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(54) **CLOTH FEEDING DEVICE AND CLOTH SPREADING DEVICE HAVING CLOTH FEEDING DEVICE**

(57) To provide: a cloth feeding device that ensures a corner of a cloth is grasped without displacing the cloth; and a cloth spreading device having the cloth feeding device. [Solution] The present invention comprises a clamp part that grasps a corner of a cloth, and an intermediate holding part that grasps the corner passed from the clamp part grasping the corner of the cloth. The clamp part further has a first claw part and first claw receiving part arranged openably/closably so as to grasp a corner. The intermediate holding part further has a pair of cloth pinching parts opening and closing so as to hold the cloth therebetween. The pair of cloth pinching parts has a first holddown member that holds the cloth. The first holddown member of the pair of cloth pinching parts grasps a corner of cloth protruding from the first claw part and first claw receiving part when the cloth is passed from the clamp part to the intermediate holding part.

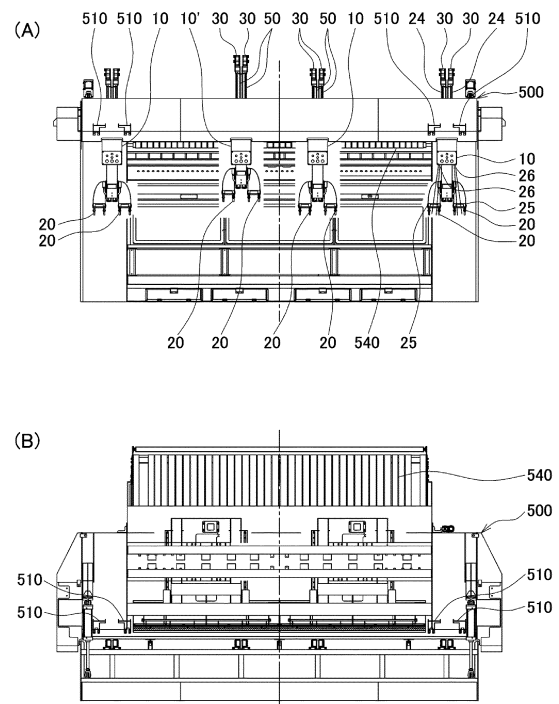


FIG. 1

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Description

Technical Field

[0001] The present invention relates to a cloth feeding device that supplies a cloth to a cloth spreading device that expands the cloth, and a cloth spreading device including the cloth feeding device.

Background Art

[0002] In the field commonly known as the linen supply industry, for example, a cycle of collecting cloths, such as a sheet, a wrapping cloth, a tablecloth, and a duvet cover, from a user of a hotel, an inn, or the like, washing the cloths, and delivering the cloths to user again is repeated. In such a cycle, the cloth described above is expanded by a worker, is fed into a cloth feeding device that transports the cloth to the next process, is transported to a processing device, such as an ironer in the next process, and is transported to a folding device that folds the cloth into a predetermined shape in response to a request of a customer.

[0003] As a so-called feeding method for supplying the cloth to the cloth spreading device, the worker finds both ends of the cloth, holds the both ends with a pair of clamps to supply the cloth to the cloth spreading device, and then expands (spreads) the cloth. As a result, the spread cloth is transported to the next process.

[0004] With such a spreading device that spreads the cloth, both corner portions of the cloth supplied by the cloth feeding device are attached to a pair of expansion clamps, and the pair of expansion clamps are expanded symmetrically to spread the cloth. However, in a case in which the left and right corner portions of the cloth are held by the pair of expansion clamps, when both corner portions cannot be held, the corner portions may hang down. In a case in which the cloth is delivered to a conveyor in this state, the corner portions of the cloth may be bent or wrinkled, wrinkles may remain on the cloth during processing in the folding device in the next process thereafter, and the quality may be degraded.

[0005] As a solution to such a problem, JP-A-2019-206777 discloses a cloth spreading device including a pair of expansion chucks that grasps corner portions of both ends of one side of a cloth and hang the cloth, in which the pair of expansion chucks perform a widening operation of widening the cloth by widening a space in a state in which the corner portions of the both ends of the one side of the cloth are grasped, and the pair of expansion chucks perform, after the widening operation, a displacement operation of displacing a grasping position toward a termination of the one side of the cloth by further widening the space in a state in which the corner portions of both ends of the one side of the cloth are grasped.

[0006] As described above, in the cloth spreading device described above, a pair of clamps, which are the pair of expansion chucks, perform the displacement op-

eration of displacing the grasping position of the cloth toward the termination of the one side of the cloth. As a result, it is intended to prevent the corner portions of the cloth from being bent due to the pair of clamps holding both corner portions of the cloth. However, since a displacement width differs depending on the cloth, the cloth may not match a predetermined displacement width and the cloth may be not sufficiently displaced, or the cloth may be extremely displaced and the cloth may fall off the clamp.

Citation List

Patent Literature

[0007] [PTL 1] JP-A-2019-206777

Summary of Invention

Technical Problem

[0008] The present invention has been made in view of the points described above, and an object of the present invention is to provide a cloth feeding device that securely grasps a corner portion of a cloth without displacing the cloth, and a cloth spreading device including the cloth feeding device.

Solution to Problem

[0009] In order to solve the objects described above, a first aspect relates to a cloth feeding device includes a clamp unit that grasps a corner portion of a cloth, and an intermediate holding unit that grasps the corner portion from the clamp unit that grasps the corner portion of the cloth, in which the clamp unit includes a first claw unit and a first claw receiving unit that are disposed to be openable and closable for grasping the corner portion, the intermediate holding unit further includes a pair of cloth interposing units that are opened and closed to interpose the cloth, the pair of cloth interposing units include first pressing members for interposing the cloth, and when the cloth is delivered from the clamp unit to the intermediate holding unit, the first pressing members in the pair of cloth interposing units grasp a corner portion of the cloth protruding from the first claw unit and the first claw receiving unit.

[0010] In addition, a second aspect relates to a cloth feeding device including a clamp unit that grasps a corner portion of a cloth, and an intermediate holding unit that grasps the corner portion from the clamp unit that grasps the corner portion of the cloth, in which the clamp unit includes a first claw unit and a first claw receiving unit that are disposed to be openable and closable for grasping the corner portion, and a second claw unit and a second claw receiving unit that are disposed to have a predetermined space from the first claw unit and the first claw receiving unit, and are openable and closable, the

intermediate holding unit further includes a pair of cloth interposing units that are opened and closed to interpose the cloth, the pair of cloth interposing units each have a first pressing member for interposing the cloth, a second pressing member for interposing the cloth, and a third pressing member for interposing the cloth, when the cloth is delivered from the clamp unit to the intermediate holding unit, the second pressing members and the third pressing members in the pair of cloth interposing units grasp the cloth disposed at the predetermined space between the first claw unit and the first claw receiving unit, and the second claw unit and the second receiving unit, and the first pressing members in the pair of cloth interposing units grasp a corner portion of the cloth protruding from the first claw unit and the first claw receiving unit.

[0011] In addition, a third aspect relates to the cloth feeding device according to the second aspect, in which the first pressing members, the second pressing members, and the third pressing members in the pair of cloth interposing units are disposed to have a predetermined second space from each other.

[0012] In addition, a fourth aspect relates to the cloth feeding device according to the first aspect, in which the intermediate holding unit includes a suction unit that sucks the corner portion of the cloth protruding from the first claw unit.

[0013] In addition, a fifth aspect relates to a cloth spreading device including a clamp unit that grasps a corner portion of a cloth, and an intermediate holding unit that grasps the corner portion from the clamp unit that grasps the corner portion of the cloth, in which the clamp unit includes a first claw unit and a first claw receiving unit that are disposed to be openable and closable for grasping the corner portion, and a second claw unit and a second claw receiving unit that are disposed to have a predetermined space from the first claw unit and the first claw receiving unit, and are openable and closable, the intermediate holding unit further includes a pair of cloth interposing units that are opened and closed to interpose the cloth, the pair of cloth interposing units each have a first pressing member for interposing the cloth, a second pressing member for interposing the cloth, and a third pressing member for interposing the cloth, when the cloth is delivered from the clamp unit to the intermediate holding unit, the second pressing members and the third pressing members in the pair of cloth interposing units grasp the cloth disposed at the predetermined space between the first claw unit and the first claw receiving unit, and the second claw unit and the second receiving unit, the first pressing members in the pair of cloth interposing units grasp a corner portion of the cloth protruding from the first claw unit and the first claw receiving unit, and when the cloth is delivered from the cloth interposing unit to the expansion clamp, the expansion clamp interposes the cloth disposed at predetermined second spaces between the first pressing member, the second pressing member, and the third pressing member.

[0014] In addition, a sixth aspect relates to the cloth

spreading device according to the fifth aspect, in which the intermediate holding unit includes a suction unit that sucks the corner portion of the cloth protruding from the first claw unit and the first claw receiving unit. Advantageous Effects of Invention

[0015] Since the present invention is configured and acts as described above, it is possible to provide the cloth feeding device that securely grasps the corner portion of the cloth without displacing the cloth, and the cloth spreading device including the cloth feeding device.

Brief Description of Drawings

[0016]

(A) of Fig. 1 is a front view of a cloth spreading device including a cloth feeding device. (B) of Fig. 1 is a plan view of (A) of Fig. 1.

(A) of Fig. 2 is a side conceptual view of the cloth spreading device including the cloth feeding device. (B) of Fig. 2 is an enlarged conceptual view of (A) of Fig. 2.

(A) of Fig. 3 is a side view of a clamp unit in an opened state. (B) of Fig. 3 is a rear view of (A) of Fig. 3. (C) of Fig. 3 is a side view of the clamp unit in a closed state. (D) of Fig. 3 is a rear view of (C) of Fig. 3. (E) of Fig. 3 is a side view of the clamp unit in a state of being opened to the maximum. (F) of Fig. 3 is a rear view of (E) of Fig. 3.

(A) of Fig. 4 is a side view of a pair of cloth interposing units in an intermediate holding unit in an opened state. (B) of Fig. 4 is a plan view of (A) of Fig. 4. (C) of Fig. 4 is a rear view of (A) of Fig. 4. (D) of Fig. 4 is a side view of the pair of cloth interposing units in the intermediate holding unit in a closed state. (E) of Fig. 4 is a plan view of (D) of Fig. 4. (F) of Fig. 4 is a rear view of (D) of Fig. 4.

(A) of Fig. 5 is a side conceptual view in a state in which the clamp unit and a drive unit in the cloth feeding device are moved downward. (B) of Fig. 5 is a side conceptual view in a state in which the clamp unit and a drive unit in the cloth feeding device are moved upward.

(A) of Fig. 6 is a front view in a state in which the clamp unit waits at an initial position. (B) of Fig. 6 is a side conceptual view in the state of (A) of Fig. 6.

(A) of Fig. 7 is a front view in a state in which, in a case in which the cloth spreading device is activated, the intermediate holding unit is rotated by a rotation cylinder, and the pair of cloth interposing units are in an opened state. (B) of Fig. 7 is a side conceptual view in the state of (A) of Fig. 7.

(A) of Fig. 8 is a front view in a state in which a right corner portion of a cloth is attached to the clamp unit of the cloth feeding device. (B) of Fig. 8 is a side conceptual view in the state of (A) of Fig. 8.

(A) of Fig. 9 is a side view of the intermediate holding unit in the state of Fig. 8. (B) of Fig. 9 is a plan view

of the intermediate holding unit in the state of (A) of Fig. 9. (C) of Fig. 9 is a rear view of the intermediate holding unit in the state of (A) of Fig. 9. (D) of Fig. 9 is a side view of the clamp unit in the state of Fig. 8. (E) of Fig. 9 is a plan view of the clamp unit in the state of (D) of Fig. 9. (F) of Fig. 9 is a rear view of the clamp unit in the state of (D) of Fig. 9.

(A) of Fig. 10 is a front view in a state in which the clamp unit raises the cloth. (B) of Fig. 10 is a side conceptual view in the state of (A) of Fig. 10.

(A) of Fig. 11 is a side view of the intermediate holding unit in the state of Fig. 10. (B) of Fig. 11 is a plan view of the intermediate holding unit in the state of (A) of Fig. 11. (C) of Fig. 11 is a rear view of the intermediate holding unit in the state of (A) of Fig. 11. (D) of Fig. 11 is a side view of the clamp unit in the state of Fig. 7. (E) of Fig. 11 is a plan conceptual view of the clamp unit in the state of (D). (F) of Fig. 11 is a rear view of the clamp unit in the state of (D) of Fig. 11.

(A) of Fig. 12 is a front view in a state in which the clamp unit delivers the cloth and rises until a sensor reacts. (B) of Fig. 12 is a side conceptual view in the state of (A) of Fig. 12.

(A) of Fig. 13 is a side view of the clamp unit and the intermediate holding unit in the state of Fig. 12. (B) of Fig. 13 is a plan view of the clamp unit and the intermediate holding unit in the state of (A) of Fig. 13. (C) of Fig. 13 is a rear view of the clamp unit and the intermediate holding unit in the state of (A) of Fig. 13.

(A) of Fig. 14 is a front view in a state in which a corner portion is sucked by a suction unit while the clamp unit holds the cloth. (B) of Fig. 14 is a side conceptual view in the state of (A) of Fig. 14.

(A) of Fig. 15 is a side view of the clamp unit and the intermediate holding unit in the state of (B) of Fig. 14. (B) of Fig. 15 is a plan view of the clamp unit and the intermediate holding unit in the state of (A) of Fig. 15. (C) of Fig. 15 is a rear view of the clamp unit and the intermediate holding unit in the state of (A) of Fig. 15.

(A) of Fig. 16 is a front view in a state in which the cloth interposing unit holds the corner portion of the cloth. (B) of Fig. 16 is a side conceptual view in the state of (A) of Fig. 16.

(A) of Fig. 17 is a side view of the clamp unit and the intermediate holding unit in the state of (B) of Fig. 16. (B) of Fig. 17 is a plan view of the clamp unit and the intermediate holding unit in the state of (A) of Fig. 17. (C) of Fig. 17 is a rear view of the clamp unit and the intermediate holding unit in the state of (A) of Fig. 17.

(A) of Fig. 18 is a front view in a state in which the clamp unit is opened to the maximum while the cloth interposing unit holds the corner portion of the cloth. (B) of Fig. 18 is a side conceptual view in the state of (A) of Fig. 18. (A) of Fig. 19 is a side view of the

clamp unit and the intermediate holding unit in the state of Fig. 18. (B) of Fig. 19 is a plan view of the clamp unit and the intermediate holding unit in the state of (A) of Fig. 19. (C) of Fig. 19 is a rear view of the clamp unit and the intermediate holding unit in the state of (A) of Fig. 19.

(A) of Fig. 20 is a front view in a state in which the cloth interposing unit is rotated backward while holding the corner portion of the cloth in a state in which the clamp unit is opened to the maximum. (B) of Fig. 20 is a side conceptual view in the state of (A) of Fig. 20.

(A) of Fig. 21 is a side view of the clamp unit and the intermediate holding unit in the state of Fig. 20. (B) of Fig. 21 is a plan view of the clamp unit and the intermediate holding unit in the state of (A) of Fig. 21. (C) of Fig. 21 is a rear view of the clamp unit and the intermediate holding unit in the state of (A) of Fig. 21.

