(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 3 075 689 B1**

(12) **EUROPEAN PATENT SPECIFICATION**

(45) Date of publication and mention of the grant of the patent:
20.12.2017 Bulletin 2017/51

(21) Application number: **16162138.8**

(22) Date of filing: **24.03.2016**

(51) Int Cl.:
B65H 19/12 *(2006.01)* ***B41J 15/04*** *(2006.01)*

(54) INKJET PRINTER

TINTENSTRAHLDRUCKER

IMPRIMANTE À JET D'ENCRE

(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

(30) Priority: **24.03.2015 JP 2015060615**

(43) Date of publication of application:
05.10.2016 Bulletin 2016/40

(73) Proprietor: **Mimaki Engineering Co., Ltd.**
Tomi-City, Nagano 389-0512 (JP)

(72) Inventor: **Ohnishi, Masaru**
Tomi-city, Nagano 389-0512 (JP)

(74) Representative: **Hinkelmann, Klaus**
Patentanwaltskanzlei Hinkelmann
Lyonel-Feininger-Strasse 28
80807 München (DE)

(56) References cited:
EP-A2- 2 184 244
JP-A- H1 179 492
JP-A- 2007 031 127
US-A1- 2011 206 439
US-A1- 2013 271 543

Note: Within nine months of the publication of the mention of the grant of the European patent in the European Patent Bulletin, any person may give notice to the European Patent Office of opposition to that patent, in accordance with the Implementing Regulations. Notice of opposition shall not be deemed to have been filed until the opposition fee has been paid. (Art. 99(1) European Patent Convention).

EP 3 075 689 B1

Printed by Jouve, 75001 PARIS (FR)

Description

Technical Field

[0001] The disclosure relates to an inkjet printer for performing printing on a roll type medium which is a roll type print medium.

Background Art

[0002] In the related art, there is known a large-sized inkjet printer for performing printing a roll type medium which is a roll type print medium (see Patent Literature 1 for instance) . The inkjet printer disclosed in Patent Literature 1 has medium unwinding means, a recording unit, and winding means. The medium unwinding means has a pair of first holders for holding both end parts of a roll type medium such that the medium is rotatable. Each first holder has a shaft part configured to be fit into a core opening of a roll core of a roll type medium, and a flange part configured to be able to come into contact with an end of the roll type medium. Further, below the first holders, there are disposed a temporarily placing table where a roll type medium is temporarily placed before the roll type medium is fit on the first holders, and a lifting unit configured to lift the roll type medium temporarily placed on the temporarily placing table in order to fit the roll type medium on the first holders.

[0003] In the inkjet printer disclosed in Patent Literature 1, in order to set a roll type medium, first, a user mounts the roll type medium placed on the temporarily placing table on a mounting part of the lifting unit. Thereafter, the user lifts the roll type medium with the lifting unit until the core opening of the roll core of the roll type medium becomes flush with the first holders. Thereafter, the user manually slides the pair of first holders, thereby fitting the first holders into the core opening of the roll core.

Citation List

Patent Literature

[0004] [Patent Literature 1] JP-A-2012-153456

Summary of Invention

Technical Problem

[0005] In a case of a large-sized inkjet printer like the inkjet printer disclosed in Patent Literature 1, since roll type media are heavy in weight, user's work for setting a roll type medium

[0006] US 2011/0206439 A1 discloses a roll medium feeding apparatus comprising: a roll medium accommodating unit including a bearing that supports a shaft member of a roll medium; and a drawer member configured to slidably move relative to the roll paper accommodating unit, the roll medium accommodating unit including first support surfaces configured to support ends of the shaft member, the first support surfaces extending in a direction in which the drawer member slides from the bearing and the drawer member including second support surfaces configured to support the ends of the shaft member, the second support surfaces intersecting with the first support surfaces at an obtuse angle relative to a direction in which the shaft member extends. US 2013/0271543 A1 discloses a medium loading device comprising: a support unit having a medium holder that is attached to each of both end sections of a roll medium obtained by rolling a long medium into a roll so that the medium holder is rotatable together with the roll medium, and a medium supporter that supports the medium holder rotatably; a loading portion in which the roll medium with the support units attached thereto is loaded; a temporary placement portion on which the roll medium with the support units attached thereto is placed temporarily before being loaded into the loading portion; and a transfer path for transferring the roll medium with the support units attached thereto from the temporary placement portion to the loading portion, wherein the medium supporter has in a region facing the transfer path a contact portion that is in contact with the transfer path, and the contact portion has a first contact point at which the contact portion is in contact with the transfer path and which is closest to the loading portion and a second contact point at which the contact portion is in contact with the transfer path and which is closest to the temporary placement portion, the first contact point and the second contact point being disposed at a distance in a transfer direction of the roll medium from the temporary placement portion to the loading portion.

[0007] is cumbersome and complicated.

[0008] It is therefore an object of the disclosure to provide an inkjet printer capable of simplifying user's work for setting a roll type medium.

Solution to Problem

[0009] In order to achieve the above described object, an inkjet printer of the disclosure includes: medium setting parts where a roll type medium which is a roll type print medium is set; and medium mounting parts where the roll type medium is mounted in order to set the roll type medium in the medium setting parts, wherein, at the medium mounting parts, inclined surfaces are formed to be inclined such that the roll type medium moves toward the medium setting parts, and the medium mounting parts have stoppers which regulate movement of the roll type medium toward the medium setting parts, wherein the stoppers are configured to be movable between regulation positions for regulating movement of the roll type medium toward the medium setting parts and open positions for allowing movement of the roll type medium toward the medium setting parts.

[0010] The inkjet printer of the disclosure includes the medium mounting parts where a roll type medium is

mounted in order to set the roll type medium in the medium setting parts. Also, in the disclosure, at the medium mounting parts, the inclined surfaces are formed to be inclined such that a roll type medium moves toward the medium setting parts, and the medium mounting parts have stoppers for regulating movement of a roll type medium toward the medium setting parts. Therefore, in the disclosure, if a roll type medium is mounted on the medium mounting parts, whereby the roll type medium is moved along the inclined surfaces to positions where movement is regulated by the stoppers, it becomes possible to correct the inclination of the roll type medium by the stoppers. Therefore, in the disclosure, it becomes possible to set the roll type medium having the corrected inclination in the medium setting parts. In other words, in the disclosure, it becomes possible to prevent an inclined roll type medium from being set in the medium setting parts, and it becomes possible to make it unnecessary to perform correction on the inclination of the roll type medium in the medium setting parts. As a result, in the disclosure, it becomes possible to simplify user's work for setting a roll type medium.

[0011] In the disclosure, it is preferable that the inclined surfaces should be inclined such that the roll type medium moves toward the medium setting parts due to the weight of the roll type medium. According to this configuration, since it becomes possible to automatically move a roll type medium along the inclined surfaces, it becomes possible to further simplify user's work for setting a roll type medium.

[0012] In the disclosure, the stoppers are configured to be movable between regulation positions for regulating movement of the roll type medium toward the medium setting parts and open positions for allowing movement of the roll type medium toward the medium setting parts. According to this configuration, in a case of setting a roll type medium subjected to movement regulation by the stoppers in the medium setting parts, a user does not need to perform work such as lifting up of the roll type medium. Therefore, it is possible to further simplify user's work for setting a roll type medium.

[0013] In the disclosure, for example, the stoppers are configured to be movable between the regulation positions where they protrude upward from the inclined surfaces, thereby regulating movement of the roll type medium, and the open positions where they retract downward from the inclined surfaces, thereby allowing movement of the roll type medium. Also, in the disclosure, for example, the roll type medium is fit on a support shaft to rotate together with the roll type medium or to support the roll type medium such that the roll type medium is rotatable, and end parts of the support shaft protrude outward from both end surfaces of the roll type medium, respectively, and at the medium mounting parts, the two inclined surfaces are formed such that the end parts of the support shaft protruding outward from both end surfaces of the roll type medium are mounted on the inclined surfaces, respectively.

[0014] In the disclosure, it is preferable that the roll type medium should be fit on a support shaft to rotate together with the roll type medium or to support the roll type medium such that the roll type medium is rotatable, and end parts of the support shaft should protrude outward from both end surfaces of the roll type medium, respectively, and the medium mounting parts should have the two stoppers, and the two stoppers at the regulation positions should be able to come into contact with the end parts of the support shaft protruding outward from both end surfaces of the roll type medium, respectively. According to this configuration, the stoppers do not come into contact with the roll type medium. Therefore, it becomes possible to prevent a roll type medium from being damaged or stained due to contact with the stoppers.

[0015] In the disclosure, it is preferable that, on the outer sides of the inclined surfaces in the axial direction of the support shaft when the roll type medium is set in the medium setting parts, guide walls should be formed to guide the roll type medium toward the medium setting parts in the axial direction. According to this configuration, since the roll type medium is moved along the inclined surface to the positions where movement is regulated by the stoppers, it becomes possible to correct the position of the roll type medium in the axial direction of the support shaft by the guide walls. Therefore, it becomes possible to set a roll type medium, which is in a state where the position of the roll type medium in the axial direction of the support shaft has been corrected, in the medium setting parts. In other words, it becomes possible to prevent a roll type medium which is out of position in the axial direction of the support shaft, from being set in the medium setting parts, and it becomes possible to make it unnecessary to perform correction on the position of the roll type medium in the medium setting parts. As a result, it becomes possible to further simplify user's work for setting a roll type medium.

Advantageous Effects of Invention

[0016] As described above, in the inkjet printer of the disclosure, it becomes possible to simplify user's work for setting a roll type medium.

Brief Description of Drawings

[0017]

FIG. 1 is a perspective view illustrating the whole of an inkjet printer according to an embodiment of the disclosure.

FIG. 2 is a plan view of a rear end side part of the inkjet printer shown in FIG. 1.

FIG. 3 is a side view of a medium lifting/lowering mechanism shown in FIG. 2.

FIG. 4 is a side view illustrating a rear end side part of a medium holding member as seen from a direction E-E of FIG. 2.

FIGs. 5(A) and 5(B) are views for explaining the operation of a stopper shown in FIG. 4.
FIGs. 6(A) and 6(B) are plan views for explaining the effects of the inkjet printer shown in FIG. 1.
FIGs. 7(A) and 7(B) are plan views for explaining the effects of the inkjet printer shown in FIG. 1.
FIG. 8 is a plan view for explaining a rear end side part of an inkjet printer according to another embodiment of the disclosure.
FIG. 9 is a side view for explaining a rear end side part of the inkjet printer according to another embodiment of the disclosure.
FIGs. 10 (A) to 10 (C) are side views for explaining a rear end side part of the inkjet printer according to another embodiment of the disclosure.
FIG. 11 is a plan view for explaining a medium lifting/lowering mechanism according to another embodiment of the disclosure.
FIG. 12 is a side view of the medium lifting/lowering mechanism shown in FIG. 11.
FIG. 13 is a side view for explaining a medium lifting/lowering mechanism according to a further embodiment of the disclosure.
FIG. 14 is a side view for explaining a medium lifting/lowering mechanism according to a still further embodiment of the disclosure.

Description of Embodiments

[0018] Hereinafter, embodiments of the disclosure will be described with reference to the drawings.

(OVERALL CONFIGURATION OF INKJET PRINTER)

[0019] FIG. 1 is a perspective view illustrating the whole of an inkjet printer 1 according to an embodiment of the disclosure. FIG. 2 is a plan view of a rear end side part of the inkjet printer 1 shown in FIG. 1. FIG. 3 is a side view of a medium lifting/lowering mechanism 4 shown in FIG. 2.

