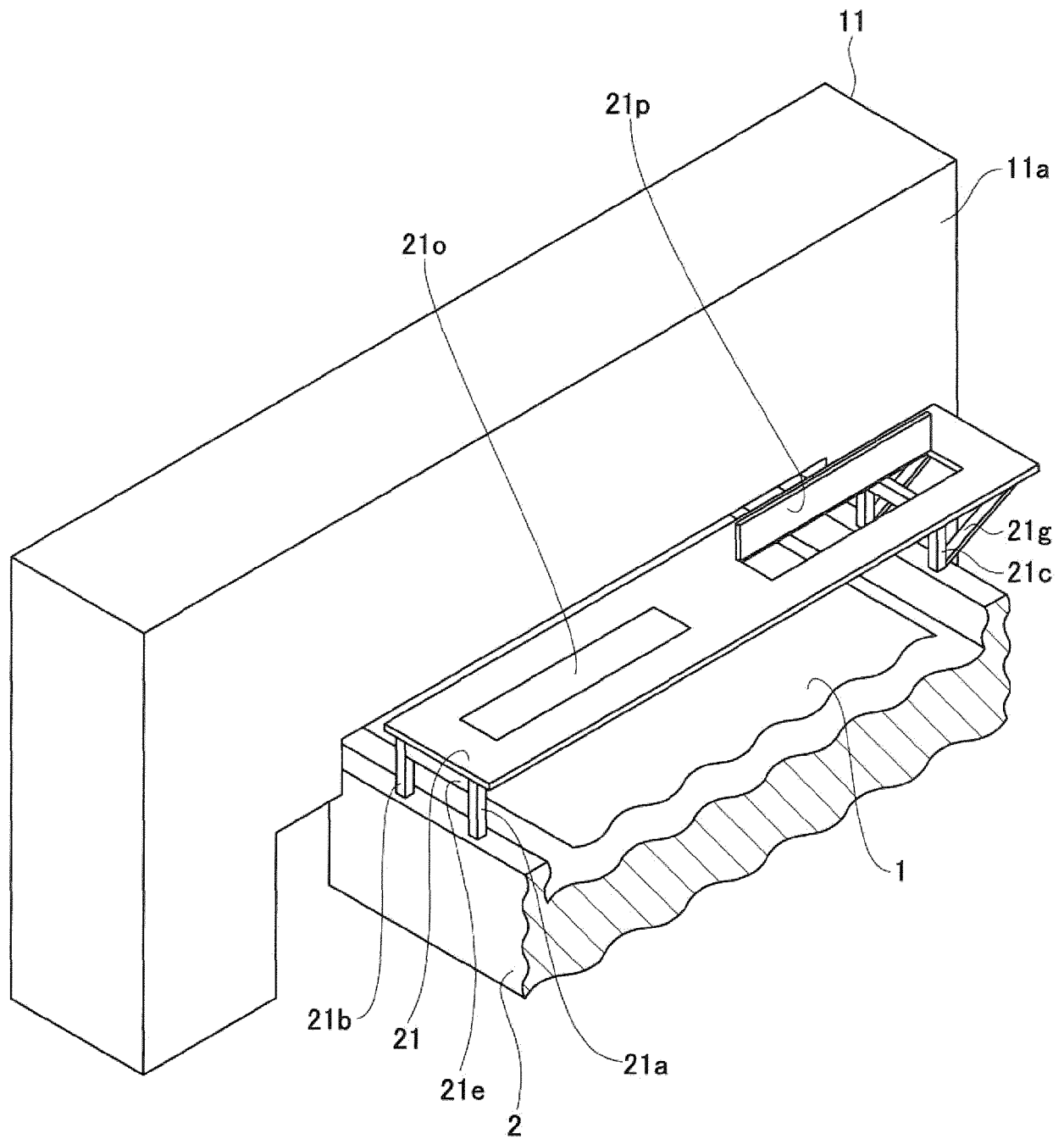
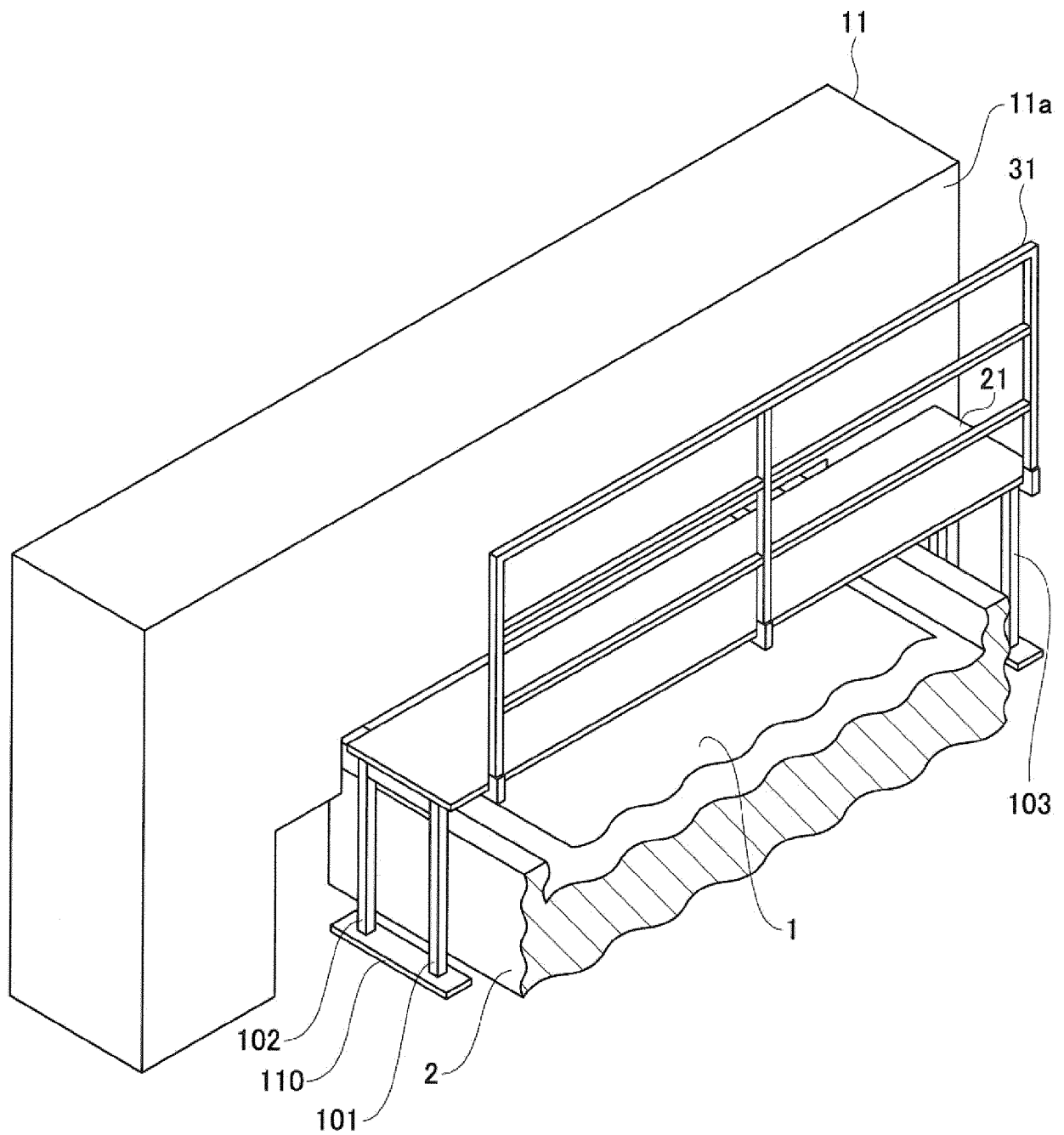