(A) of Fig. 22 is a front view in a state in which the clamp unit is closed and the cloth attached to the cloth interposing unit is moved to a buffer position. (B) of Fig. 22 is a side conceptual view in the state of (A) of Fig. 22.

(A) of Fig. 23 is a side view of the clamp unit and the intermediate holding unit in the state of Fig. 22. (B) of Fig. 23 is a plan view of the clamp unit and the intermediate holding unit in the state of (A) of Fig. 23. (C) of Fig. 23 is a rear view of the clamp unit and the intermediate holding unit in the state of (A) of Fig. 23.

(A) of Fig. 24 is a front view in a state in which the cloth attached to the cloth interposing unit is moved to the buffer position. (B) of Fig. 24 is a side conceptual view in the state of (A) of Fig. 24.

(A) of Fig. 25 is a side view of the intermediate holding unit and an expansion clamp in the state of Fig. 24. (B) of Fig. 25 is a plan view of the intermediate holding unit and the expansion clamp in the state of (A) of Fig. 25. (C) of Fig. 25 is a front view of the intermediate holding unit and the expansion clamp in the state of (A) of Fig. 25.

(A) of Fig. 26 is a front view in a state in which the cloth is to be delivered from the cloth interposing unit to the expansion clamp. (B) of Fig. 26 is a side conceptual view in the state of (A) of Fig. 26.

(A) of Fig. 27 is a side view of the intermediate holding unit and an expansion clamp in the state of Fig. 26. (B) of Fig. 27 is a plan view of the intermediate holding unit and the expansion clamp in the state of (A) of Fig. 27. (C) of Fig. 27 is a front view of the intermediate holding unit and the expansion clamp in the state of (A) of Fig. 27.

(A) of Fig. 28 is a front view in a state in which the cloth is delivered from the cloth interposing unit to the expansion clamp. (B) of Fig. 28 is a side conceptual view in the state of (A) of Fig. 28.

(A) of Fig. 29 is a side view of the intermediate holding

unit and an expansion clamp in the state of Fig. 28. (B) of Fig. 28 is a plan view of the intermediate holding unit and the expansion clamp in the state of (A) of Fig. 28. (C) of Fig. 28 is a front view of the intermediate holding unit and the expansion clamp in the state of (A) of Fig. 28.

(A) of Fig. 30 is a front view in a state in which the expansion clamp expands the cloth. (B) of Fig. 30 is a side conceptual view in the state of (A) of Fig. 30. (A) of Fig. 31 is a side view of the intermediate holding unit and an expansion clamp in the state of Fig. 30. (B) of Fig. 31 is a plan view of the intermediate holding unit and the expansion clamp in the state of (A) of Fig. 31. (C) of Fig. 31 is a front view of the intermediate holding unit and the expansion clamp in the state of (A) of Fig. 31.

(A) of Fig. 32 is a front view in a state in which eight cloths are held. (B) of Fig. 32 is a side conceptual view in the state of (A) of Fig. 32.

Description of Embodiments

[0017] Hereinafter, a cloth feeding device 10 and a cloth spreading device 500 having the cloth feeding device 10 will be described with reference to the shown embodiment. The cloth spreading device 500 according to the present embodiment expands a cloth W, such as a washed sheet, a wrapping cloth, a tablecloth, or a duvet cover, to the left and right and transports the cloth W to the next process, and the cloth feeding device 10 delivers the cloth W to a pair of left and right expansion clamps 510 and 510 in the cloth spreading device 500 for expanding the cloth W to the left and right. Thereafter, the cloth W expanded by the pair of left and right expansion clamps 510 and 510 is transported to the next process by a conveyor 540.

[0018] In the cloth spreading device 500 according to the present embodiment, four cloth feeding devices 10 are disposed, and a worker (not shown) can attach the cloth W to each of the cloth feeding devices 10. In addition, the cloth spreading device 500 according to the present embodiment includes two pairs of left and right expansion clamps 510 and 510, and can receive the cloth W from the four disposed cloth feeding devices 10 in order or randomly.

[0019] The cloth feeding device 10 includes a pair of left and right clamp units 20 and 20 that attach the cloth W, and a pair of left and right intermediate holding units 100 and 100. The cloth feeding device 10 also includes feeding sensors 25 and 25 that detect that the cloth W is attached to the clamp unit 20. Moreover, the cloth feeding device 10 includes LED lights 26 and 26 that emit light to inform the worker (not shown) that the cloth W is attached by the feeding sensors 25 and 25.

[0020] The pair of left and right clamp units 20 and 20 can be raised by drive units 24 and 24, and can be lowered after delivering the cloth W to the pair of left and right intermediate holding units 100 and 100. The drive

unit 24 is, for example, preferably an electric actuator. In addition, the electric actuator can be replaced with a pneumatic device and a linear guide.

[0021] In addition, the pair of left and right clamp units 20 and 20 can be moved upward and downward independently of each other. In addition, the pair of left and right clamp units 20 and 20 are bilaterally symmetrical, so that the right clamp unit 20 will be described in particular, and the description of the left clamp 20 will be omitted.

[0022] In addition, the configuration and the operation of the right clamp unit 20 in front view in the pair of left and right clamp units 20 will be described. The clamp unit 20 includes a first claw unit 21a and a first claw receiving unit 21b that can be opened and closed, a second claw unit 22a and a second claw receiving unit 22b that can be opened and closed, and a dual cylinder 23 that drives the first claw unit 21a and the first claw receiving unit 21b, and the second claw unit 22a and the second claw receiving unit 22b to be openable and closable. In addition, the first claw unit 21a and the second claw unit 22a are disposed to have a predetermined space H. Similarly, the first claw receiving unit 21b and the second claw receiving unit 22b are disposed to have the predetermined space H. It should be noted that the first claw unit 21a and the second claw unit 22a are configured integrally with a main body of the clamp unit 20. In this way, the cloth W can be grasped by the first claw unit 21a and the first claw receiving unit 21b that receives the first claw unit 21a. Similarly, the cloth W can be grasped by the second claw unit 22a and the second claw receiving unit 22b that receives the second claw unit 22a. It should be noted that the predetermined space H in the present embodiment is preferably 107 mm, but the predetermined space H is not limited to this.

[0023] In addition, the clamp unit 20 is moved upward and downward by the drive unit 24. As described above, the drive unit 24 is preferably an actuator. In this way, the pair of clamp units 20 and 20 can be driven independently of each other by the drive units 24 and 24. This point will be further described later.

[0024] In addition, the intermediate holding unit 100 includes a pair of cloth interposing units 110 and 110 that are opened and closed to interpose the cloth W. The intermediate holding unit 100 also includes a delivery cylinder 120 that is driven to deliver the cloth W interposed between the pair of cloth interposing units 110 and 110 to the expansion clamp 510. In addition, the intermediate holding unit 100 includes a delivery claw cylinder 135 that drives the pair of cloth interposing units 110 and 110 to be openable and closable. In addition, the intermediate holding unit 100 includes a rotation cylinder 150 that is driven to rotate the pair of cloth interposing units 110 and 110 from a receiving position at which the cloth W is received from the raised clamp unit 20 as described later to a buffer position described later in which the cloth W is stored. The intermediate holding unit 100 also includes a delivery position sensor 200.

[0025] (A) and (B) of Fig. 3 show a state in which the clamp unit 20 waits before the cloth W is attached. (C) and (D) of Fig. 3 show a state in which the dual cylinder 23 is slightly driven in a contraction direction, and the first claw unit 21a and the first claw receiving unit 21b, and the second claw unit 22a and the second claw receiving unit 22b are interposed. (E) and (F) of Fig. 4 show a state in which the dual cylinder 23 is driven in an extension direction, and the first claw unit 21a and the first claw receiving unit 21b, and the second claw unit 22a and the second claw receiving unit 22b have opening portions R, respectively. It should be noted that the opening portions R show a state in which the first claw unit 21a and the first claw receiving unit 21b, and the second claw unit 22a and the second claw receiving unit 22b are opened to the maximum.

[0026] In addition, the pair of cloth interposing units 110 and 110 are configured to be openable and closable by the delivery claw cylinder 135 as described above (see Fig. 2B), the pair of cloth interposing units 110 and 110 are opened substantially on a straight line (see (A), (B), and (C) of Fig. 4), and the pair of cloth interposing units 110 and 110 are closed to overlap each other (see (E) and (F) of Fig. 4).

[0027] The pair of cloth interposing units 110 and 110 each have a shaft-shaped first pressing member 111, a shaft-shaped second pressing member 112, and a shaft-shaped third pressing member 113 for interposing the cloth W.

[0028] In addition, the shaft-shaped first pressing member 111 and the shaft-shaped second pressing member 112 are disposed to have a second space H2. In addition, the shaft-shaped second pressing member 112 and the shaft-shaped third pressing member 113 are disposed to have the second space H2. The intermediate holding unit 100 also includes a suction unit 140 that sucks the cloth W (see (A), (B), (C), (D), (E), and (F) of Fig. 4). It should be noted that the second space H2 in the present embodiment is preferably 44 mm, but the second space H2 is not limited to this.

[0029] Next, an upward/downward movement unit 50 that moves the pair of left and right clamp units 20 and 20 and a pair of left and right drive units 24 and 24 upward and downward includes a rail unit 51 attached to the drive unit 24, a journal unit 52 that slides along the rail unit 51, a cylinder unit 53 that drives the journal unit 52 along the rail unit 51, the cylinder unit 53, and an attachment unit 54 for attaching the cylinder unit 53 to the cloth feeding device 10.

[0030] As the cylinder unit 53 expands and contracts, the clamp units 20 and 20 and the drive unit 24 are moved upward and downward, and the positions of the pair of left and right clamp units 20 and 20 disposed at the lowermost portion is moved upward and downward according to the height or the physique of the worker (not shown). The cloth feeding device 10 according to the present embodiment can move the positions of the pair of left and right clamp units 20 and 20 disposed at the

lowermost portion upward within a range of 200 mm. It should be noted that, in Figs. 1 and 5, a cloth feeding device 10' is disposed to move the positions of the pair of left and right clamp units 20 and 20 disposed at the lowermost portion in the cloth feeding device 10 upward within a range of 200 mm. In this way, by moving the positions of the clamp units 20 and 20 upward and downward, workers of different heights can be accommodated. In addition, by the upward/downward movement in this way, the clamp units 20 and 20 can be visually recognized regardless of the height of the worker (not shown).

[0031] Next, the operation and the configuration in a state in which the cloth W attached to the clamp units 20 and 20 in the cloth feeding device 10 is delivered to the expansion clamps 510 and 510 via the intermediate holding units 100 and 100 will be described. In a state in which the cloth feeding device 10 is stopped (see (A) and (B) of Fig. 6), a switch (not shown) is turned on to activate the cloth spreading device 500, the first claw unit 21a and the first claw receiving unit 21b, and the second claw unit 22a and the second claw receiving unit 22b in the clamp units 20 and 20 are opened. At the same time, the delivery cylinder 120 and the rotation cylinder 150 are moved to the initial positions thereof. In addition, by driving of the delivery claw cylinder 135, the pair of cloth interposing units 110 and 110 are in an opened state (see (A) and (B) of Fig. 7).

[0032] The worker (not shown) attaches a vicinity of a right corner portion WR of the cloth W between the first claw unit 21a and the first claw receiving unit 21b and between the second claw unit 22a and the second claw receiving unit 22b. In this case, the worker (not shown) may also attach a vicinity of a left corner portion WL of the cloth W to the left clamp unit 20 in front view. It should be noted that, in the following description, a case in which the cloth W is attached to the right clamp unit 20 in the pair of left and right clamp units 20 and 20 in order to untangle the cloth W and is raised will be described. However, in a case in which both the left and right corner portions of the cloth W are attached to the pair of left and right clamp units 20 and 20, it is sufficient to also apply the following operation to the left clamp unit 20, and thus the description thereof may be omitted.

[0033] In a case in which the vicinity of the right corner portion WR of the cloth W is attached between the first claw unit 21a and the first claw receiving unit 21b of the clamp unit 20 and between the second claw unit 22a and the second claw receiving unit 22b, the feeding sensor 25 senses the attachment, and the LED light 26 illuminates the clamp unit 20. As a result, the worker (not shown) is informed that the attachment of the right corner portion WR of the cloth W to the clamp unit 20 is completed. At the same time, the first claw unit 21a and the first claw receiving unit 21b, and the second claw unit 22a and the second claw receiving unit 22b are closed together to grip and fix the vicinity of the right corner portion WR (see (A) and (B) of Fig. 8, and Fig. 9).

[0034] Thereafter, the clamp unit 20 is raised by the

drive unit 24. Since the intermediate holding unit 100 further includes the delivery position sensor 200, the delivery position sensor 200 raises the clamp unit 20 to a position at which the intermediate holding unit 100 in the intermediate holding unit 100 can grip both the right corner portions WR of the cloth W (see Figs. 10 and 11).

[0035] The clamp unit 20 is raised by the drive unit 24 and stopped at a position at which the pair of cloth interposing units 110 and 110 in the intermediate holding unit 100 interpose the cloth W (see Figs. 12 and 13).

[0036] Since the right corner portion WR of the cloth W is located on an outer side G of the first claw unit 21a and the first claw receiving unit 21b, the right corner portion WR may hang down. In order to prevent the right corner portion WR of the cloth W from hanging down, the suction unit 140 sucks the right corner portion WR of the cloth W. As a result, the right corner portion WR of the cloth W is arranged to stand upright (see Figs. 14 and 15). It should be noted that the outer side G refers to a direction from the center of the cloth W toward the right corner portion WR when the vicinity of the right corner portion WR of the cloth W is interposed between the first claw unit 21a and the first claw receiving unit 21b. In addition, the outer side G refers to a direction from the center of the cloth W toward the left corner portion WL when the vicinity of the left corner portion WL of the cloth W is interposed between the first claw unit 21a and the first claw receiving unit 21b. That is, the outer side G refers to directions from the center of the cloth toward both the left and right ends of the cloth.

[0037] As described above, since the intermediate holding unit 100 includes the pair of cloth interposing units 110 and 110 that interpose and hold the vicinity of the right corner portion WR of the cloth W, the pair of cloth interposing units 110 and 110 include the first pressing members 111 for interposing the cloth W, the second pressing members 112 for interposing the cloth W, and the third pressing members 113 for interposing the cloth W, by driving of the delivery claw cylinder 135, a portion of the cloth W disposed at a predetermined space H between the first claw unit 21a and the first claw receiving unit 21b, and the second claw unit 22a and the second claw receiving unit 22b in the clamp unit 20 is interposed between the second pressing members 112 and the third pressing members 113, and the right corner portion WR of the cloth W that protrudes in a direction of the outer side G of the first claw unit 21a and the first claw receiving unit 21b is interposed between the first pressing members 111. As described above, since the right corner portion WR of the cloth W is sucked by the suction unit 140 and arranged to stand upright, the right corner portion WR of the cloth W protrudes to the outer side from the first claw unit 21a and the first claw receiving unit 21b can be interposed between the first pressing members 111. At this point, the cloth W is still in a state of being attached to the first claw unit 21a and the first claw receiving unit 21b, and the second claw unit 22a and the second claw receiving unit 22b of the clamp unit 20 (see

Figs. 16, 17). In this way, the right corner portion WR of the cloth W that protrudes is interposed between the first pressing members 111, so that the cloth W can be prevented from hanging down.