[0020] The inkjet printer 1 (hereinafter, referred to as the "printer 1") of the present embodiment is a large-sized printer for performing printing a roll type medium 2 which is a roll type print medium. The printer 1 includes a main printer body 3, and the medium lifting/lowering mechanism 4 for lifting and lowering a roll type medium 2 to be set in the main printer body 3. The main printer body 3 includes a printing unit 6 for performing printing on a roll type medium 2, two supporting members 7 for supporting the printing unit 6, and two medium holding members 8 for holding a roll type medium 2. Also, in FIG. 1, the medium lifting/lowering mechanism 4 is not shown.

[0021] A roll type medium 2 is fit on a support shaft 9 for supporting the roll type medium 2 such that the roll type medium is rotatable. Specifically, the roll type medium 2 is fit on the support shaft 9 such that the roll type medium is rotatable with bearings interposed therebetween. The support shaft 9 is formed in an elongated columnar shape. Both end parts 9a of the support shaft 9 protrude outward from both end surfaces of the roll type medium 2. In other words, both end parts 9a of the support shaft 9 protrude outward from both end surfaces of the roll type medium 2 in the axial direction of the roll type medium 2 (the axial direction of the support shaft 9), respectively.

[0022] The printing unit 6 includes an inkjet head (not shown) for ejecting ink toward a roll type medium 2. In the following description, the movement direction of the inkjet head (that is, a main scan direction or the Y direction of the drawings such as FIG. 1) will be referred to as the left-right direction, and a direction (the X direction of the drawings such as FIG. 1) perpendicular to a vertical direction (an upward and downward direction or the Z direction of the drawings such as FIG. 1) and the left-right direction will be referred to as the front-rear direction. Also, the X1 direction side and the X2 direction side will be referred to as the front side and the rear side from the below, respectively.

[0023] The supporting members 7 are installed on a floor. The two supporting members 7 support both end sides of the printing unit 6 in the left-right direction, respectively, and the printing unit 6 is attached to the upper ends of the supporting members 7. The medium holding members 8 are formed almost in an elongated cuboidal rod shape. The two medium holding members 8 are fixed to the two supporting members 7, respectively, such that the longitudinal directions of the medium holding members 8 are aligned in the front-rear direction. The interval between the two medium holding members 8 in the left-right direction is set to be wider than the width of a roll type medium 2 (the width in the axial direction of a roll type medium 2).

[0024] At front end side parts of the two medium holding members 8, winding-side holding parts 10 for holding a roll type medium 2 subjected to printing by the printing unit 6 are provided. Specifically, at the front end side part of each of the two medium holding members 8, a recess 11 is formed downward from the top surface of the corresponding medium holding members 8, and the winding-side holding parts 10 are configured by the two recesses 11. The recesses 11 are formed, for example, such that their shapes as seen from the left-right direction become almost a U shape. In the recesses 11, both end parts 9a of the support shaft 9 are disposed, whereby the support shaft 9 is disposed such that the axial direction of the support shaft is aligned in the left-right direction.

[0025] At rear end side parts of the two medium holding members 8, there are provided feeding side holding parts 12 for holding a roll type medium 2 to be printed by the printing unit 6, and medium mounting parts 13 where a roll type medium 2 is mounted in order to set a roll type medium 2 in the feeding side holding parts 12. The feeding side holding parts 12 in the present embodiment are medium setting parts where a roll type medium 2 is set. The detailed configurations of the feeding side holding

parts 12 and the medium mounting parts 13 will be described below.

[0026] The medium lifting/lowering mechanism 4 includes a main body part 15, and two lifting/lowering members 16 which are held on the main body part 15 such that they can move up and down. The main body part 15 is joined with a slide mechanism (not shown) for sliding the main body part 15 in the front-rear direction, and thus can be automatically or manually moved in the front-rear direction. On the upper end side of the main body part 15, rollers 17 are attached so as to be rotatable. On the rollers 17, a roll type medium 2 to be mounted on the medium mounting parts 13 is mounted. In the present embodiment, each pair of rollers 17 are disposed so as to be adjacent to each other in the left-right direction. In other words, on the upper end side of the main body part 15, four rollers 17 are attached. The four rollers 17 are attached on the upper end side of the main body part 15 such that a roll type medium 2 mounted on the rollers 17 can move in the left-right direction. Also, the axial directions of the rotating shafts of each pair of rollers 17 are inclined downward as they go inward in the front-rear direction (refer to FIG. 3), such that a roll type medium 2 mounted on the rollers 17 is positioned in the front-rear direction.

[0027] The lifting/lowering members 16 are formed almost in an elongated, rectangular, and flat plate shape. The lifting/lowering members 16 are disposed such that the longitudinal directions of the lifting/lowering members 16 are aligned in the front-rear direction. Also, the lifting/lowering members 16 are disposed such that the rear end side parts of the lifting/lowering members 16 protrude from the main body part 15 toward the rear side. The two lifting/lowering members 16 are disposed with the four rollers 17 interposed therebetween in the left-right direction, as seen from the upward and downward direction. In other words, the two lifting/lowering members 16 are disposed with a predetermined interval in the left-right direction. The interval between the two lifting/lowering members 16 in the left-right direction is set to be narrower than the width of a roll type medium 2 (the width in the axial direction). As shown in FIG. 3, the thicknesses of the rear end parts of the lifting/lowering members 16 (the thicknesses in the upward and downward direction) gradually decrease as they go toward the rear side. The two lifting/lowering members 16 are joined with a driving mechanism (not shown) for lifting and lowering the lifting/lowering members 16 automatically or manually.

(CONFIGURATIONS OF FEEDING SIDE HOLDING PARTS AND MEDIUM MOUNTING PARTS)

[0028] FIG. 4 is a side view illustrating a rear end side part of a medium holding member 8 as seen from a direction E-E of FIG. 2. FIGs. 5(A) and 5(B) are views for explaining the operation of a stopper 23 shown in FIG. 4.

[0029] At the rear end side part of each of the two medium holding members 8, a recess 19 is formed downward from the top surface of the corresponding medium holding member 8. In the present embodiment, the feeding side holding parts 12 are configured by the two recesses 19. The recesses 19 are formed, for example, such that their shapes as seen from the left-right direction become almost a U shape. Also, the recesses 19 are formed in predetermined ranges on the outer sides from the inner surfaces of the medium holding members 8 in the left-right direction. In other words, in a medium holding member 8 to be disposed on the right side, a recess 19 is formed in a predetermined range on the right side from the left surface of the medium holding member 8, and in a medium holding member 8 to be disposed on the left side, a recess 19 is formed in a predetermined range on the left side from the right surface of the medium holding member 8. In the recesses 19, both end parts 9a of the support shaft 9 are disposed, whereby the support shaft 9 is disposed such that the axial direction of the support shaft is arranged in the left-right direction. In other words, the left-right direction is the axial direction of the support shaft 9 when a roll type medium 2 has been set in the feeding side holding parts 12.

[0030] The medium mounting parts 13 are disposed on the rear sides of the feeding side holding parts 12 (that is, the rear sides of the recesses 19). At the medium mounting parts 13, inclined surfaces 20 are formed to be inclined such that a roll type medium 2 moves toward the feeding side holding parts 12. In other words, at the rear end side parts of the two medium holding members 8, the planar inclined surfaces 20 are formed, respectively, to be inclined downward as they go toward the front side, such that a roll type medium 2 moves toward the two recesses 19. The inclined surfaces 20 are inclined such that a roll type medium 2 moves toward the feeding side holding parts 12 due to the weight of the roll type medium. Also, the inclined surfaces 20 are formed to be connected directly to the recesses 19. In other words, the front ends of the inclined surfaces 20 are connected directly to the recesses 19. Also, the two inclined surfaces 20 are disposed at positions overlapping each other in the front-rear direction. The recesses 19 are deeper than the front ends of the inclined surfaces 20.

[0031] As described above, the interval between the two medium holding members 8 in the left-right direction is set to be wider than the width of a roll type medium 2, and in a case of setting a roll type medium 2 on the feeding side holding parts 12, both end parts 9a of the support shaft 9 (that is, the end parts 9a of the support shaft 9 protruding outward from both end surfaces of the roll type medium 2, respectively) are mounted on the two inclined surfaces 20, respectively, as will be described below. In other words, the medium mounting parts 13 have the two inclined surfaces 20 where both end parts 9a of the support shaft 9 are mounted, respectively.

[0032] Also, at the medium mounting parts 13, horizontal surfaces 21 are formed to be connected to the rear ends of the inclined surfaces 20, and guide walls 22 are formed in the left-right direction so as to guide a roll type

medium 2 to the feeding side holding parts 12. Each horizontal surface 21 is formed in a planar shape perpendicular to the vertical direction (the upward and downward direction). The guide walls 22 are formed in planar shapes rising up from the inclined surfaces 20. Also, the guide walls 22 are formed on the outer sides of the inclined surfaces 20 in the left-right direction. In other words, in the medium holding member 8 to be disposed on the right side, a guide wall 22 is formed on the right side of the inclined surface 20, and in the medium holding member 8 to be disposed on the left side, a guide wall 22 is formed on the left side of the inclined surface 20. As seen from the upward and downward direction, the two guide walls 22 are inclined inward in the left-right direction as they go toward the front side. The front ends of the guide walls 22 are connected to the outer side surfaces of the recesses 19 in the left-right direction.

[0033] Also, at the medium mounting parts 13, protrusions for preventing a roll type medium 2 from falling to the rear side may be formed to rise up from the rear end parts of the horizontal surfaces 21. Also, at the medium mounting parts 13, the horizontal surfaces 21 may not be formed. Also, between the inclined surfaces 20 and the recesses 19 in the front-rear direction, horizontal surfaces may be formed in planar shapes perpendicular to the vertical direction.

[0034] The medium mounting parts 13 have stoppers 23 for regulating movement of a roll type medium 2 toward the feeding side holding parts 12 due to the weight of the roll type medium. The stoppers 23 are disposed on the front end parts of the two inclined surfaces 20, respectively. In other words, the medium mounting parts 13 have two stoppers 23. The stoppers 23 are formed, for example, in an elongated columnar shape, and are disposed such that the longitudinal directions of the stoppers 23 are aligned in the upward and downward direction. Also, the two stoppers 23 are disposed at positions overlapping each other in the front-rear direction. The stoppers 23 are joined to a lifting/lowering mechanism (not shown) for lifting and lowering the stoppers 23 automatically or manually.

[0035] The stoppers 23 are configured to be movable between regulation positions 23A (the position shown in FIG. 5 (A)) for regulating movement of a roll type medium 2 toward the feeding side holding parts 12 due to the weight of the roll type medium, and open positions 23B (the position shown in FIG. 5(B)) for allowing movement of a roll type medium 2 toward the feeding side holding parts 12 due to the weight of the roll type medium. In other words, the stoppers 23 are configured to be able to move up and down between the regulation positions 23A where they protrude upward from the inclined surfaces 20, thereby regulating movement of a roll type medium 2, and the open positions 23B where they retract downward from the inclined surfaces 20, thereby allowing movement of a roll type medium 2, and are configured to be able to protrude and retract from the top surface sides of the inclined surfaces 20. The stoppers 23 move up and down between the regulation positions 23A and the open positions 23B, for example, by pressing an operation button (not shown). The two stoppers 23 at the regulation positions 23A can come into contact with both end parts 9a of the support shaft 9, respectively.