FIG. 17





EUROPEAN SEARCH REPORT

Application Number
EP 19 21 4417

5

10

15

20

25

30

35

40

45

50

55

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	JP 2017 087433 A (KOMORI CORP) 25 May 2017 (2017-05-25)	1-4, 7-11,14, 15	INV. B41J29/02 B41J29/13 B41J11/00
A	* paragraphs [0022], [0040], [0068]; figure 1 *	5,6,12, 13	
X	US 5 003 889 A (GLUNZ WOLFGANG [DE] ET AL) 2 April 1991 (1991-04-02)	1,5,6, 12,15	
A	* column 4, line 33 - column 4, line 62; figures 1-7 *	2-4, 7-11,13, 14	
X	US 5 816 157 A (GERTSCH PETER [CH] ET AL) 6 October 1998 (1998-10-06)	1,5	
A	* figures 4-5 *	2-4,6-15	
A	US 5 655 448 A (JUNGHANS RUDI [DE]) 12 August 1997 (1997-08-12) * figures 1-2 *	1-15	
A	US 2013/008744 A1 (ERNST BERNHARD WILHELM [DE] ET AL) 10 January 2013 (2013-01-10) * figure 2 *	1-15	TECHNICAL FIELDS SEARCHED (IPC) B41J B41F
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 16 June 2020	Examiner Loi, Alberto
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	

EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 19 21 4417

5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

16-06-2020

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
JP 2017087433 A	25-05-2017	NONE	
US 5003889 A	02-04-1991	DE 3905400 A1 EP 0384385 A2 JP 2839622 B2 JP H02251449 A US 5003889 A	23-08-1990 29-08-1990 16-12-1998 09-10-1990 02-04-1991
US 5816157 A	06-10-1998	DE 19516653 C1 EP 0741013 A2 ES 2128152 T3 US 5816157 A	19-09-1996 06-11-1996 01-05-1999 06-10-1998
US 5655448 A	12-08-1997	DE 9301640 U1 JP 3415668 B2 JP H06255088 A US 5655448 A	18-03-1993 09-06-2003 13-09-1994 12-08-1997
US 2013008744 A1	10-01-2013	CN 102791488 A DE 102010002613 A1 EP 2542413 A1 US 2013008744 A1 WO 2011107306 A1	21-11-2012 08-09-2011 09-01-2013 10-01-2013 09-09-2011

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- JP 2019026362 A [0001]
- JP 2016002675 A [0005] [0006]