[0038] Then, the first claw unit 21a and the first claw receiving unit 21b, and the second claw unit 22a and the second claw receiving unit 22b are opened, respectively, and the cloth W held by the clamp unit 20 is released. On the other hand, the cloth W is held by the intermediate holding unit 100 (see Figs. 18 and 19). In this manner, the cloth W is delivered from the clamp unit 20 to the intermediate holding unit 100. In this case, the openings between the first claw unit 21a and the first claw receiving unit 21b, and the second claw unit 22a and the second claw receiving unit 22b are maximized.

[0039] Next, the rotation cylinder 150 rotates, and the pair of cloth interposing units 110 and 110 that interpose the cloth W and the delivery claw cylinder 135 rotate backward K along with the rotation (see Figs. 20 and 21). That is, the pair of cloth interposing units 110 and 110 in an upright state are rotated to face in a horizontal direction. As a result, the pair of cloth interposing units 110 and 110 are removed from a track along which the clamp unit 20 is moved upward and downward. Therefore, the cloth W held by the intermediate holding unit 100 and the clamp unit 20 do not interfere with each other. In this manner, the pair of cloth interposing units 110 and 110 are rotated backward by the rotation cylinder 150, so that the cloth W is moved to a position, which will be described later, at which the cloth W is accumulated. That is, the rotation cylinder 150 rotates the pair of cloth interposing units 110 and 110 backward while holding the cloth W, so that the cloth W is moved to the buffer position.

[0040] Similarly to the processes described above, the left corner portion WL of the cloth W is also attached to the clamp unit 20, and the cloth W is delivered from the clamp unit 20 to the intermediate holding unit 100 and held, so that the right corner portion WR and the left corner portion WL of the cloth W are held by the intermediate holding units 100 and 100, respectively (see Figs. 22 and 23).

[0041] In this case, since the cloth W held by the pair of cloth interposing units 110 and 110 in the intermediate holding units 100 and 100 and the clamp units 20 and 20 do not interfere with each other, the clamp units 20 and 20 are restored to the original positions (lowermost portion) (see Figs. 24 and 25).

[0042] The worker (not shown) can attach the cloth W to the clamp units 20 and 20 again. Since, in the cloth spreading device 500 according to the present embodiment, four cloth feeding devices 10 are disposed, four cloths W can be attached to each clamp unit, and four cloths W can be held by each intermediate holding unit 100. In this manner, the cloth spreading device 500 can temporarily accumulate, that is, store a total of eight cloths W. In other words, the cloth spreading device 500 can buffer a total of eight cloths W (see Fig. 32).

[0043] Each of the right corner portion WR and the left

corner portion WL of the cloth W is fixed to have the second space H2 by the first pressing members 111, the second pressing members 112, and the third pressing members 113 in the pair of cloth interposing units 110. In addition, the expansion clamp 510 includes a first opening/closing claw 521 that is opened and closed for grasping the cloth W, and a second opening/closing claw 522 that is opened and closed, and the first opening/closing claw 521 and the second opening/closing claw 522 are disposed to have a third space H3 (see Fig. 25). It should be noted that the third space H3 in the present embodiment is preferably 28 mm, but the third space H3 is not limited to this.

[0044] Next, the cloth W is delivered from the intermediate holding units 100 and 100 to the pair of expansion clamps 510 and 510. Specifically, the delivery cylinder 120 is driven to drive the pair of cloth interposing units 110 and 110 that grasp the cloth W to come into contact with the expansion clamps 510 and 510. As described above, each of the right corner portion WR and the left corner portion WL of the cloth W is fixed to have the predetermined second space H2 by the first pressing members 111, the second pressing members 112, and the third pressing members 113 in the pair of cloth interposing units 110 and 110. Each of the first opening/closing claw 521 and the first opening/closing claw 522 in the expansion clamp 510 grips and grasps the cloth W disposed at the second space H2 between the first pressing member 111 and the second pressing member 112 and at the second space H2 between the second pressing member 112 and the third pressing member 113 by the first opening/closing claw 521 that is opened and closed and the second opening/closing claw 522 that is opened and closed, respectively (see Figs. 26 and 27).

[0045] In this way, in the process of delivering the cloth W from the clamp unit 20 to the intermediate holding unit 100 and the expansion clamp 510, the first claw unit 21a and the first claw receiving unit 21b, and the second claw unit 22a and the second claw receiving unit 22b in the clamp unit 20 have the predetermined space H, the first pressing member 111, the second pressing member 112, and the third pressing member 113 in the intermediate holding unit 100 have the predetermined second spaces H2, respectively, so that the first opening/closing claw 521 and the first opening/closing claw 522 in the expansion clamp 510 grasp the cloth W disposed at the predetermined second spaces H2, and it is possible to prevent the right corner portion WR and the left corner portion WL of the cloth W from being bent (see Figs. 26, 27, 28, and 29).

[0046] As described above, since the first pressing member 111, the second pressing member 112, and the third pressing member 113 are shaft-shaped, the first pressing member 111, the second pressing member 112, and the third pressing member 113 are narrow in width and can grasp the right corner portion WR and the left corner portion WL of the cloth W. Thereafter, the pair of cloth interposing units 110 and 110 are opened to release

the holding of the cloth W. In addition, the pair of cloth interposing units 110 and 110 are moved forward F by the delivery cylinder 120 (see Figs. 28 and 29).

[0047] In this way, the pair of cloth interposing units 110 and 110 are moved forward F by the delivery cylinder 120, so that the pair of expansion clamps 510 and 510 do not interfere with the movement in the left and right directions in a front view in the cloth spreading device 500, and the pair of expansion clamps 510 and 510 can spread to expand the cloth W (see Figs. 30 and 31). In this way, the right corner portion WR and the left corner portion WL of the cloth W are grasped by the pair of cloth interposing units 110 and 110, respectively, and the right corner portion WR and the left corner portion WL of the cloth W are grasped by the pair of expansion clamps 510 and 510, respectively, so that the right corner portion WR and the left corner portion WL of the cloth W can be prevented from hanging down.

Reference Signs List

[0048]

- 10: cloth feeding device
- 20: clamp unit
- 21a: first claw unit
- 21b: first claw receiving unit
- 22a: second claw unit
- 22b: second claw receiving unit
- 22: second claw unit
- 23: dual cylinder
- 25: feeding sensor
- 26: LED light
- 24: drive unit
- 100: intermediate holding unit
- 110: cloth interposing unit
- 111: first pressing member
- 112: second pressing member
- 113: third pressing member
- 135: delivery claw cylinder
- 140: suction unit
- 150: rotation cylinder
- 500: cloth spreading device
- 510: expansion clamp
- 521: first opening/closing claw
- 522: second opening/closing claw
- W: cloth
- WR: right corner portion
- WL: left corner portion

Claims

1. A cloth feeding device comprising:
 - a clamp unit that grasps a corner portion of a cloth; and
 - an intermediate holding unit that grasps the cor-

ner portion from the clamp unit that grasps the corner portion of the cloth,
 wherein the clamp unit includes a first claw unit and a first claw receiving unit that are disposed to be openable and closable for grasping the corner portion,
 the intermediate holding unit further includes a pair of cloth interposing units that are opened and closed to interpose the cloth,
 the pair of cloth interposing units include first pressing members for interposing the cloth, and when the cloth is delivered from the clamp unit to the intermediate holding unit, the first pressing members in the pair of cloth interposing units grasp a corner portion of the cloth protruding from the first claw unit and the first claw receiving unit.

2. A cloth feeding device comprising:

a clamp unit that grasps a corner portion of a cloth; and
 an intermediate holding unit that grasps the corner portion from the clamp unit that grasps the corner portion of the cloth,
 wherein the clamp unit includes

a first claw unit and a first claw receiving unit that are disposed to be openable and closable for grasping the corner portion, and a second claw unit and a second claw receiving unit that are disposed to have a predetermined space from the first claw unit and the first claw receiving unit, and are openable and closable,

the intermediate holding unit further includes a pair of cloth interposing units that are opened and closed to interpose the cloth,
 the pair of cloth interposing units each have a first pressing member for interposing the cloth, a second pressing member for interposing the cloth, and a third pressing member for interposing the cloth,
 when the cloth is delivered from the clamp unit to the intermediate holding unit, the second pressing members and the third pressing members in the pair of cloth interposing units grasp the cloth disposed at the predetermined space between the first claw unit and the first claw receiving unit, and the second claw unit and the second receiving unit, and
 the first pressing members in the pair of cloth interposing units grasp a corner portion of the cloth protruding from the first claw unit and the first claw receiving unit.

3. The cloth feeding device according to claim 2,

wherein the first pressing members, the second pressing members, and the third pressing members in the pair of cloth interposing units are disposed to have a predetermined second space from each other.

4. The cloth feeding device according to claim 1, wherein the intermediate holding unit includes a suction unit that sucks the corner portion of the cloth protruding from the first claw unit and the first claw receiving unit.

5. A cloth spreading device comprising:

a clamp unit that grasps a corner portion of a cloth; and
 an intermediate holding unit that grasps the corner portion from the clamp unit that grasps the corner portion of the cloth,
 wherein the clamp unit includes

a first claw unit and a first claw receiving unit that are disposed to be openable and closable for grasping the corner portion, and a second claw unit and a second claw receiving unit that are disposed to have a predetermined space from the first claw unit and the first claw receiving unit, and are openable and closable,

the intermediate holding unit further includes a pair of cloth interposing units that are opened and closed to interpose the cloth,
 the pair of cloth interposing units each have a first pressing member for interposing the cloth, a second pressing member for interposing the cloth, and a third pressing member for interposing the cloth,
 when the cloth is delivered from the clamp unit to the intermediate holding unit, the second pressing members and the third pressing members in the pair of cloth interposing units grasp the cloth disposed at the predetermined space between the first claw unit and the first claw receiving unit, and the second claw unit and the second receiving unit,
 the first pressing members in the pair of cloth interposing units grasp a corner portion of the cloth protruding from the first claw unit and the first claw receiving unit, and
 when the cloth is delivered from the cloth interposing unit to the expansion clamp, the expansion clamp interposes the cloth disposed at predetermined second spaces between the first pressing member, the second pressing member, and the third pressing member.

6. The cloth spreading device according to claim 5,

wherein the intermediate holding unit includes a suction unit that sucks the corner portion of the cloth protruding from the first claw unit and the first claw receiving unit.

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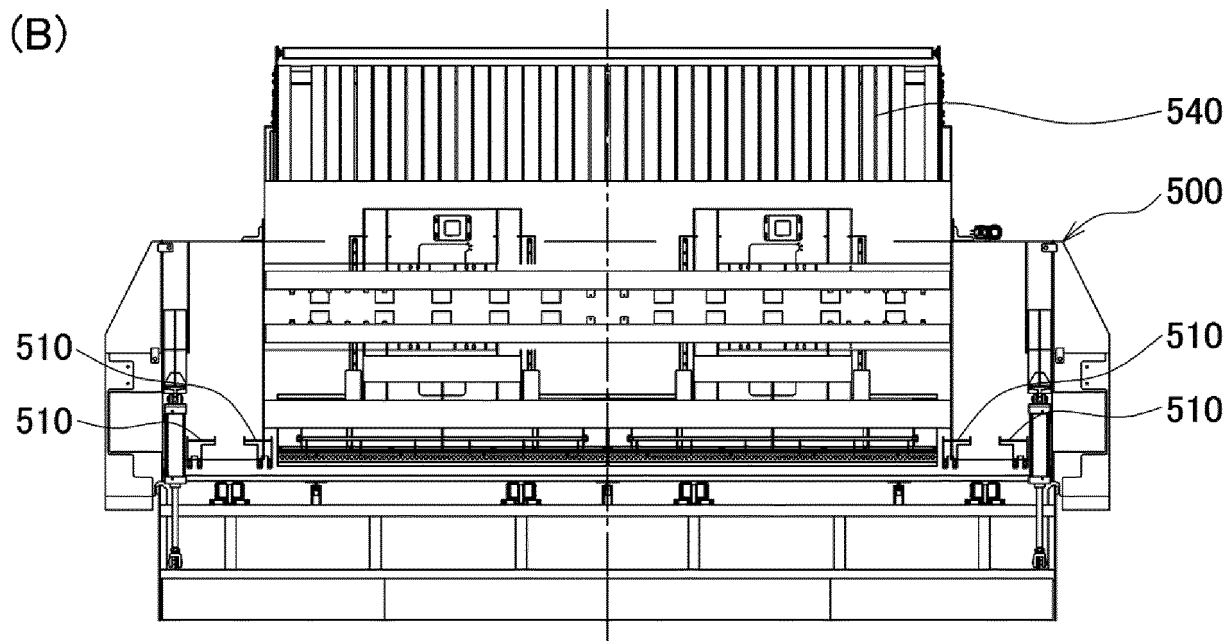
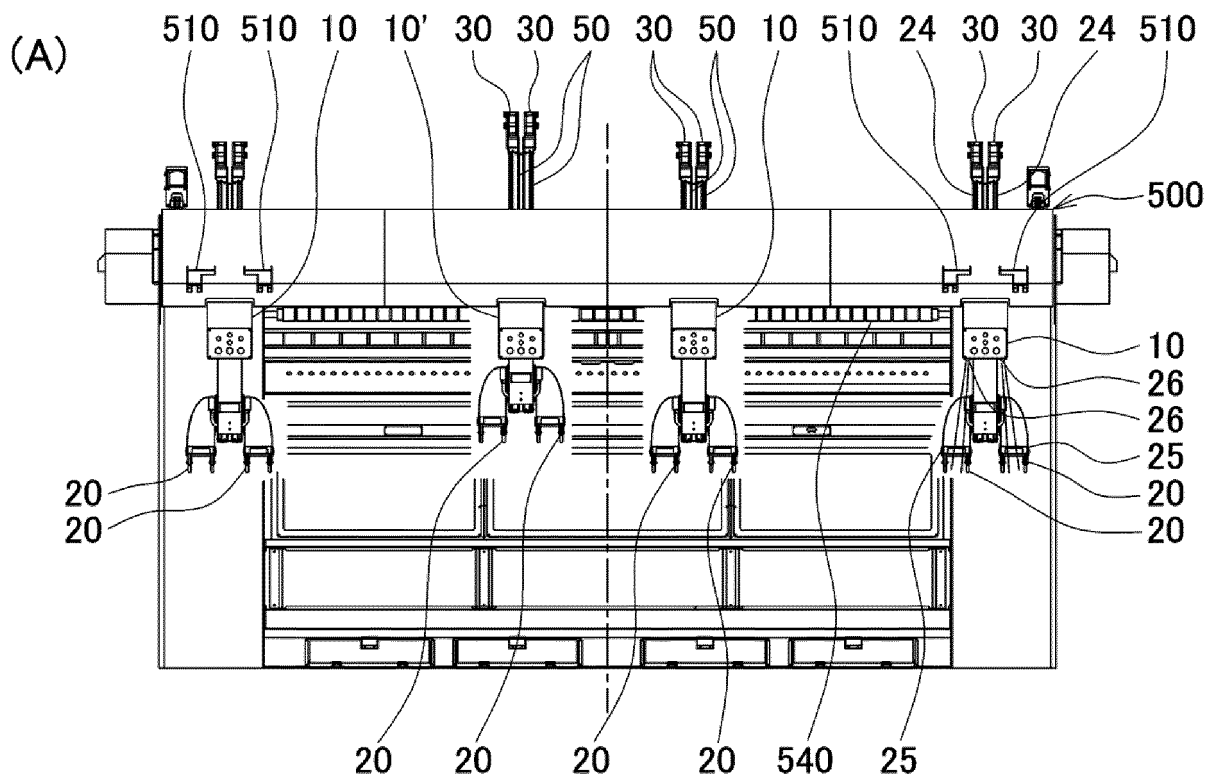