(METHOD OF SETTING ROLL TYPE MEDIUM)

[0036] In the printer 1, in a case of setting a roll type medium 2 in the feeding side holding parts 12, first, the roll type medium 2 is mounted on the main body part 15 of the medium lifting/lowering mechanism 4. Specifically, first, in a state where the main body part 15 has been slid to the rear side and the lifting/lowering members 16 have been lowered to the lower limit, a user mounts the roll type medium 2 on the rear end parts of the two lifting/lowering members 16 from the rear sides of the lifting/lowering members 16. Since the interval between the two lifting/lowering members 16 in the left-right direction is narrower than the width of the roll type medium 2 as described above, on the two lifting/lowering members 16, the roll type medium 2, not the support shaft 9, is placed. Thereafter, the lifting/lowering members 16 are lifted, whereby the roll type medium 2 is moved on the lifting/lowering members 16 toward the front side. As a result, the roll type medium 2 is mounted on the rollers 17.

[0037] Thereafter, the main body part 15 is moved toward the front side while the lifting/lowering members 16 are lifted, whereby the roll type medium 2 is mounted on the medium mounting parts 13. Specifically, both end parts 9a of the support shaft 9 are mounted on the two inclined surfaces 20 from the upper sides of the medium holding members 8, respectively. When the both end parts 9a of the support shaft 9 are mounted on the inclined surfaces 20, the stoppers 23 are disposed at the regulation positions 23A. Therefore, if both end parts 9a of the support shaft 9 are mounted on the inclined surfaces 20, the roll type medium 2 moves along the inclined surfaces 20 due to the weight of the roll type medium until both end parts 9a of the support shaft 9 come into contact with the two stoppers 23. Also, if both end parts 9a of the support shaft 9 come into contact with the two stoppers 23, the stoppers 23 are moved to the open positions 23B. If the stoppers 23 move to the open positions 23B, the roll type medium 2 moves along the inclined surfaces 20 again due to the weight of the roll type medium, whereby both end parts 9a of the support shaft 9 are fit into the recesses 19. If both end parts 9a of the support shaft 9 are fit into the recesses 19, setting of the roll type medium 2 in the feeding side holding parts 12 is completed.

(MAIN EFFECTS OF PRESENT EMBODIMENT)

[0038] As described above, in the present embodiment, the inclined surfaces 20 are formed at the medium mounting parts 13 so as to be inclined such that a roll type medium 2 moves toward the feeding side holding parts 12 due to the weight of the roll type medium, and

the stoppers 23 are configured to be able to move between the regulation positions 23A and the open positions 23B. Also, in the present embodiment, when a roll type medium 2 is mounted on the medium mounting parts 13, the stoppers 23 are disposed at the regulation positions 23A, and if both end parts 9a of the support shaft 9 come into contact with the two stoppers 23, the stoppers 23 are moved to the open positions 23B. Therefore, in the present embodiment, for example, even if the roll type medium 2 is mounted on the medium mounting parts 13 in a state where the axial direction of the roll type medium 2 is inclined with respect to the left-right direction as seen from the upward and downward direction as shown in FIG. 6(A), it is possible to correct the inclination of the roll type medium 2 as shown in FIG. 6 (B) by the stoppers 23, and then set the roll type medium 2 having the corrected inclination in the feeding side holding parts 12.

[0039] In other words, in the present embodiment, it becomes possible to prevent an inclined roll type medium 2 from being set in the feeding side holding parts 12, and it becomes possible to make it unnecessary to perform correction on the inclination of the roll type medium 2 in the feeding side holding parts 12. Therefore, in the present embodiment, it becomes possible to simplify user's work for setting a roll type medium 2. Also, in the present embodiment, since the inclined surfaces 20 are inclined such that a roll type medium 2 moves toward the feeding side holding parts 12 due to the weight of the roll type medium, it becomes possible to automatically move a roll type medium 2 along the inclined surfaces 20. Therefore, in the present embodiment, it becomes possible to further simplify user's work for setting a roll type medium 2. Further, in the present embodiment, since the stoppers 23 can move between the regulation positions 23A and the open positions 23B, in a case of setting a roll type medium 2, subjected to movement regulation by the stoppers 23, in the feeding side holding parts 12, the user does not need to lift up the roll type medium 2. Therefore, in the present embodiment, it is possible to further simplify user's work for setting a roll type medium 2.

[0040] Also, in the present embodiment, if the user mounts a roll type medium 2 on the medium mounting parts 13 in a state where the stoppers 23 have been moved to the regulation positions 23A, and both end parts 9a of the support shaft 9 come into contact with the two stoppers 23, the stoppers 23 are moved to the open positions 23B. Therefore, it becomes possible to automatically correct the inclination of the roll type medium 2, and it becomes possible to automatically set the roll type medium 2 having the corrected inclination, on the feeding side holding parts 12. Therefore, in the present embodiment, setting of a roll type medium 2 is easy.

[0041] Also, in the present embodiment, since the medium mounting parts 13 have the guide walls 22 formed in the left-right direction so as to guide a roll type medium 2 to the feeding side holding parts 12, for example, even if a roll type medium 2 is mounted on the medium mounting parts 13 in a state where the roll type medium is out of place in the left-right direction with respect to the feeding side holding parts 12 as shown in FIG. 7(A), it becomes possible to automatically correct the deviation of the roll type medium 2 in the left-right direction by the guide walls 22, and then automatically set the roll type medium 2 subjected to correction on the deviation in the left-right direction, in the feeding side holding parts 12, as shown in FIG. 7(B). That is, in the present embodiment, it becomes possible to set the roll type medium 2, which is in a state where the position of the roll type medium in the left-right direction has been corrected, in the feeding side holding parts 12. In other words, in the present embodiment, it becomes possible to prevent a roll type medium 2 which is out of position in the left-right direction, from being set in the feeding side holding parts 12, and it becomes possible to make it unnecessary to perform correction on the position of a roll type medium 2 in the left-right direction, in the feeding side holding parts 12. As a result, in the present embodiment, it becomes possible to further simplify user's work for setting a roll type medium 2.

[0042] In the present embodiment, the stoppers 23 at the regulation positions 23A come into contact with both end parts 9a of the support shaft 9. In other words, in the present embodiment, the stoppers 23 do not come into contact with a roll type medium 2. For this reason, in the present embodiment, it becomes possible to prevent a roll type medium 2 from being damaged or stained due to contact with the stoppers 23.

(OTHER EMBODIMENTS)

[0043] In the above described embodiment, the inclined surfaces 20 are inclined such that a roll type medium 2 moves toward the feeding side holding parts 12 due to the weight of the roll type medium. However, the inclined surfaces 20 may be inclined such that a roll type medium 2 cannot move toward the feeding side holding parts 12 due to the weight of the roll type medium. In other words, the inclination angle of the inclined surfaces 20 may be such a gentle angle that a roll type medium 2 does not move toward the feeding side holding parts 12 due to the weight of the roll type medium. In this case, the user may apply little force to a roll type medium 2, thereby moving the roll type medium 2 along the inclined surfaces 20.

[0044] In the above described embodiment, a roll type medium 2 is fit on the support shaft 9 for supporting the roll type medium 2 such that the roll type medium is rotatable. However, a roll type medium 2 is fixed to the support shaft 9 to rotate together with the roll type medium 2. In this case, for example, as shown in FIG. 8, bearings 30 are fit on both end parts 9a of the support shaft 9, respectively, and the bearings 30 are fit into the recesses 19 constituting the feeding side holding parts 12. Also, in the example shown in FIG. 8, in a case of setting a roll type medium 2 in the feeding side holding parts 12, the two bearings 30 are mounted on the two inclined sur-

faces 20, respectively. Also, in a case where a roll type medium 2 is fixed to the support shaft 9 to rotate together with the roll type medium 2, as shown in FIG. 9, rollers 31 for supporting the support shaft 9 such that the support shaft is rotatable may be disposed in the recesses 19. In other words, the feeding side holding parts 12 may have the rollers 31 for supporting the support shaft 9 such that the support shaft is rotatable. Also, in FIG. 8 and FIG. 9, components identical to those in the above described embodiment are denoted by the same reference symbols.

[0045] In the above described embodiment, in a case of setting a roll type medium 2 in the feeding side holding parts 12, both end parts 9a of the support shaft 9 disposed on the upper sides of the medium holding members 8 are mounted on the inclined surfaces 20 as they are. Besides, for example, as shown in FIG. 10, passing grooves 33 may be formed in the medium holding members 8 so as to pass both end parts 9a of the support shaft 9 from the lower sides of the medium holding members 8 to the upper sides of the medium holding members 8. In this case, movable lids 34 for blocking the upper ends of the passing grooves 33 are disposed on the upper end sides of the passing grooves 33. The movable lids 34 are configured to be rotatable around support shafts 35. Also, the top surfaces of the movable lids 34 constitute parts of the inclined surfaces 20. In the example shown in FIG. 10, after the support shaft 9 disposed on the lower sides of the medium holding members 8 is lifted until both end parts 9a of the support shaft 9 pass through the passing grooves 33 and the movable lids 34 lifted by both end parts 9a of the support shaft 9 having passed through the passing grooves 33 return to their original states, the support shaft 9 is lowered, whereby both end parts 9a of the support shaft 9 are mounted on the inclined surfaces 20. Also, in FIG. 10, components identical to those in the above described embodiment are denoted by the same reference symbols.

[0046] In the above described embodiment, the stoppers 23 are joined to the lifting/lowering mechanism for lifting and lowering the stoppers 23 automatically or manually. However, the stoppers 23 may be joined with a rotating mechanism for rotating the stoppers 23 automatically or manually. In this case, the stoppers 23 rotate between the regulation positions 23A where they protrude upward from the inclined surfaces 20, thereby regulating movement of a roll type medium 2, and the open positions 23B where they retract downward from the inclined surfaces 20, thereby allowing movement of a roll type medium 2. Also, the stoppers 23 may be joined with a slide mechanism for automatically or manually sliding the stoppers 23 in the left-right direction. In this case, the stoppers 23 slide between regulation positions where they protrude inward from the guide walls 22 in the left-right direction, thereby regulating movement of a roll type medium 2, and open positions where they retreat outward from the guide walls 22 in the left-right direction, thereby allowing movement of a roll type medium 2.

[0047] Also, in the above described embodiment, the stoppers 23 are configured to be movable between the regulation positions 23A and the open positions 23B. However, the stoppers 23 may be fixed at the regulation positions 23A. In other words, the stoppers 23 may be protrusions which protrude upward from the inclined surfaces 20, thereby regulating movement of a roll type medium 2. Even in this case, since it becomes possible to correct the inclination of a roll type medium 2 by the stoppers 23, it becomes possible to set the roll type medium 2 having the corrected inclination in the feeding side holding parts 12. In other words, it becomes possible to prevent an inclined roll type medium 2 from being set in the feeding side holding parts 12, and it becomes possible to make it unnecessary to perform correction on the inclination of the roll type medium 2 in the feeding side holding parts 12. As a result, it becomes possible to simplify user's work for setting a roll type medium 2. Also, in this case, the user may lift up a roll type medium 2 subjected to movement regulation by the stoppers 23, and set the roll type medium in the feeding side holding parts 12.

[0048] In the above described embodiment, a roll type medium 2 is fit on one support shaft 9. However, a roll type medium 2 may be fit on two support shafts separated in the left-right direction. In this case, end parts of each of the two support shafts protrude outward from both end surfaces of the roll type medium 2, respectively. Also, in the above described embodiment, the guide walls 22 are formed at the medium mounting parts 13. However, the guide walls 22 may not be formed at the medium mounting parts 13.

[0049] In the above described embodiment, the interval between the two lifting/lowering members 16 in the left-right direction is set to be narrower than the width of a roll type medium 2, and a roll type medium 2 is mounted on the two lifting/lowering members 16. Alternatively, for example, as shown in FIG. 11, the interval between the two lifting/lowering members 16 in the left-right direction may be set to be wider than the width of a roll type medium 2, and both end parts 9a of the support shaft 9 may be mounted on the two lifting/lowering members 16, respectively. In this case, for example, the main body part 15 is divided into two parts in the left-right direction. Also, in this case, as shown in FIG. 12, after the lower sides of both end parts 9a of the support shaft 9 are disposed on the lifting/lowering members 16 in a state where the lifting/lowering members 16 have been lowered to the lower limit, the lifting/lowering members 16 are lifted, whereby it is possible to lift a roll type medium 2. In other words, in this case, the user does not need to mount a roll type medium 2 on the lifting/lowering members 16. Therefore, it becomes possible to simplify user's work for setting a roll type medium 2. Also, in FIG. 11 and FIG. 12, components identical to those in the above described embodiment are denoted by the same reference symbols.

[0050] In the above described embodiment, the printer 1 may include a medium lifting/lowering mechanism 44

shown in FIG. 13 or 14, in place of the medium lifting/lowering mechanism 4. The medium lifting/lowering mechanism 44 includes a pillar main body part 45 which is disposed such that the longitudinal direction thereof is aligned in the upward and downward direction, a lifting/lowering member 46 which is held by the main body part 45 so as to be movable up and down, and wheels 47 for moving the main body part 45. The lifting/lowering member 46 is joined with a driving mechanism for manually lifting and lowering the lifting/lowering member 46, and if a handle 48 is rotated, the lifting/lowering member 46 moves up or down. In the example shown in FIG. 13, a roll type medium 2 is mounted on the lifting/lowering member 46, and in the example shown in FIG. 14, both end parts 9a of the support shaft 9 are mounted on the lifting/lowering member 46.

Reference Signs List

[0051]

1:	printer (inkjet printer)
2:	roll type medium
9:	support shaft
9a:	both end parts (end parts)
12:	feeding side holding part (medium setting part)
13:	medium mounting part
20:	inclined surface
22:	guide wall
23:	stopper
23A:	regulation position
23B:	open position
Y:	axial direction of support shaft

Claims

1. An inkjet printer (1), comprising:

medium setting parts (12) where a roll type medium (2) which is a roll type print medium is set; and
medium mounting parts (13) where the roll type medium (2) is mounted in order to set the roll type medium (2) in the medium setting parts (12),
wherein, at the medium mounting parts (13), inclined surfaces (20) are formed to be inclined such that the roll type medium (2) moves toward the medium setting parts (12), and
the medium mounting parts (13) have stoppers (23) which regulate movement of the roll type medium (2) toward the medium setting parts (12), **characterised in that** the stoppers (23) are configured to be movable between regulation positions (23A) for regulating movement of the roll type medium (2) toward the medium setting parts (12) and open positions (23B) for allowing movement of the roll type medium (2) toward the medium setting parts (12).

2. The inkjet printer (1) according to claim 1, wherein:

the inclined surfaces (20) are inclined such that the roll type medium (2) moves toward the medium setting parts (12) due to the weight of the roll type medium (2).

3. The inkjet printer (1) according to claim 1 or 2, wherein:

the stoppers (23) are configured to be movable between the regulation positions (23A) where they protrude upward from the inclined surfaces (20), thereby regulating movement of the roll type medium (2), and the open positions (23B) where they retract downward from the inclined surfaces (20), thereby allowing movement of the roll type medium (2).

4. The inkjet printer (1) according to any one of claims 1 to 3, wherein:

the roll type medium (2) is fit on a support shaft (9) to rotate together with the roll type medium (2) or to support the roll type medium (2) such that the roll type medium (2) is rotatable,
end parts (9a) of the support shaft (9) protrude outward from both end surfaces of the roll type medium (2), respectively, and
at the medium mounting parts (13), the two inclined surfaces (20) are formed such that the end parts (9a) of the support shaft (9) protruding outward from both end surfaces of the roll type medium (2) are mounted on the inclined surfaces (20), respectively.

5. The inkjet printer (1) according to any one of claims 1 to 4, wherein:

the roll type medium (2) is fit on a support shaft (9) to rotate together with the roll type medium (2) or to support the roll type medium (2) such that the roll type medium (2) is rotatable,
end parts (9a) of the support shaft (9) protrude outward from both end surfaces of the roll type medium (2), respectively,
the medium mounting parts (13) have the two stoppers (23), and the two stoppers (23) at the regulation positions (23A) can come into contact with the end parts (9a) of the support shaft (9) protruding outward from both end surfaces of the roll type medium (2), respectively.

6. The inkjet printer (1) according to claim 4 or 5, wherein:

on the outer sides of the inclined surfaces (20) in the axial direction of the support shaft (Y) when the roll type medium (2) is set in the medium setting parts (12), guide walls (22) are formed to guide the roll type medium (2) toward the medium setting parts (12) in the axial direction.

Patentansprüche

1. Ein Tintenstrahldrucker (1), umfassend:

Mediumeinsetzteile (12), in denen ein walzenartiges Medium (2), das ein Druckmedium vom Walzentyp ist, eingesetzt ist; und
Mediumanbringteile (13), an denen das walzenartige Medium (2) angebracht ist, um das walzenartige Medium (2) in die Mediumeinsetzteile (12) einzusetzen,
wobei an den Mediumanbringteilen (13) geneigte Oberflächen (20) derart ausgebildet sind, dass sie geneigt sind, so dass sich das walzenartige Medium (2) in Richtung zu den Mediumeinsetzteilen (12) bewegt, und
die Mediumanbringteile (13) Stoppeinrichtungen (23) aufweisen, die die Bewegung des walzenartigen Mediums (2) in Richtung der Mediumeinsetzteile (12) regulieren,
dadurch gekennzeichnet, dass die Stoppeinrichtungen (23) ausgestaltet sind, um zwischen Regulierungspositionen (23A) zum Regulieren der Bewegung des walzenartigen Mediums (2) in Richtung zu den Mediumeinsetzteilen (12) und offenen Positionen (23B) bewegbar zu sein, um eine Bewegung des walzenartigen Mediums (2) in Richtung der Mediumeinsetzteile (12) zu erlauben.

2. Der Tintenstrahldrucker (1) nach Anspruch 1, wobei:

die geneigten Oberflächen (20) derart geneigt sind, dass sich das walzenartige Medium (2) aufgrund des Gewichts des walzenartigen Mediums (2) in Richtung zu den Mediumeinsetzteilen (12) bewegt.

3. Der Tintenstrahldrucker (1) nach Anspruch 1 oder 2, wobei:

die Stoppeinrichtungen (23) so ausgestaltet sind, dass sie zwischen den Regulierpositionen (23A), wo sie von den geneigten Oberflächen (20) nach oben vorstehen, und den offenen Positionen (23B), wo sie sich von den geneigten Oberflächen (20) nach unten zurückziehen, bewegbar sind, wodurch eine Bewegung des walzenartigen Mediums (2) ermöglicht wird.

4. Der Tintenstrahldrucker (1) nach einem der Ansprüche 1 bis 3, wobei:

das walzenartige Medium (2) auf eine Trägerwelle (9) angebracht ist, um sich zusammen mit dem walzenartigen Medium (2) zu drehen oder das walzenartige Medium (2) derart zu stützen, dass das walzenartige Medium (2) drehbar ist, und Endteile (9a) der Trägerwelle (9) jeweils von beiden Endflächen des walzenartigen Mediums (2) nach außen vorstehen, und
an den Mediumanbringteilen (13) die beiden geneigten Flächen (20) derart ausgebildet sind, dass die Endteile (9a) der Trägerwelle (9), die von beiden Endflächen des walzenförmigen Mediums (2) nach außen vorstehen, auf den geneigten Oberflächen (20) angebracht sind.

5. Der Tintenstrahldrucker (1) nach einem der Ansprüche 1 bis 4, wobei:

das walzenartige Medium (2) auf einer Trägerwelle (9) angebracht ist, um sich zusammen mit dem walzenartigen Medium (2) zu drehen oder das walzenartige Medium (2) derart zu tragen, dass das walzenartige Medium (2) drehbar ist, und Endteile (9a) der Trägerwelle (9) jeweils von beiden Endflächen des walzenförmigen Mediums (2) nach außen vorstehen,
wobei die Mediumanbringteile (13) die beiden Stoppeinrichtungen (23) aufweisen und die beiden Stoppeinrichtungen (23) an den Regulierpositionen (23A) mit den Endteilen (9a) der Trägerwelle (9), die nach außen von beiden Endoberflächen des walzenartigen Mediums (2) vorstehen, in Kontakt kommen können.

6. Der Tintenstrahldrucker (1) nach Anspruch 4 oder 5, wobei:

auf den Außenseiten der geneigten Oberflächen (20) in der axialen Richtung der Trägerwelle (Y), wenn das walzenartige Medium (2) in die Mediumeinsetzteile (12) eingesetzt ist, Führungswände (22) ausgebildet sind, um das walzenartige Medium (2) in Richtung der Mediumeinsetzteile (12) in der axialen Richtung zu führen.

Revendications

1. Une imprimante à jet d'encre (1) comprenant:

des parties de placement des média (12) dans lesquelles un médium de type rouleau (2) qui est un médium d'impression de type rouleau est placé; et
des parties de montage des média (13) dans

lesquelles le médium de type à rouleau (2) est monté pour positionner le médium de type à rouleau (2) dans les pièces de placement des média (12),
dans lequel, au niveau des parties de montage des média (13), des surfaces inclinées (20) sont formées pour être inclinées de sorte que le médium de type rouleau (2) se déplace vers les parties de placement des média (12), et
les parties de montage des média (13) comportent des butées (23) qui régulent le mouvement du médium de type à rouleau (2) vers les parties de placement des média (12),
caractérisé en ce que les butées (23) sont configurées pour être mobiles entre des positions de réglage (23A) pour réguler le mouvement du médium de type rouleau (2) vers les parties de placement des média (12) et des positions ouvertes (23B) pour permettre le mouvement du médium de type rouleau (2) vers les parties de placement des média (12).

2. L'imprimante à jet d'encre (1) selon la revendication 1, dans laquelle:

les surfaces inclinées (20) sont inclinées de sorte que le médium de type à rouleau (2) se déplace vers les parties de placement des média (12) en raison du poids du médium de type à rouleau (2).

3. L'imprimante à jet d'encre (1) selon la revendication 1 ou 2, dans laquelle:

les butées (23) sont configurées pour être mobiles entre les positions de réglage (23A) où elles dépassent des surfaces inclinées (20), régulant ainsi le mouvement du médium de type rouleau (2) et les positions ouvertes (23B) où elles se rétractent vers le bas à partir des surfaces inclinées (20), permettant ainsi le mouvement du médium de type rouleau (2).

4. L'imprimante à jet d'encre (1) selon l'une quelconque des revendications 1 à 3, dans laquelle:

le médium de type rouleau (2) est monté sur un arbre de support (9) pour tourner avec le médium de type rouleau (2) ou pour supporter le médium de type rouleau (2) de sorte que le médium de type rouleau (2) puisse tourner,
et les parties d'extrémité (9a) de l'arbre de support (9) font saillie vers l'extérieur des deux surfaces d'extrémité du médium de type rouleau (2), respectivement, et
au niveau des parties de montage des média (13), les deux surfaces inclinées (20) sont formées de sorte que les parties d'extrémité (9a) de l'arbre de support (9) dépassant des deux surfaces d'extrémité du médium de type rouleau (2) sont montées sur les surfaces inclinées (20), respectivement.