FIG. 1

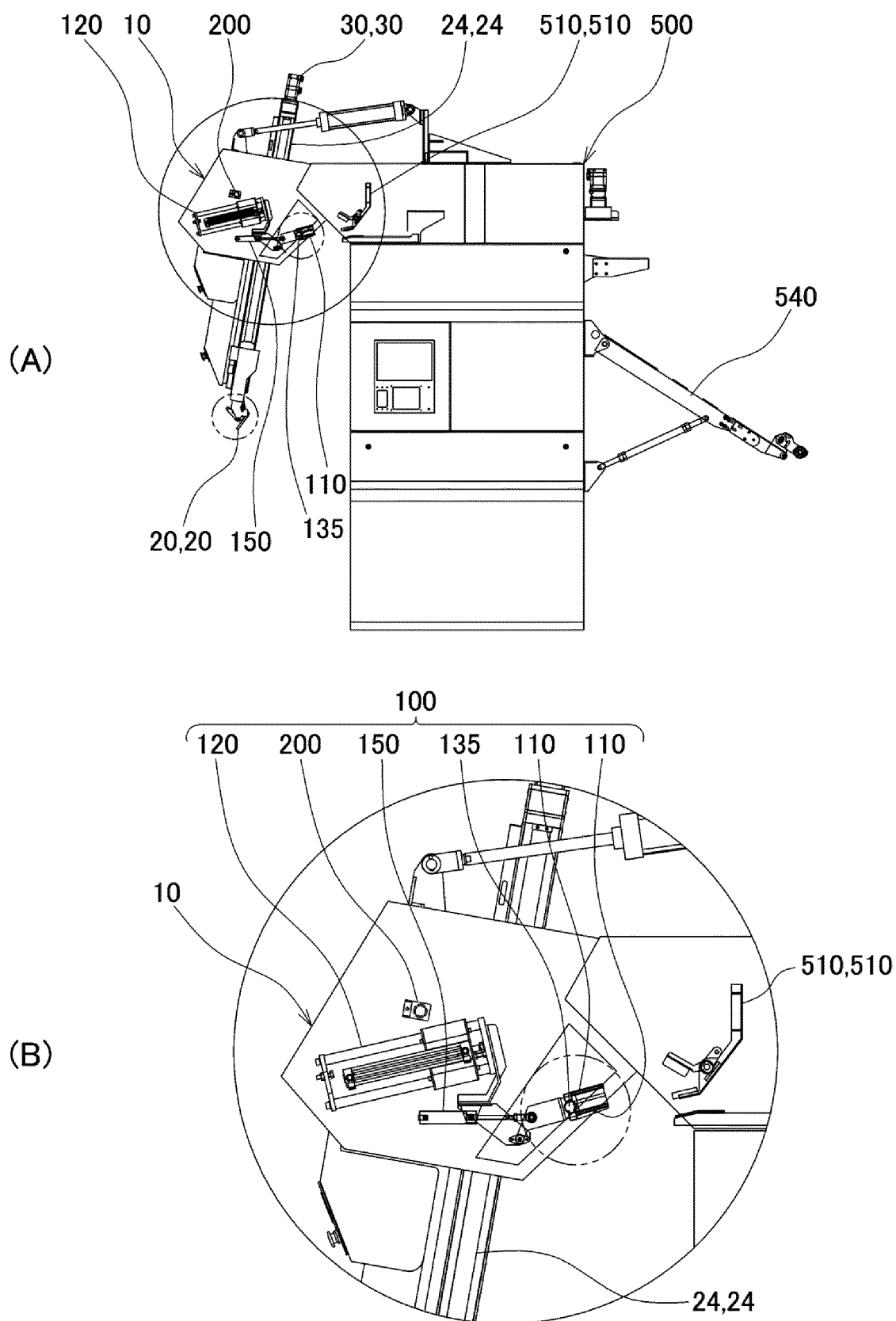


FIG. 2

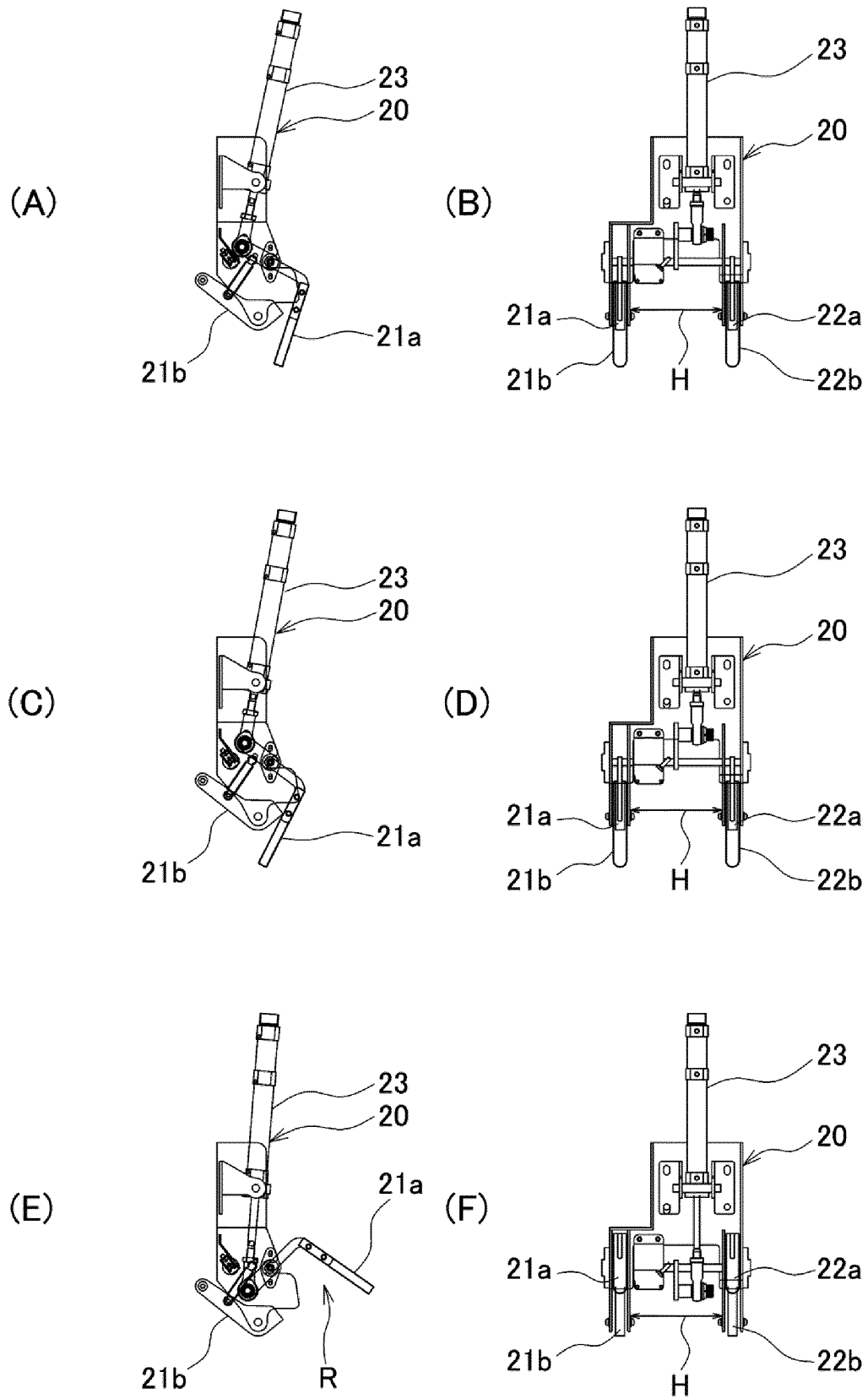


FIG. 3

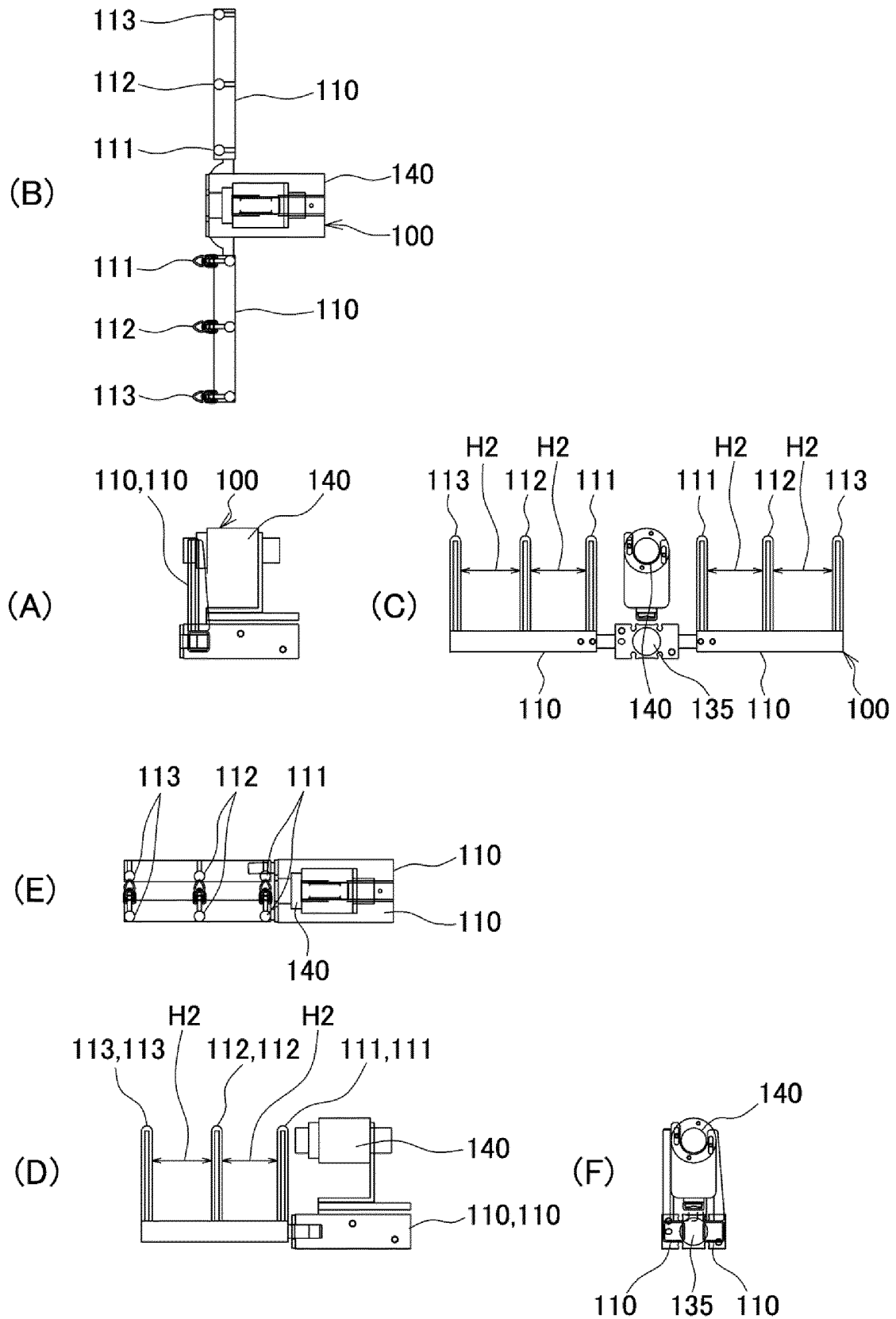


FIG. 4

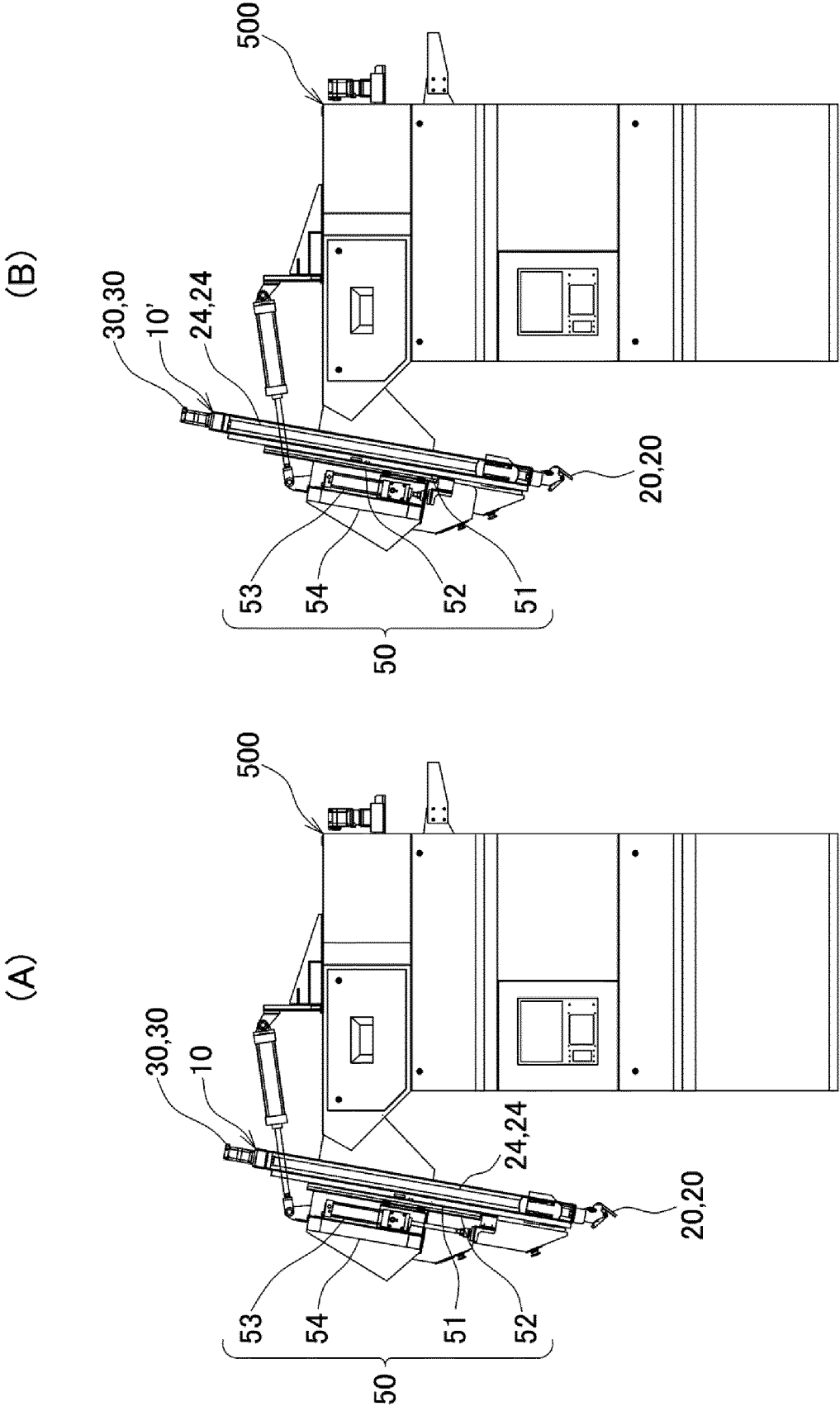


FIG. 5

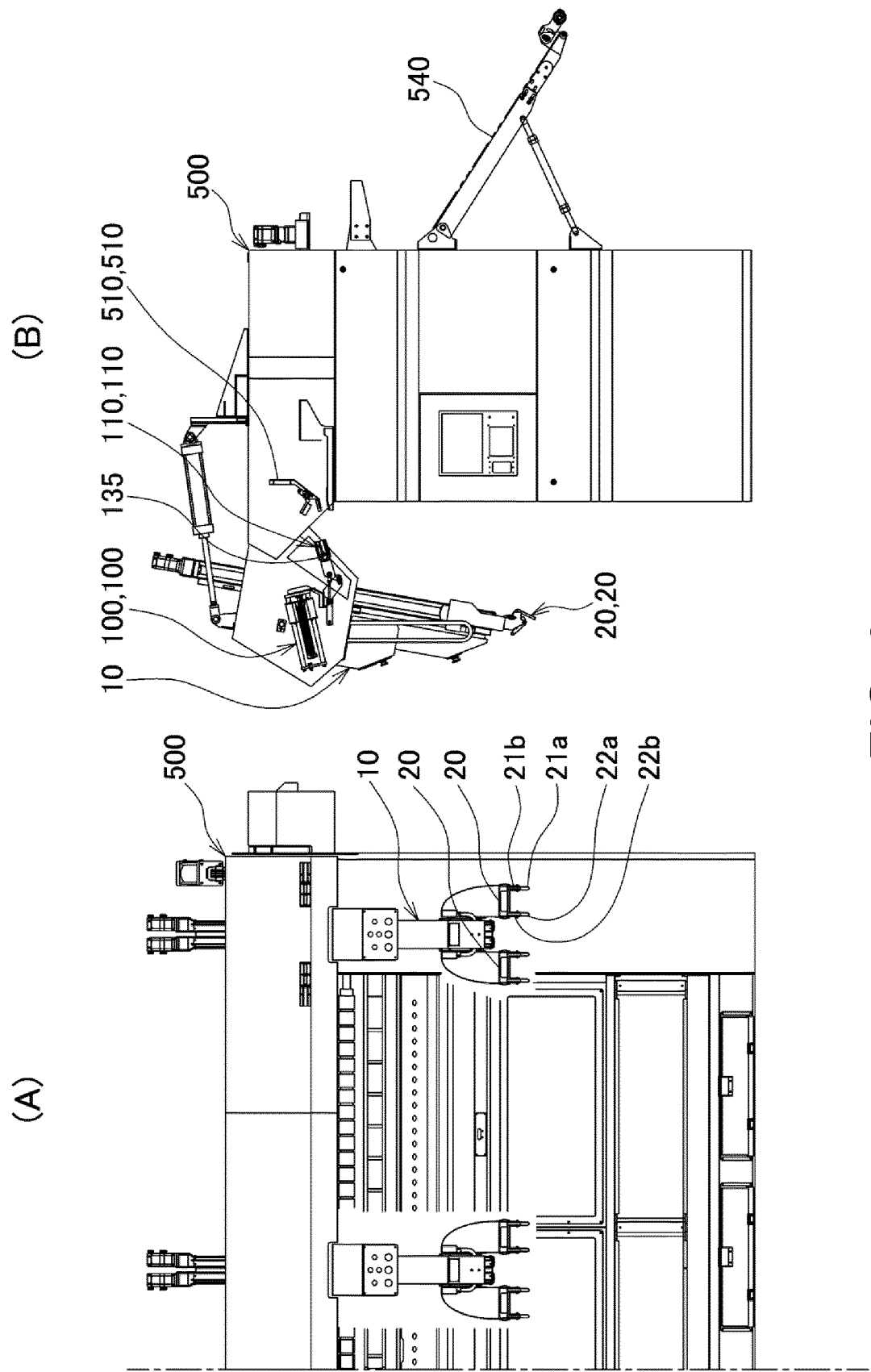
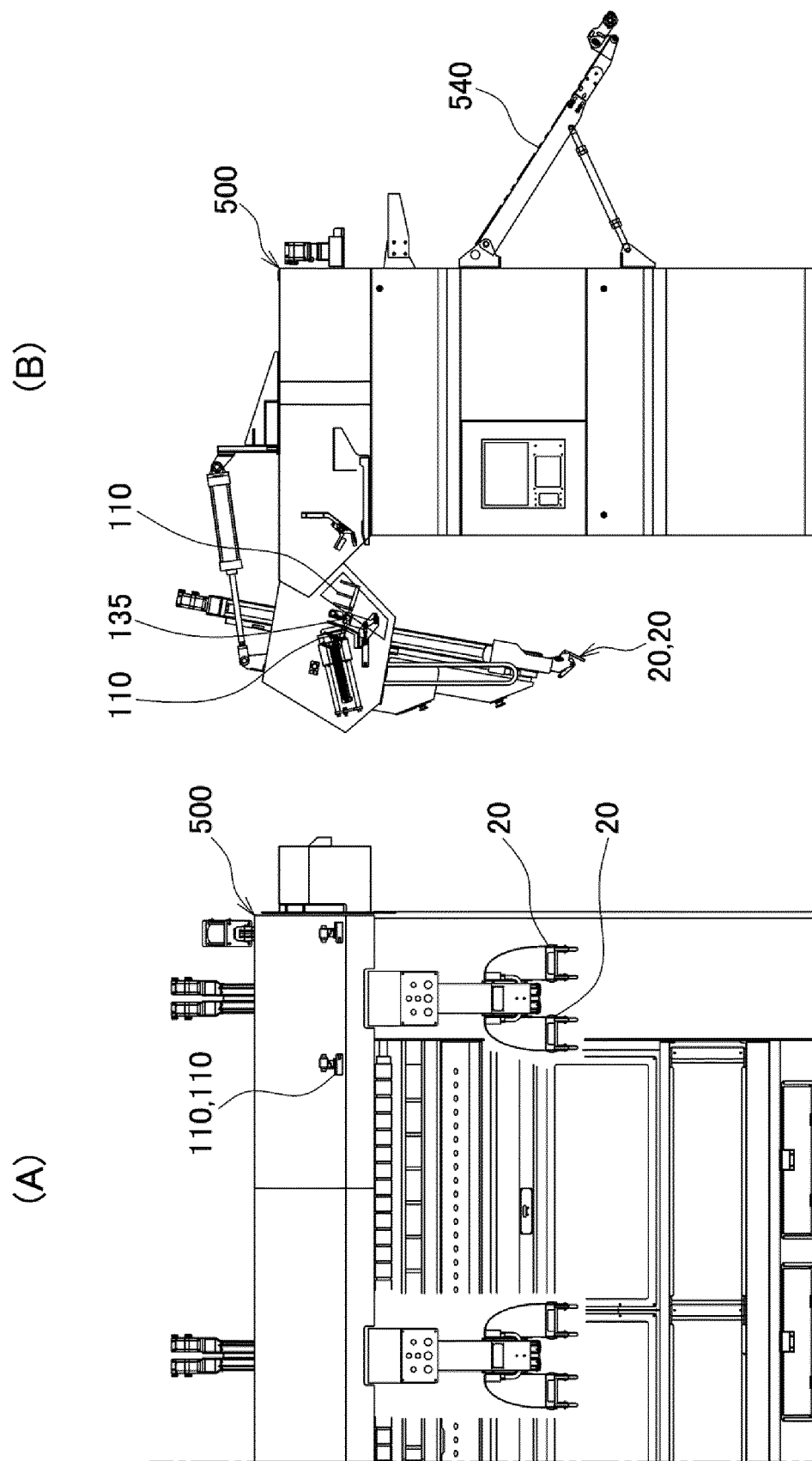