5. L'imprimante à jet d'encre (1) selon l'une quelconque des revendications 1 à 4, dans laquelle:

le médium de type rouleau (2) est monté sur un arbre de support (9) pour tourner avec le médium de type rouleau (2) ou pour supporter le médium de type rouleau (2) de sorte que le médium de type rouleau (2) puisse tourner,
et les parties d'extrémité (9a) de l'arbre de support (9) font saillie vers l'extérieur à partir des deux surfaces d'extrémité du médium de type à rouleau (2), respectivement,
dans laquelle les parties de montage des média (13) ont les deux butées (23) et les deux butées (23) aux positions de réglage (23A) peuvent entrer en contact avec les parties d'extrémité (9a) de l'arbre de support (9) faisant saillie vers l'extérieur les deux surfaces d'extrémité du médium de type rouleau (2), respectivement.

6. L'imprimante à jet d'encre (1) selon la revendication 4 ou 5, dans laquelle:

sur les côtés extérieurs des surfaces inclinées (20) dans la direction axiale de l'arbre de support (Y) lorsque le médium de type rouleau (2) est placé dans les parties de placement des média (12), des parois de guidage (22) sont formées pour guider le médium de type de rouleau (2) vers les parties de placement des média (12) dans la direction axiale.

FIG.1

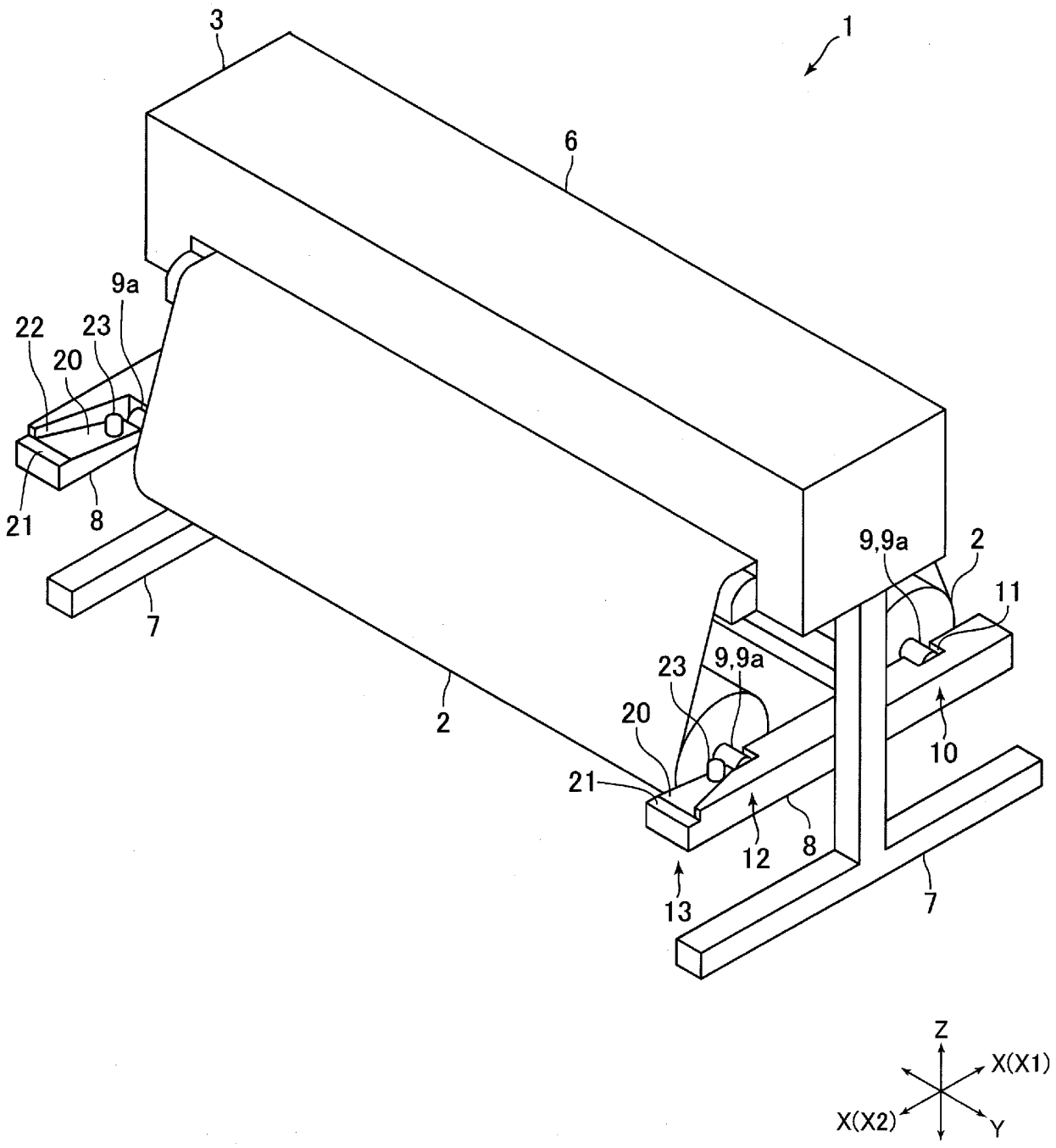


FIG.2

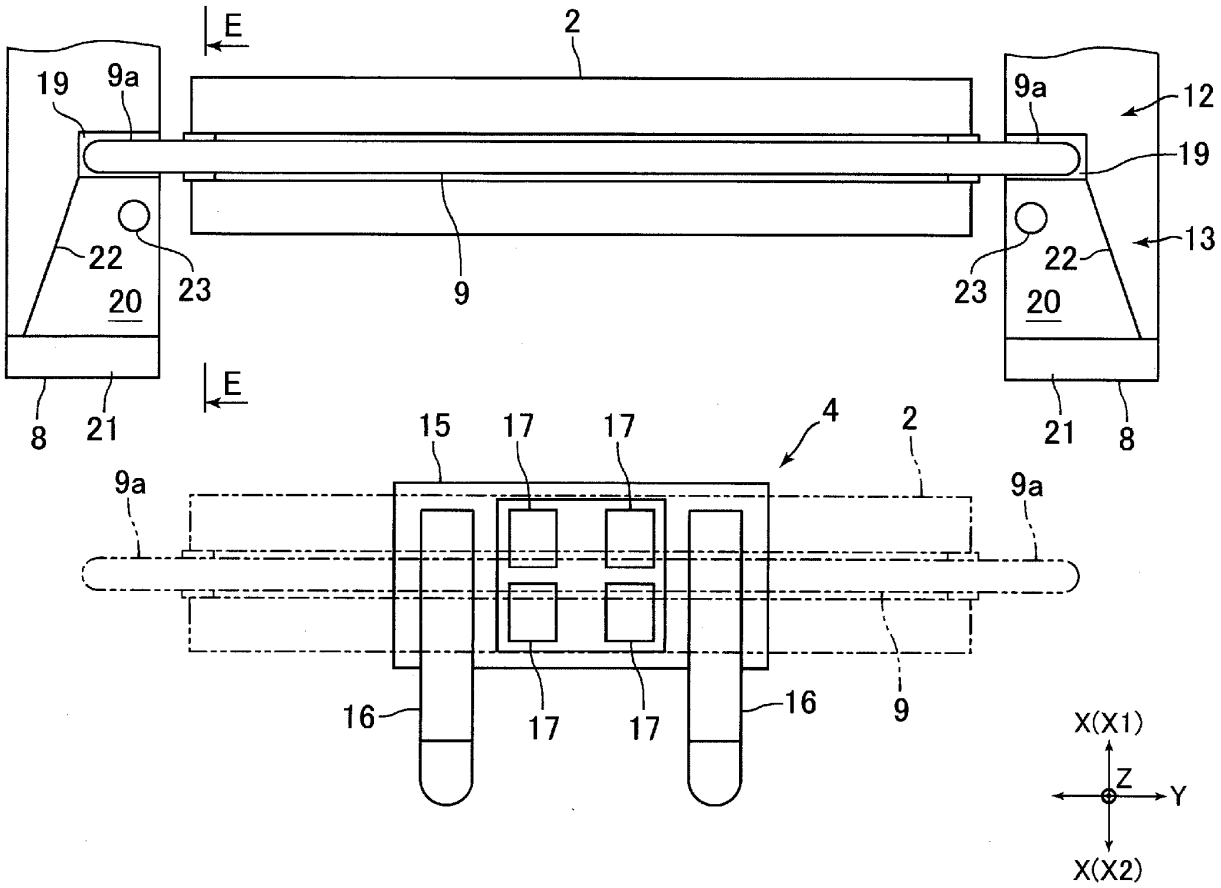

E
2
19
9a
9a
12
19
13
22
23
9
23
22
20
20
E
8
21
21
8
15
17
17
4
2
9a
9a
16
17
17
16
9
X(X1)
Z
Y
X(X2)

FIG.3

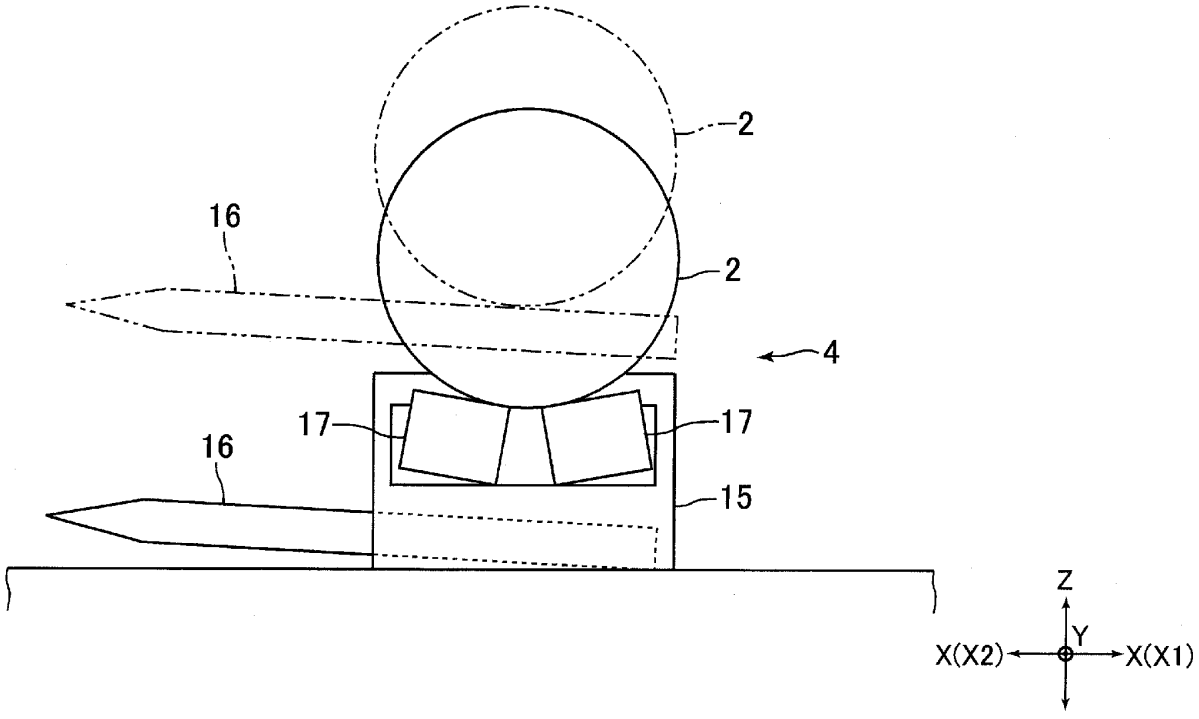

2
16
2
4
17
17
16
15
Z
Y
X(X2)
X(X1)

FIG.4

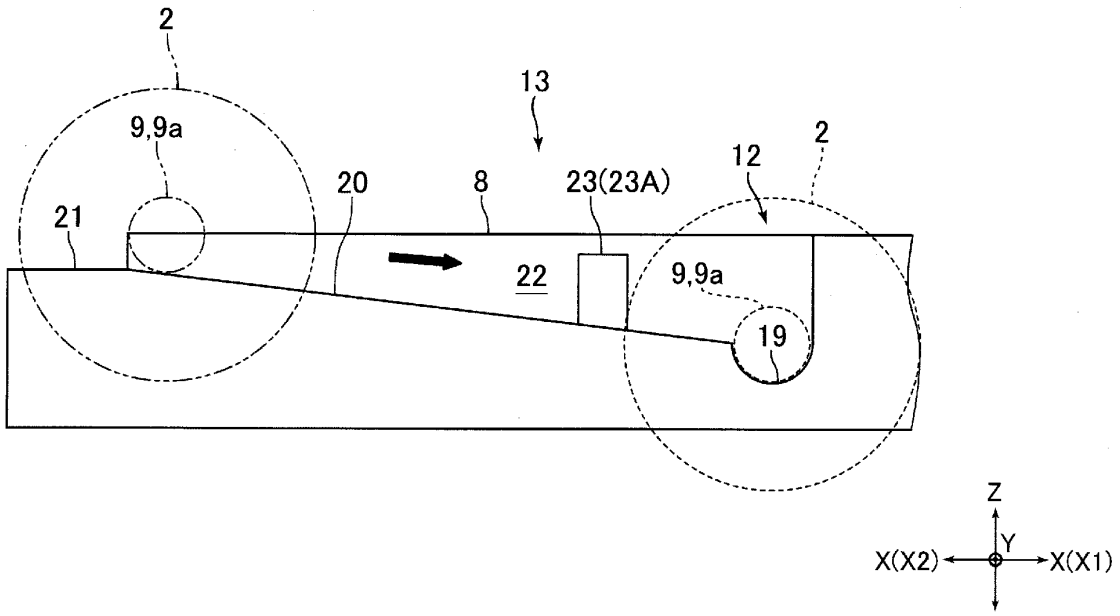

2
13
9,9a
20
8
23(23A)
12
2
21
22
9,9a
19
Z
Y
X(X2)
X(X1)

FIG.5

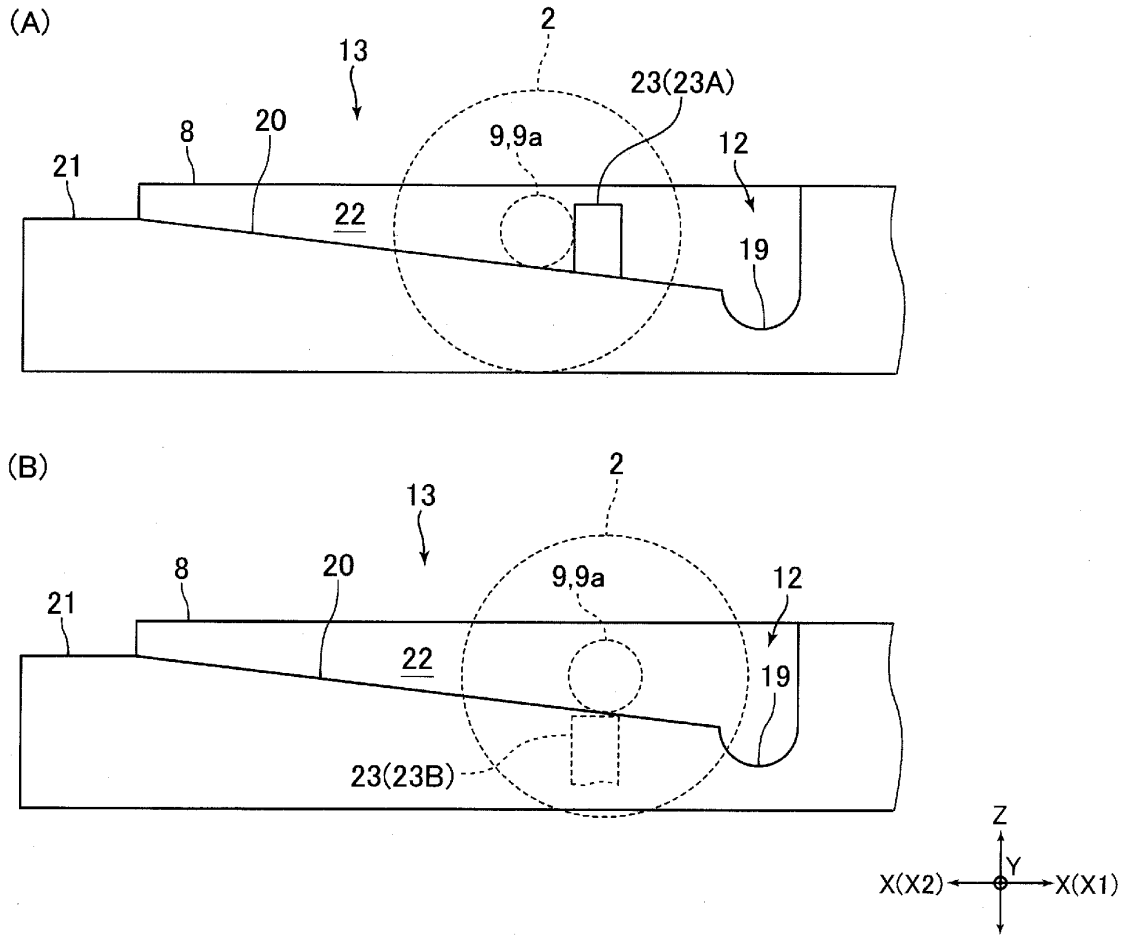

(A)
2
13
23(23A)
8
20
9,9a
12
21
22
19
(B)
2
13
8
20
9,9a
12
21
22
19
23(23B)
Z
Y
X(X2)
X(X1)

FIG.6

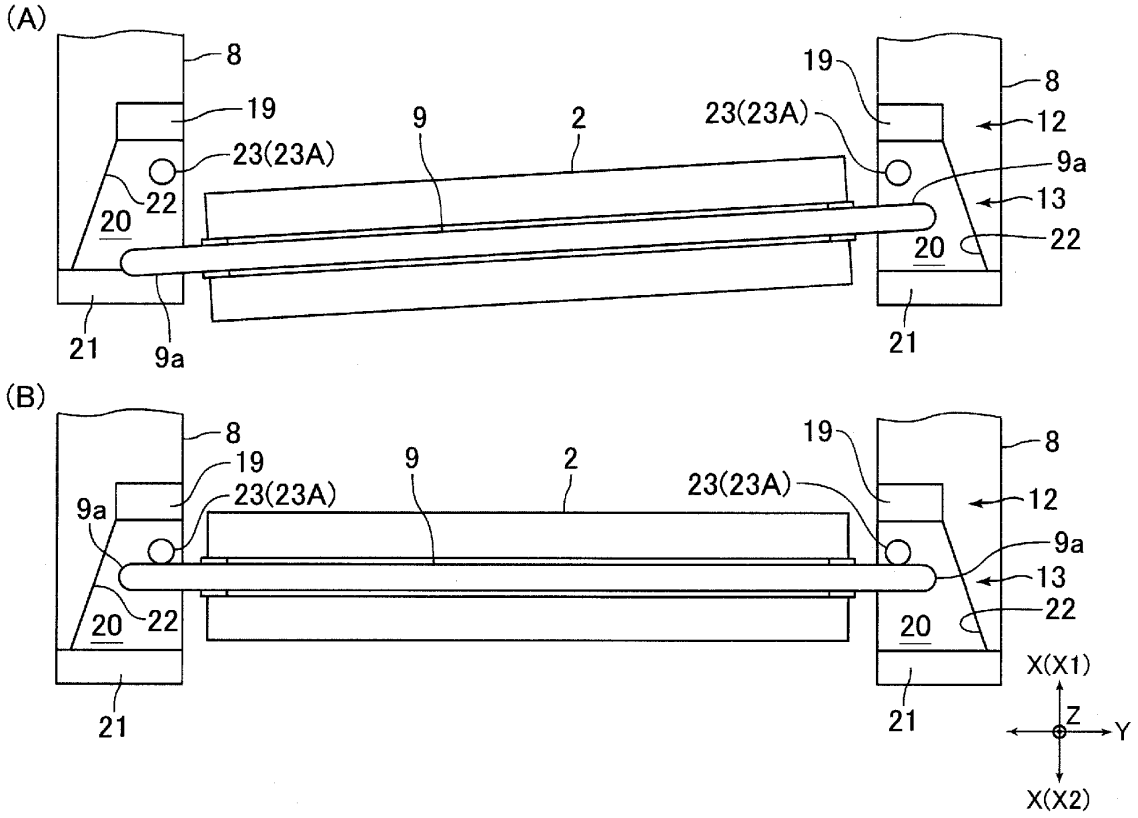

(A)
8
19
23(23A)
22
20
9
2
19
8
23(23A)
12
9a
13
20
22
21
9a
21
(B)
8
19
9
2
9a
23(23A)
19
8
23(23A)
12
9a
13
20
22
20
22
21
21
X(X1)
Z
Y
X(X2)

FIG.7

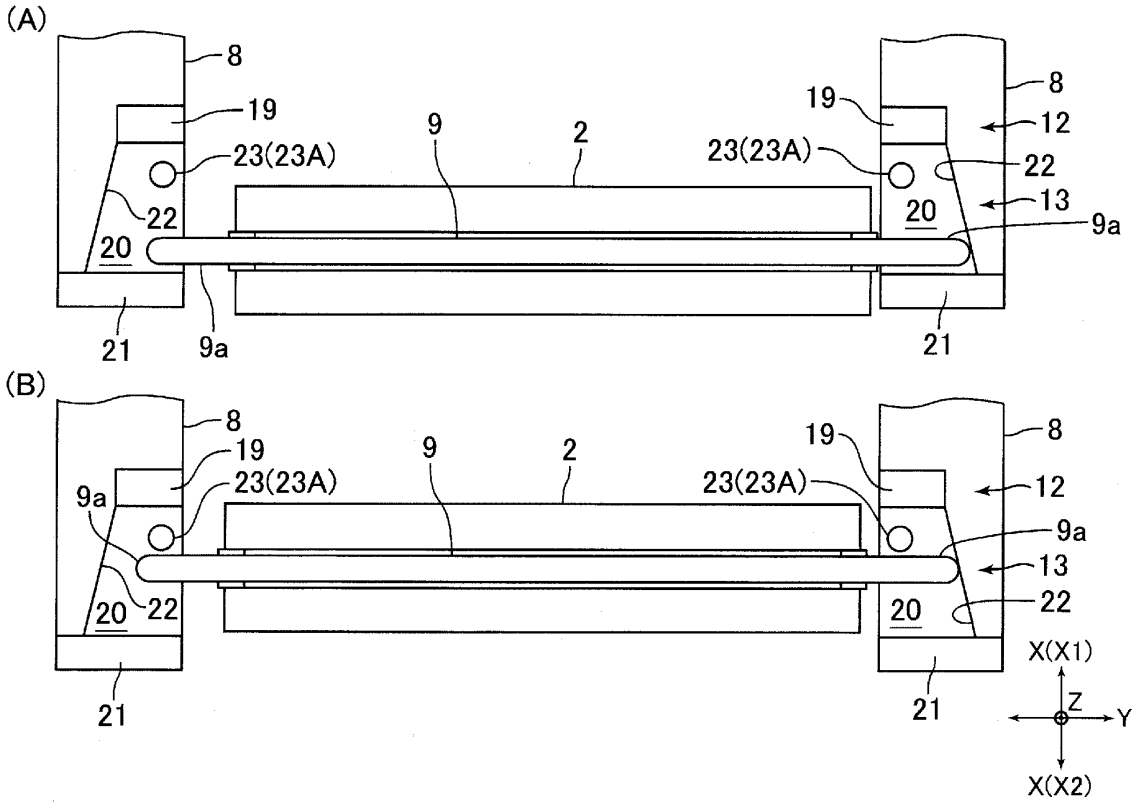

(A)
8
19
23(23A)
22
20
9
2
19
8
23(23A)
12
22
13
20
9a
21
9a
21
(B)
8
19
9
2
9a
23(23A)
19
8
23(23A)
12
9a
13
20
22
20
22
21
21
X(X1)
Z
Y
X(X2)