FIG. 6



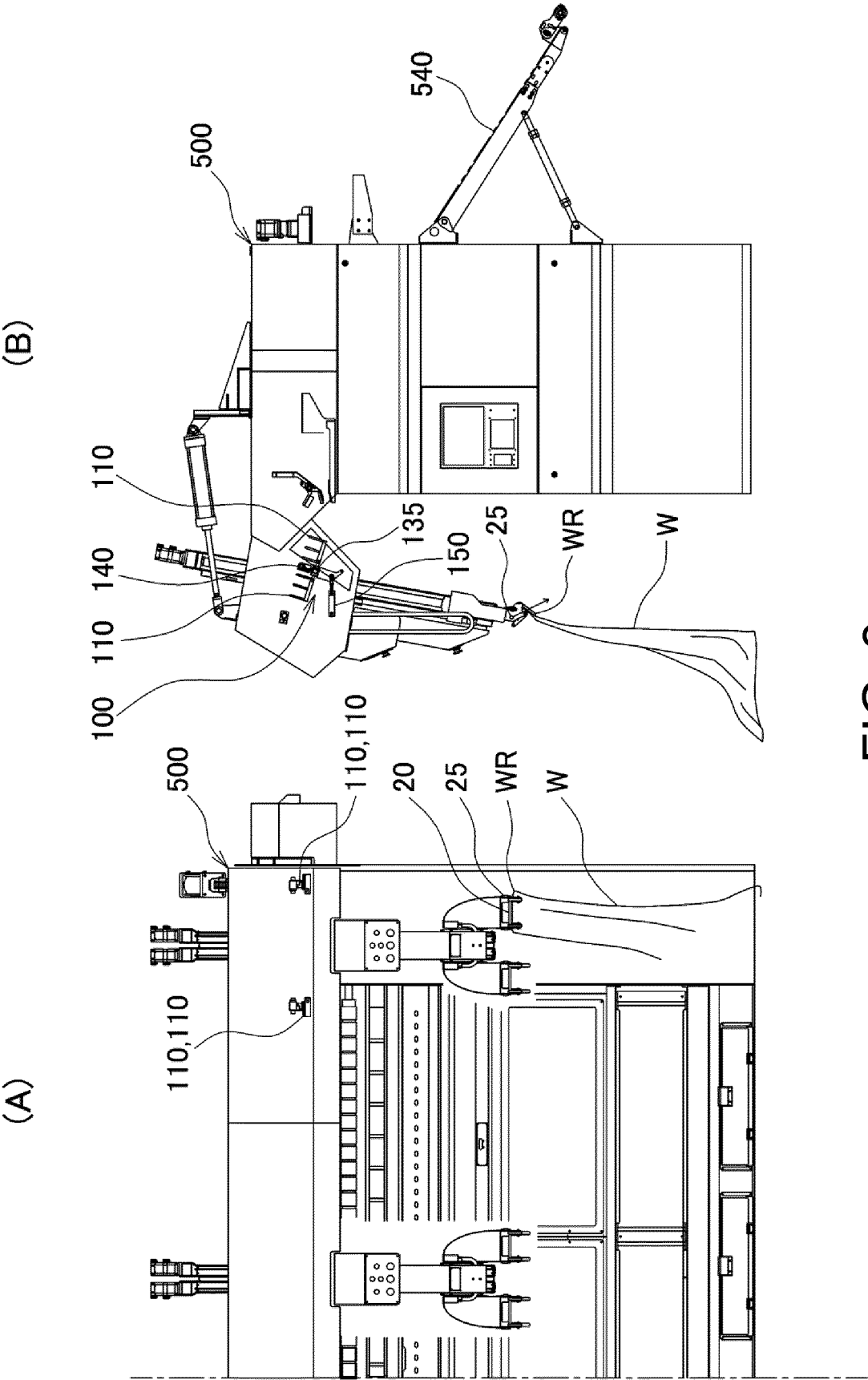


FIG. 8

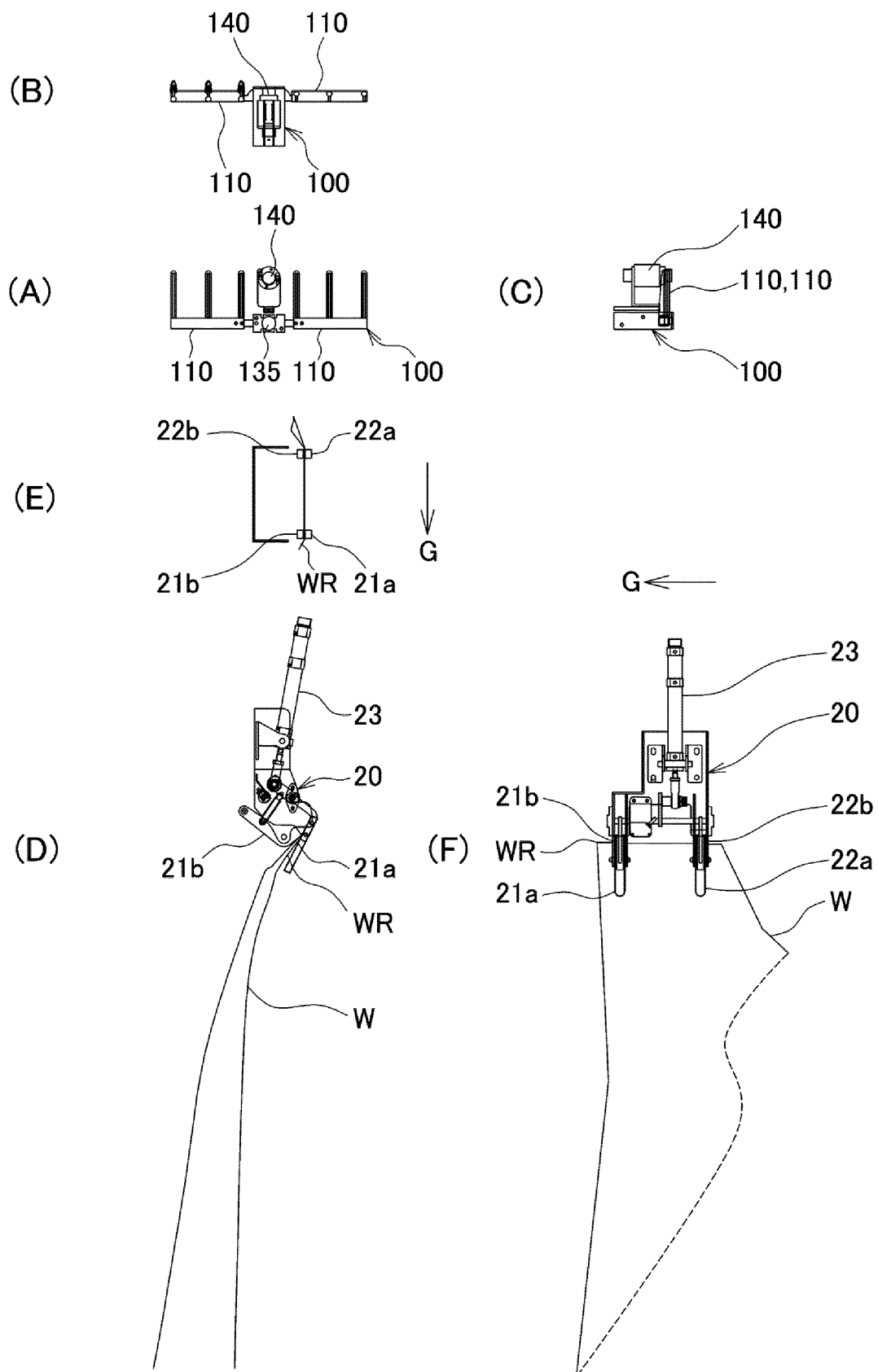


FIG. 9

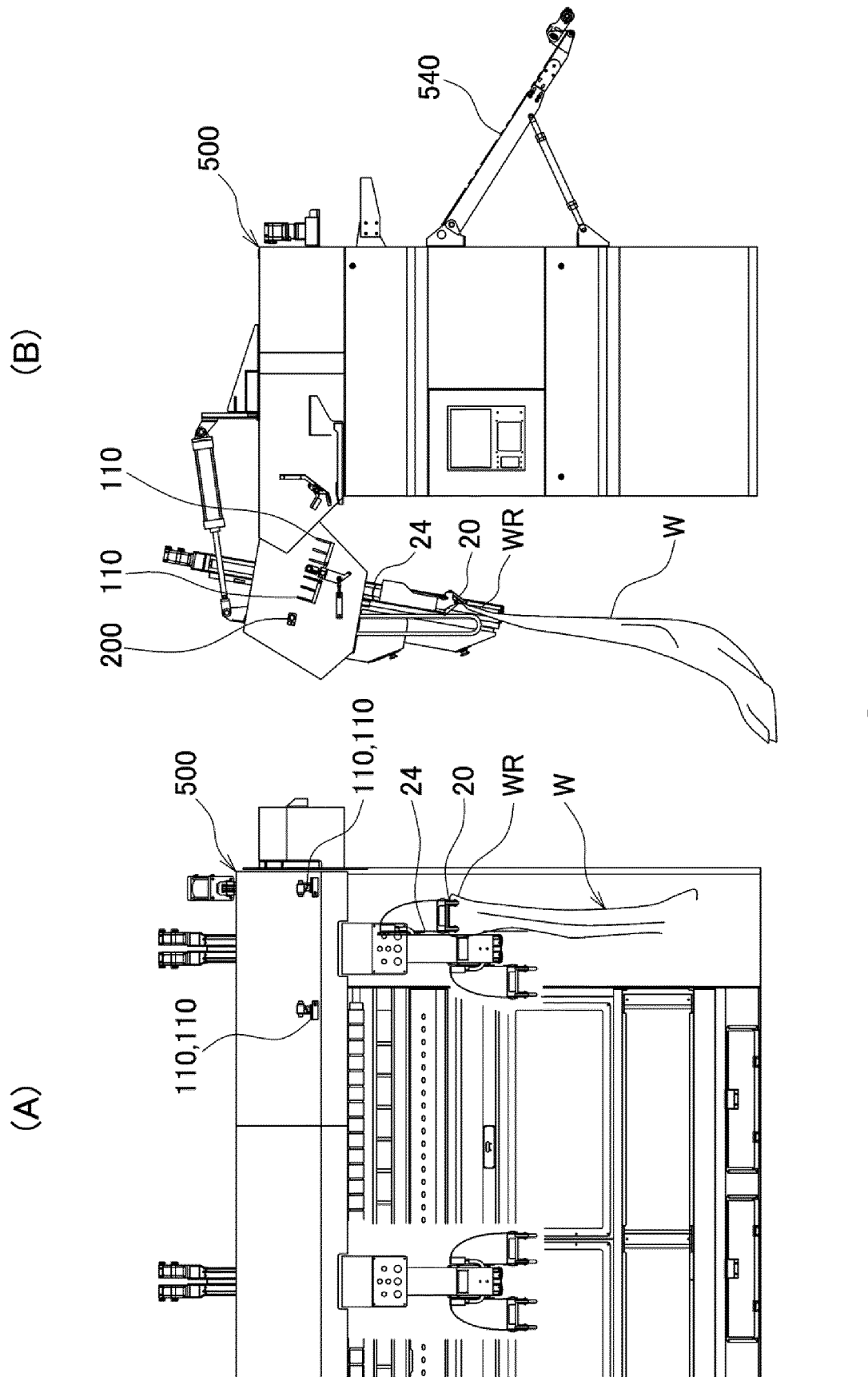


FIG. 10

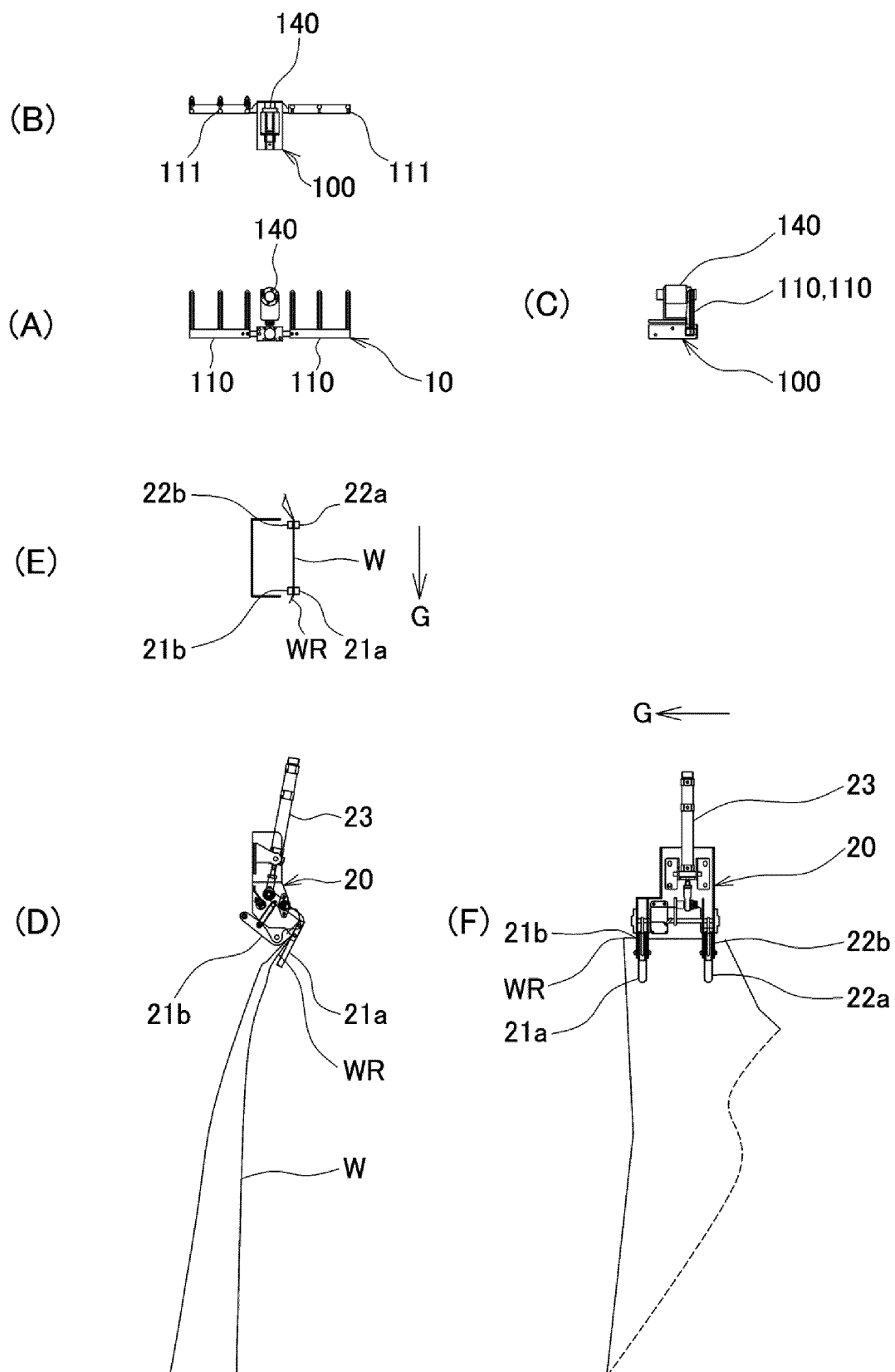


FIG. 11

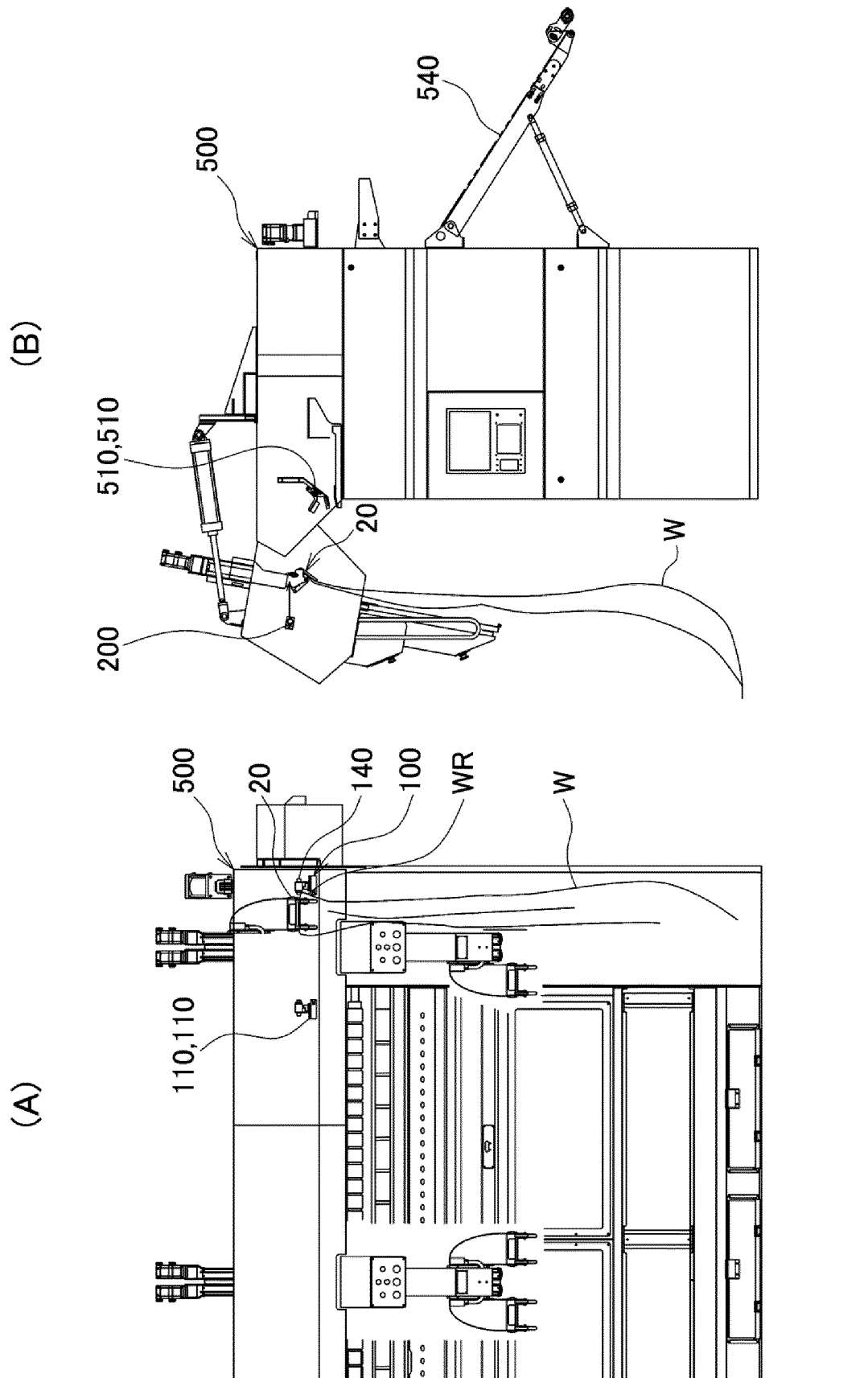


FIG. 12

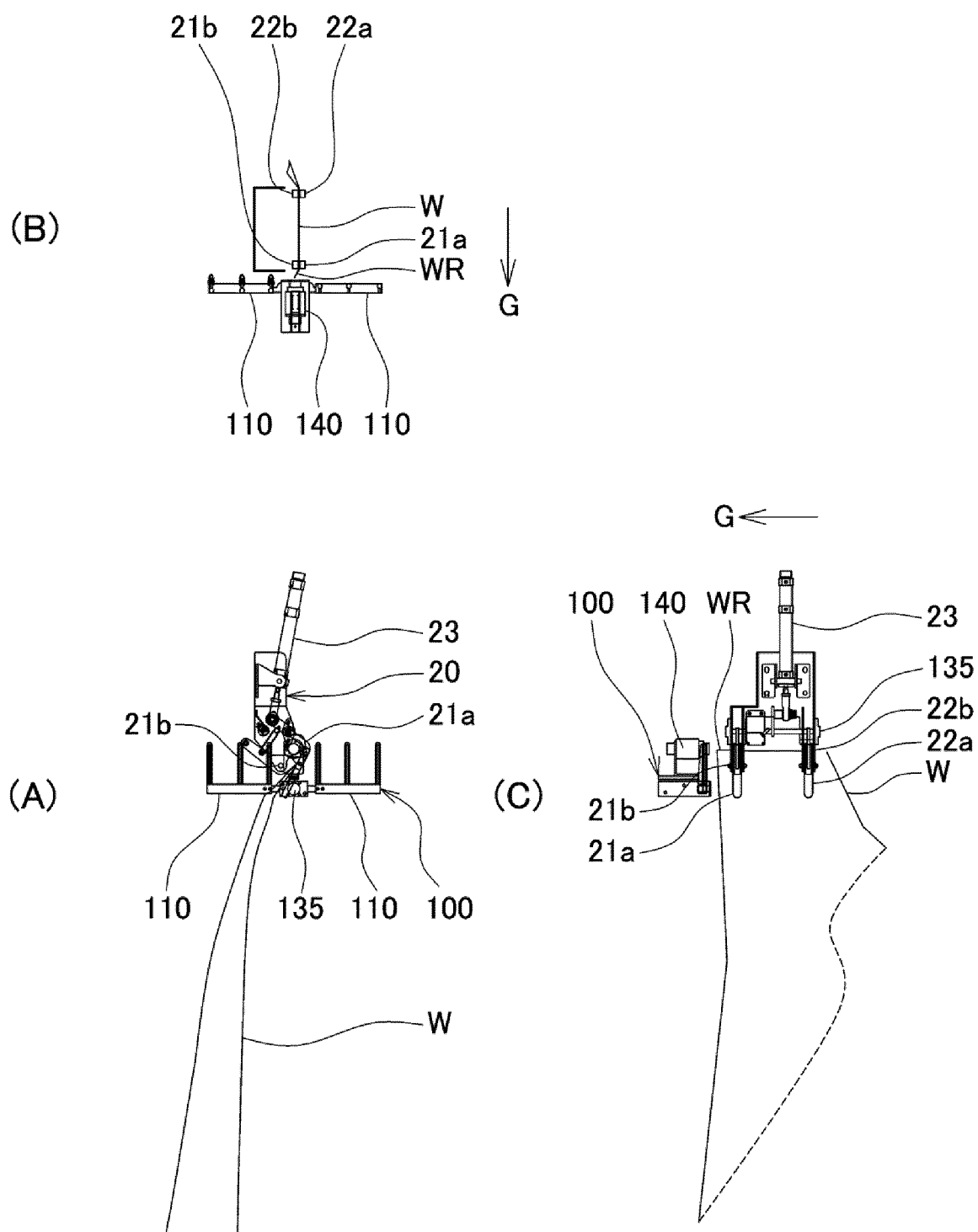


FIG. 13

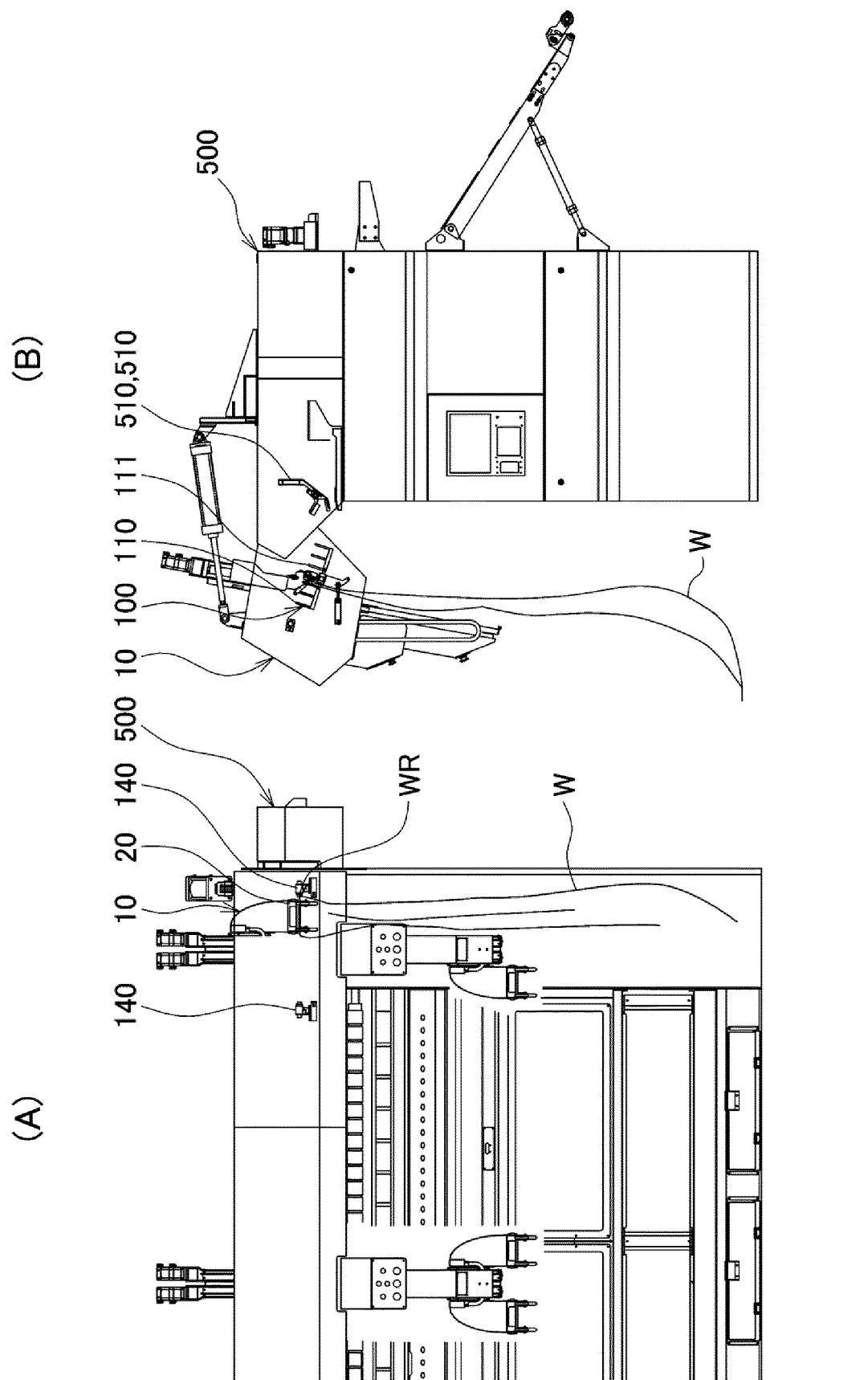


FIG. 14