FIG.8

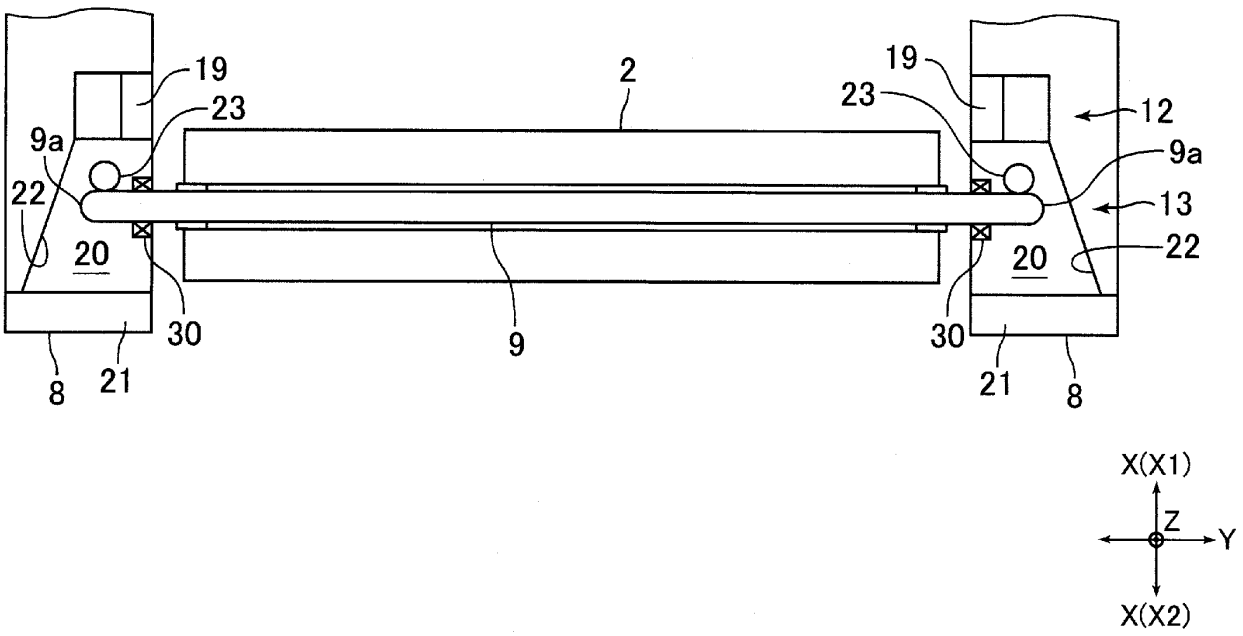

19
2
19
23
23
12
9a
9a
22
13
20
20
22
30
9
30
8
21
21
8
X(X1)
Z
Y
X(X2)

FIG.9

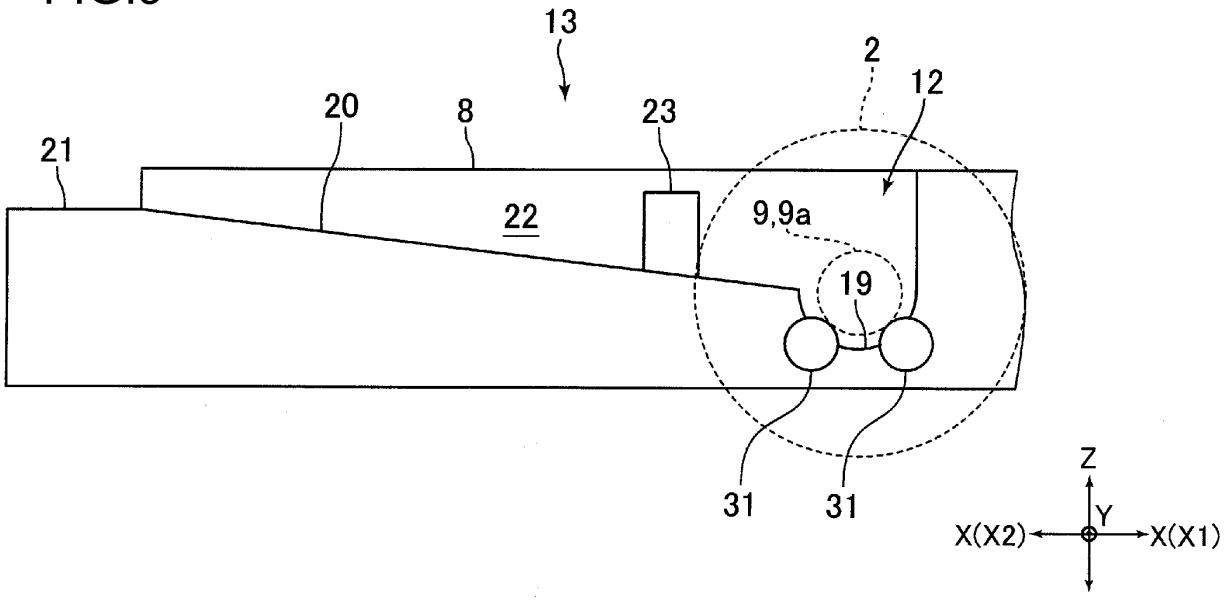

13
2
12
20
8
23
21
22
9,9a
19
31
31
Z
Y
X(X2)
X(X1)

FIG.10

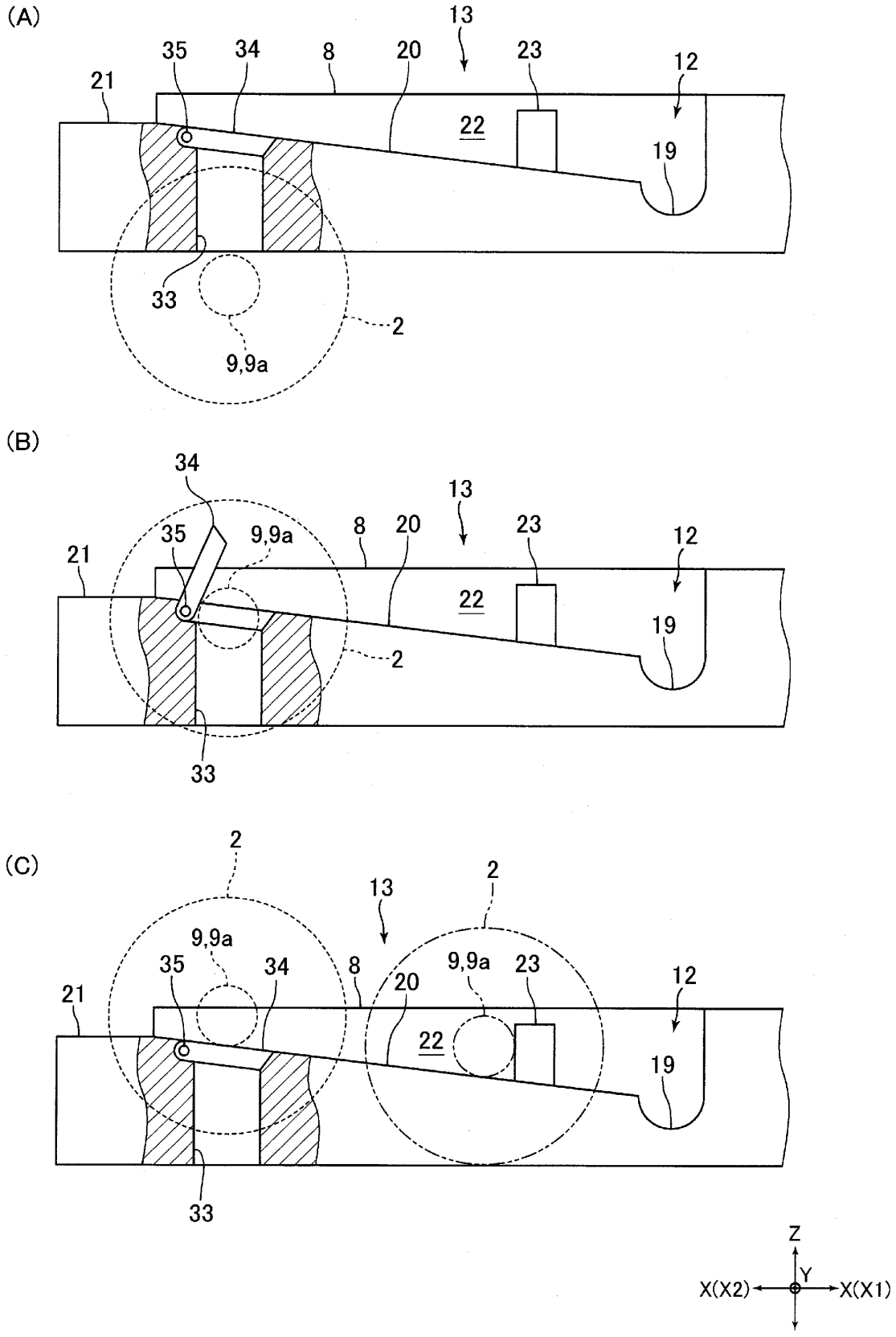

(A)
13
35
34
8
20
23
12
21
22
19
33
2
9,9a
(B)
34
13
35
9,9a
8
20
23
12
21
22
19
2
33
(C)
2
13
2
9,9a
35
34
8
9,9a
23
12
21
20
22
19
33
Z
Y
X(X2)
X(X1)

FIG.11

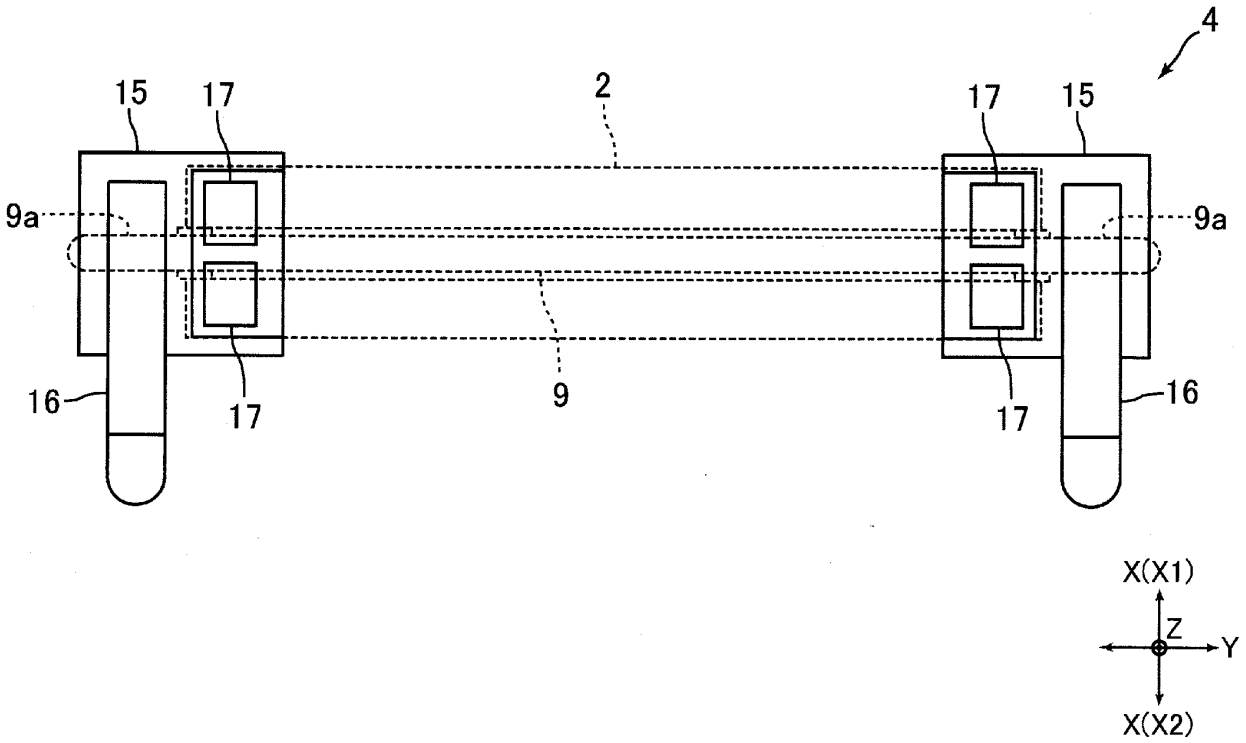

4
15
17
2
17
15
9a
9a
16
17
9
17
16
X(X1)
Z
Y
X(X2)

FIG.12

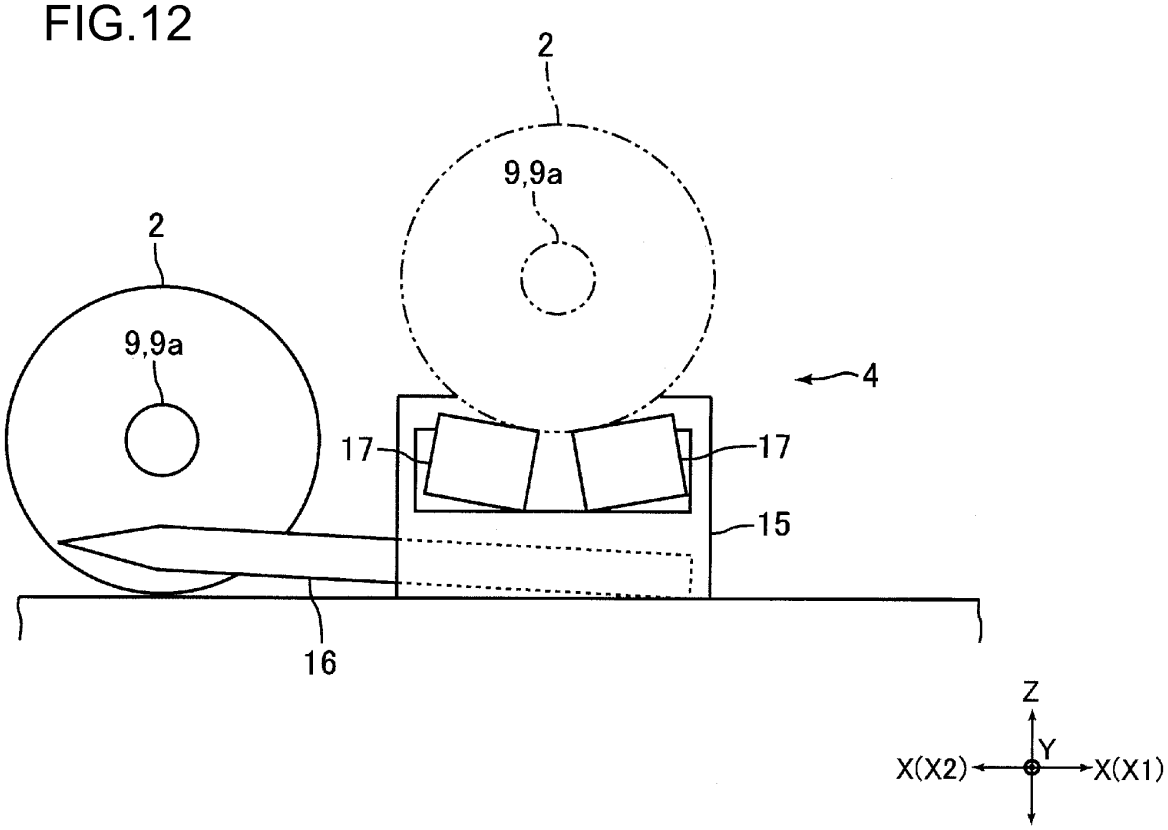

2
9,9a
2
9,9a
4
17
17
15
16
Z
Y
X(X2)
X(X1)

FIG.13

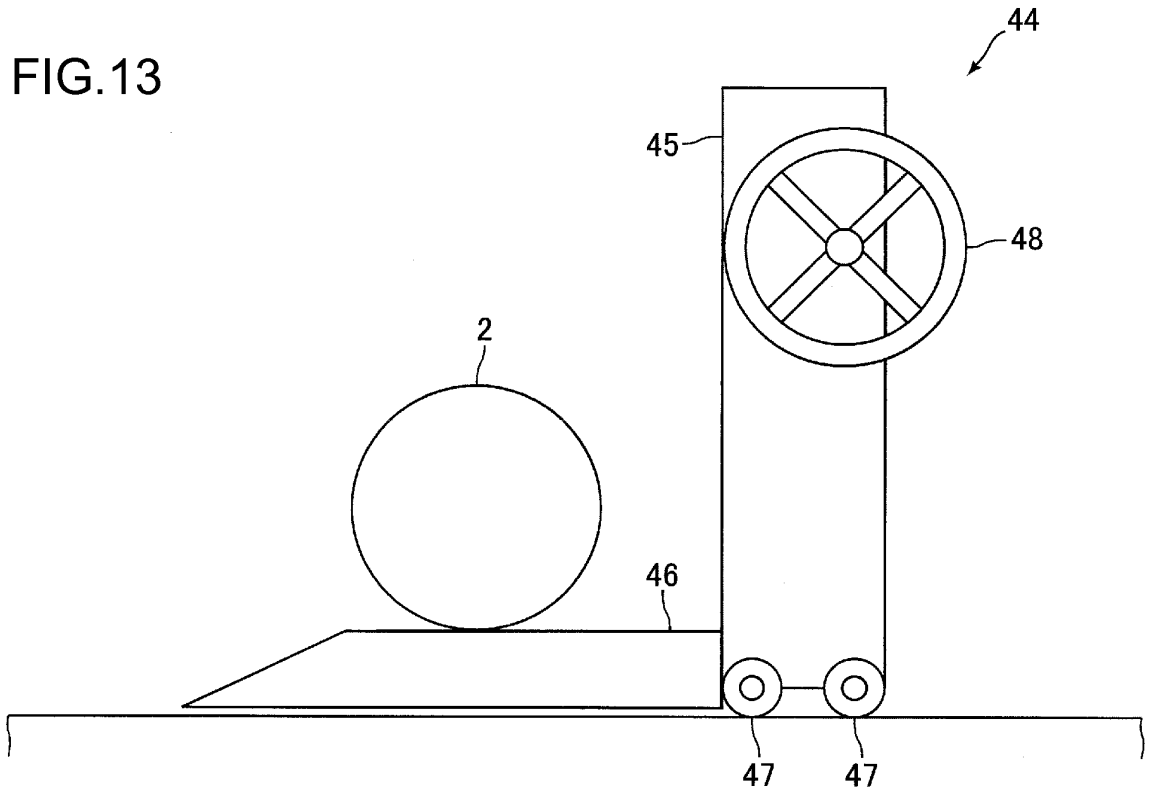
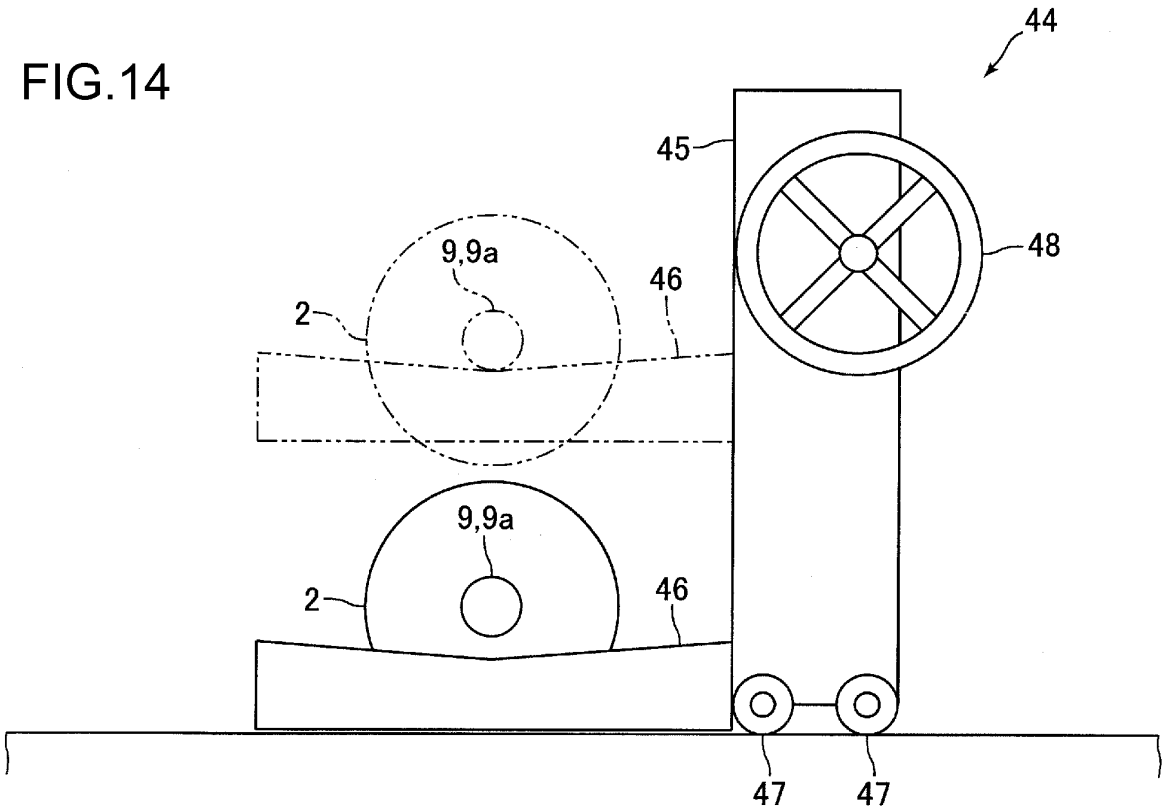


FIG.14



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 2012153456 A **[0004]**
- US 20110206439 A1 **[0006]**
- US 20130271543 A1 **[0006]**