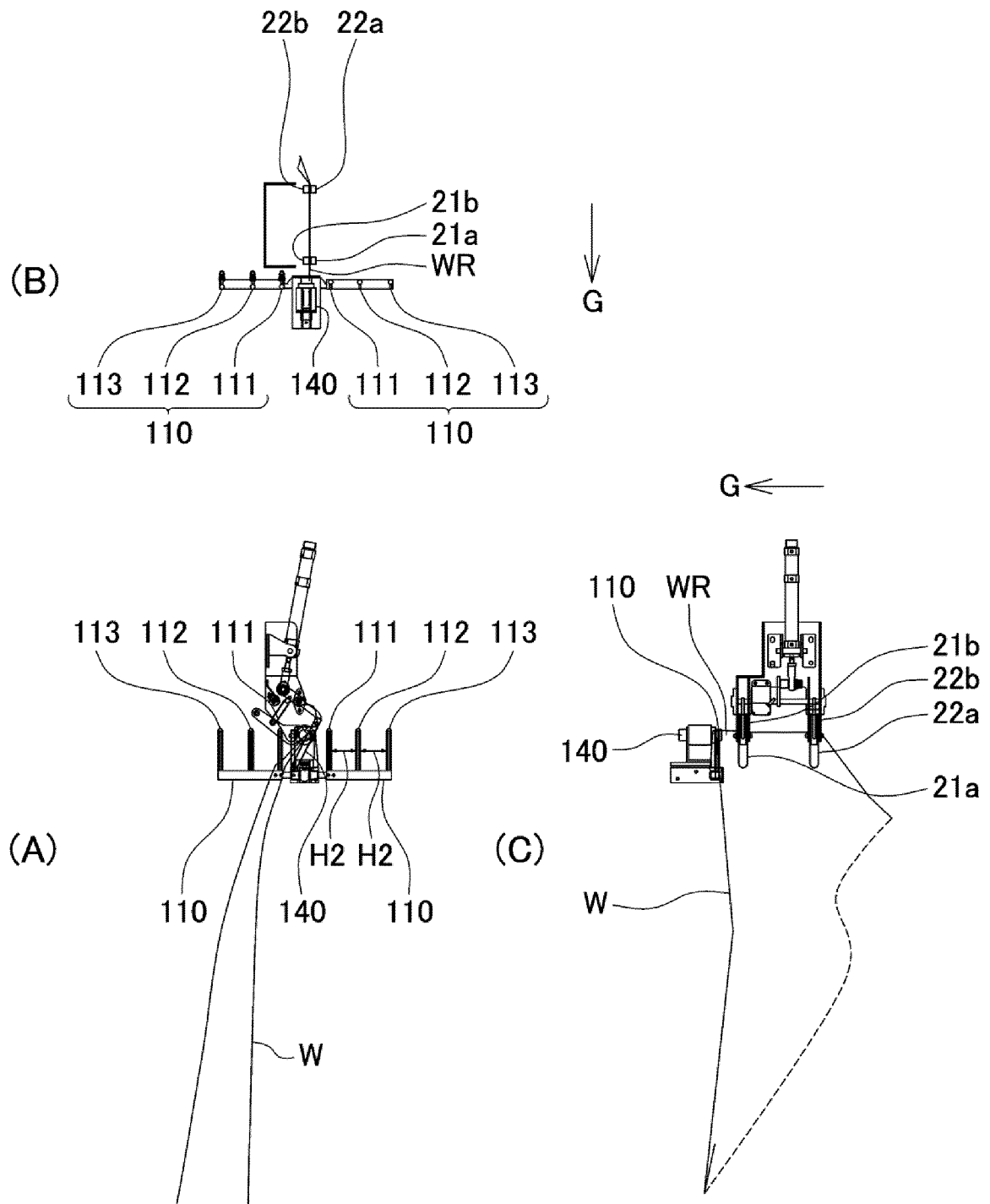


FIG. 15

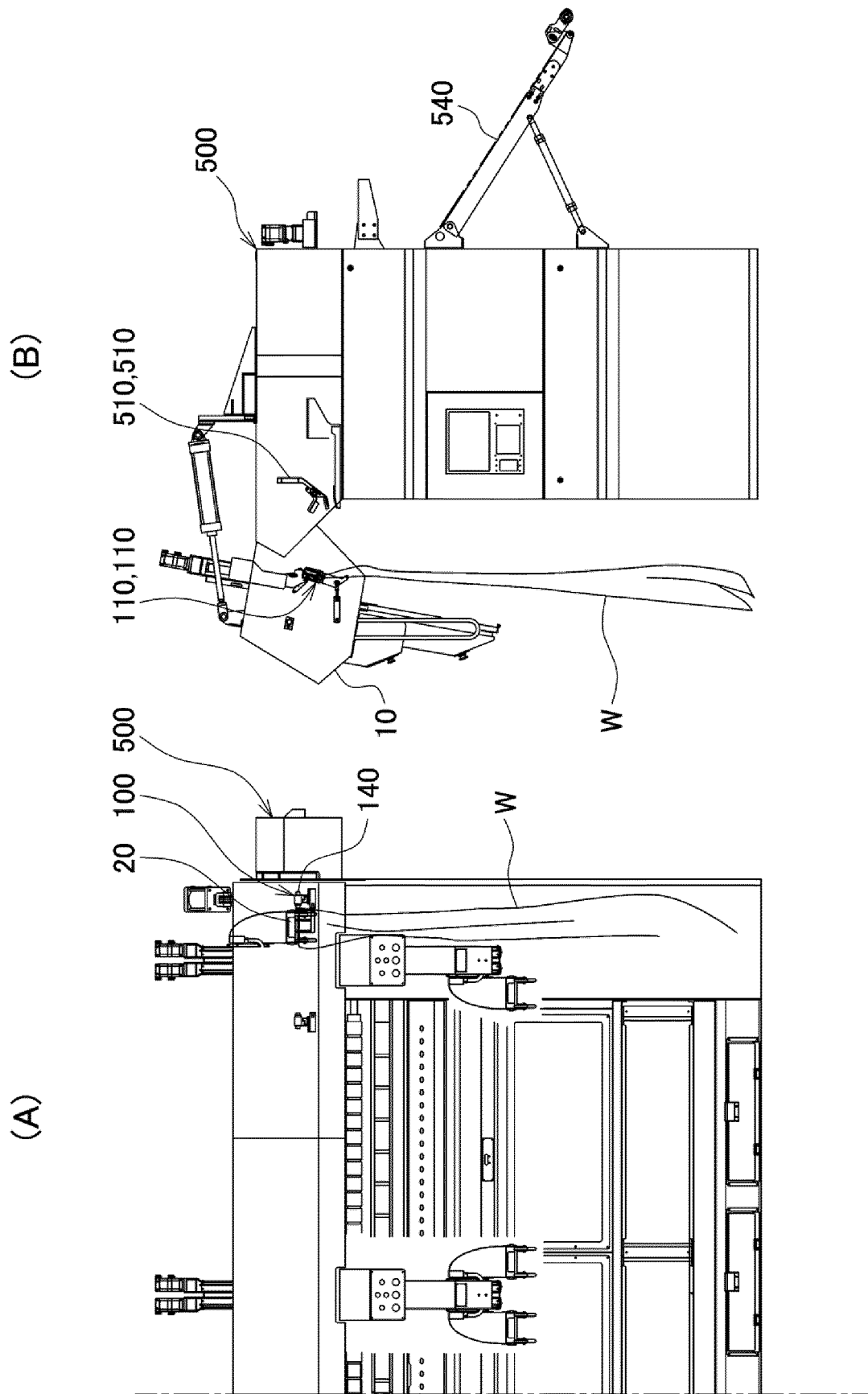


FIG. 16

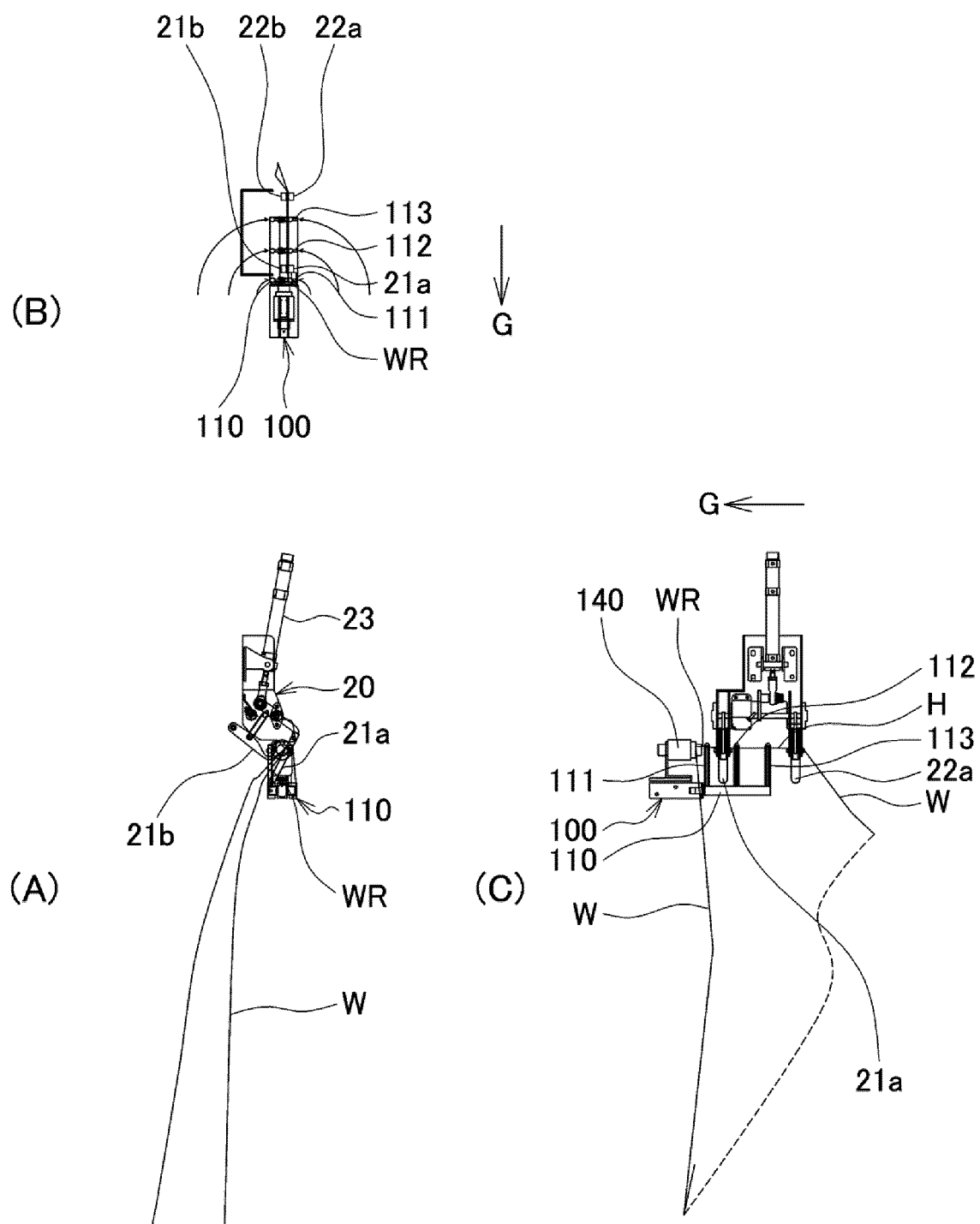


FIG. 17

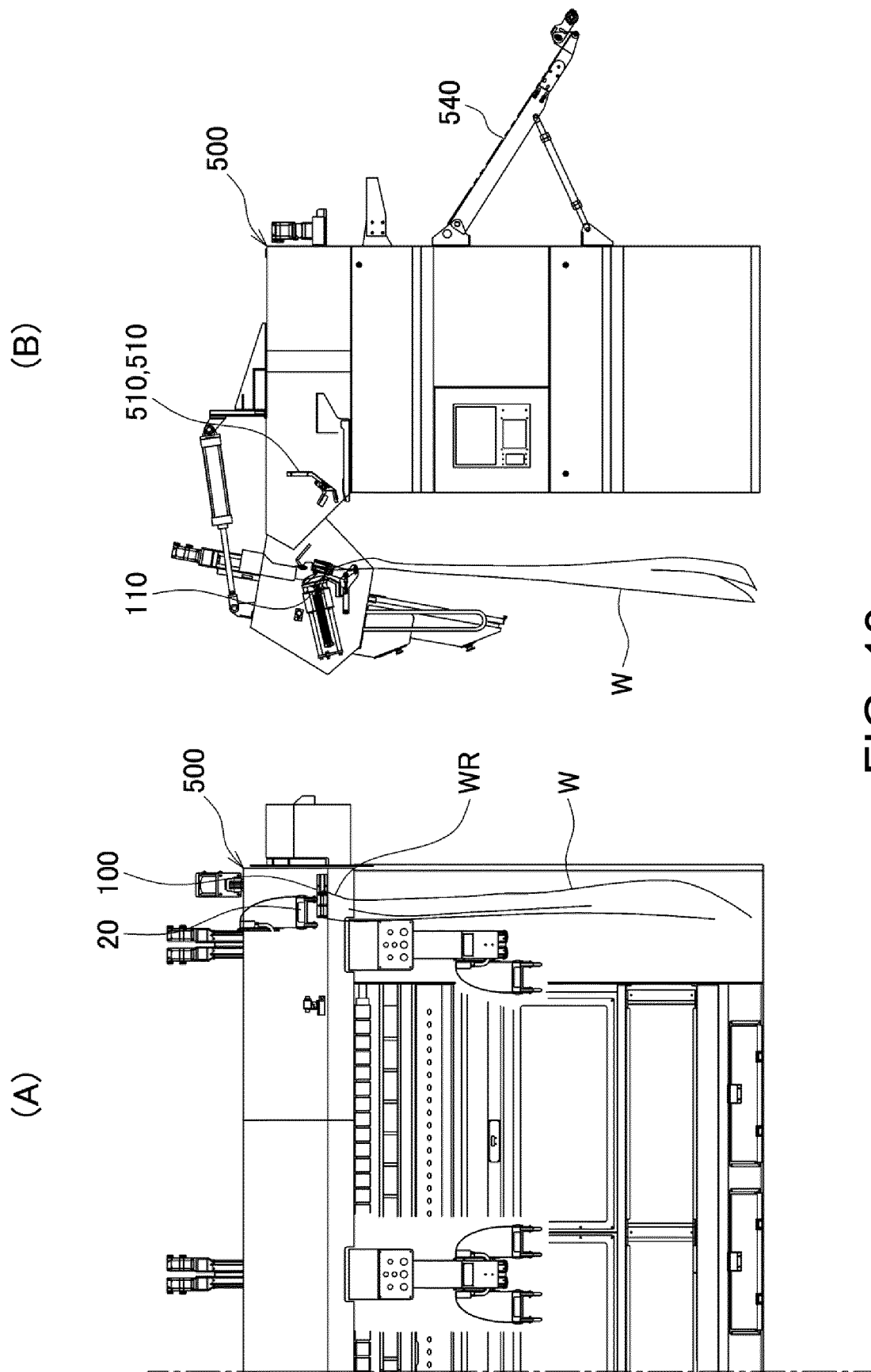


FIG. 18

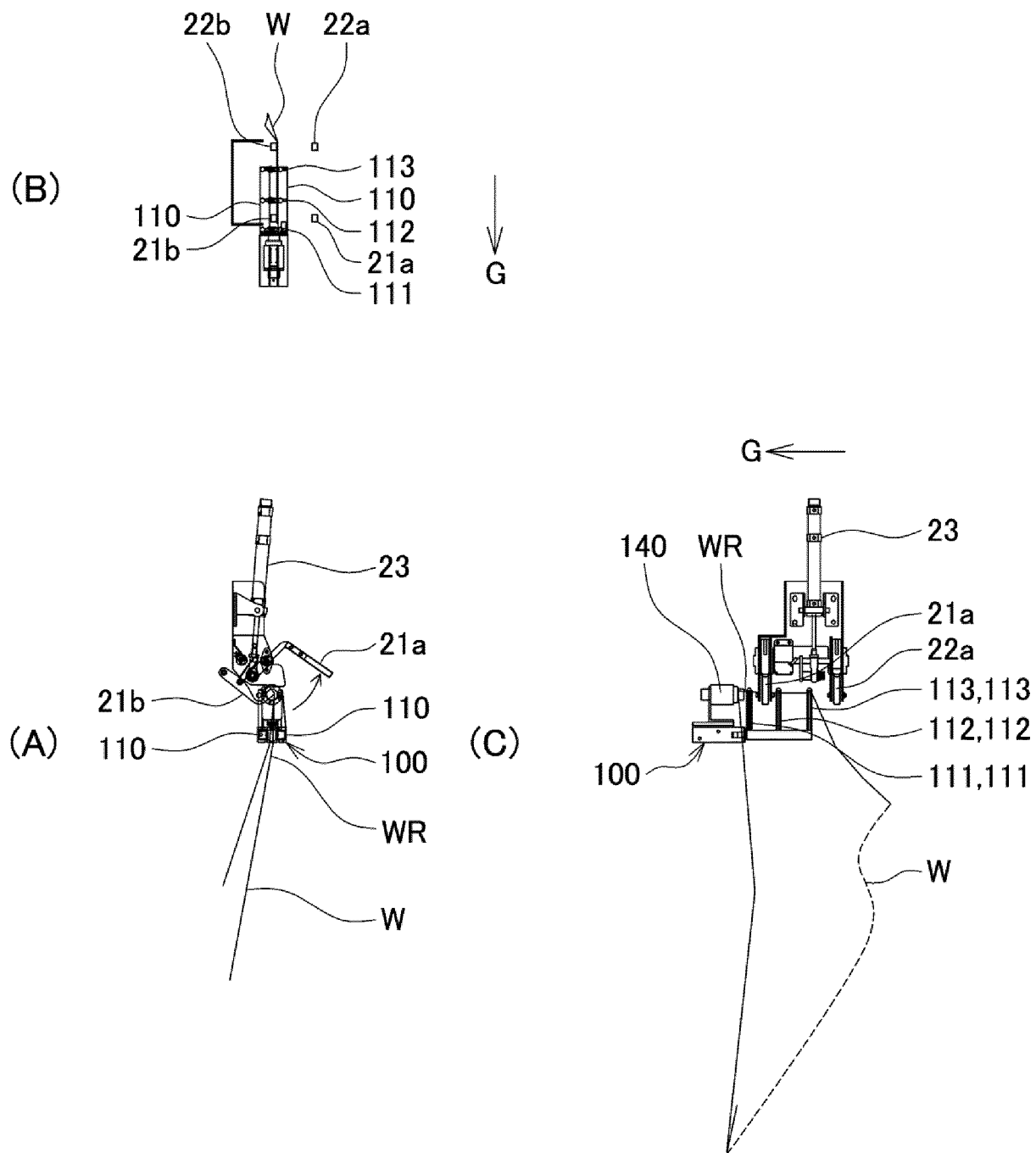


FIG. 19

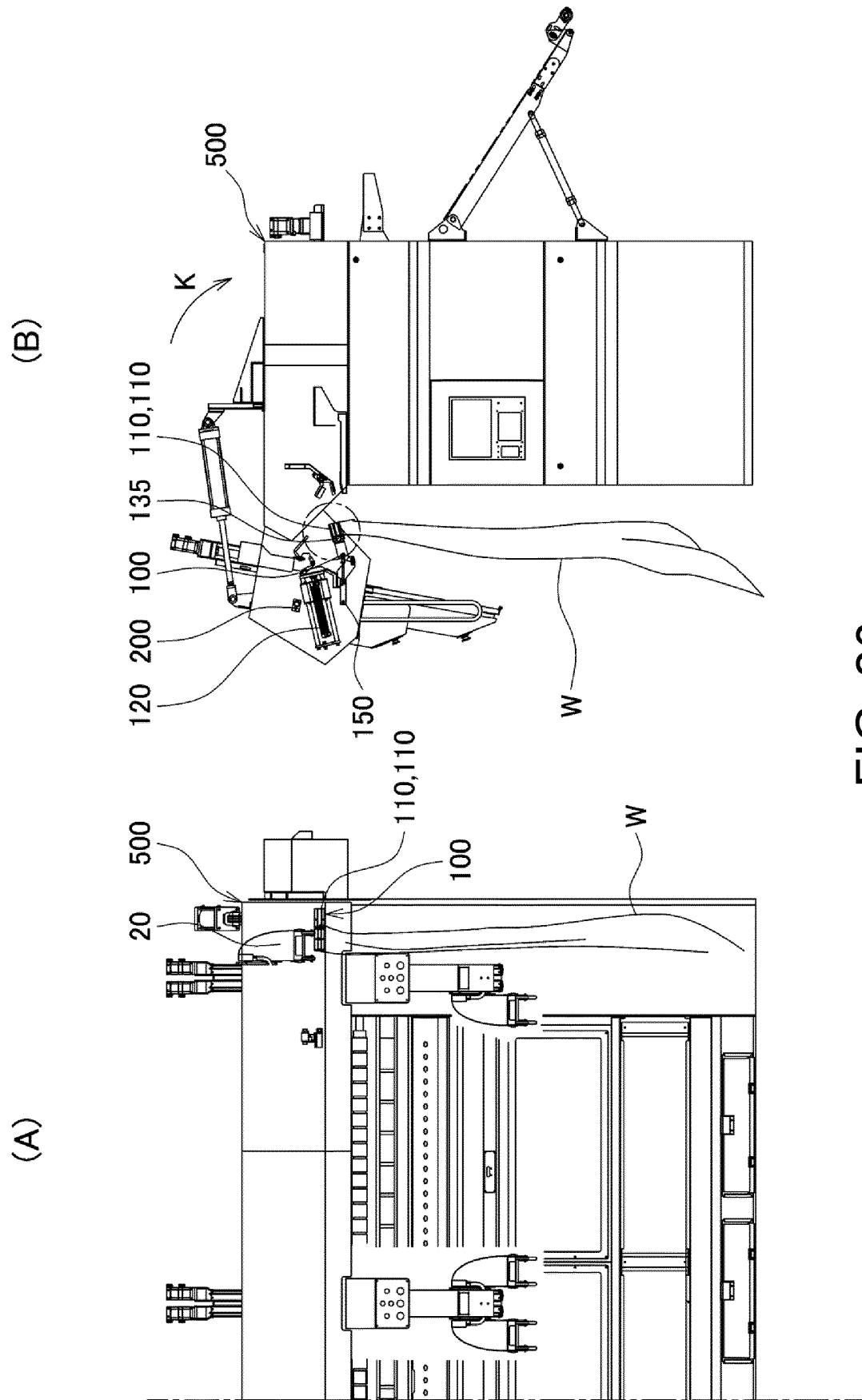


FIG. 20

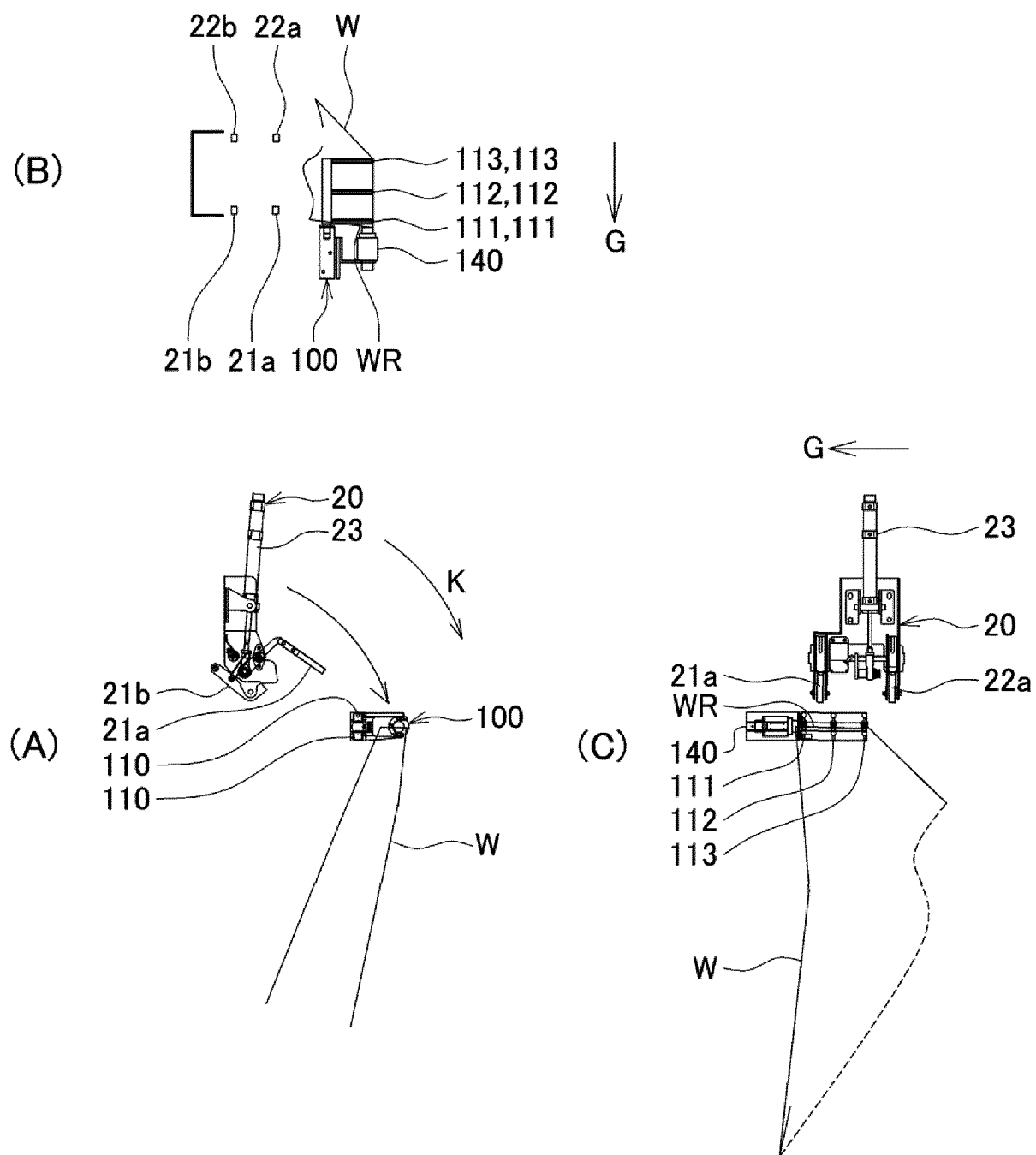


FIG. 21

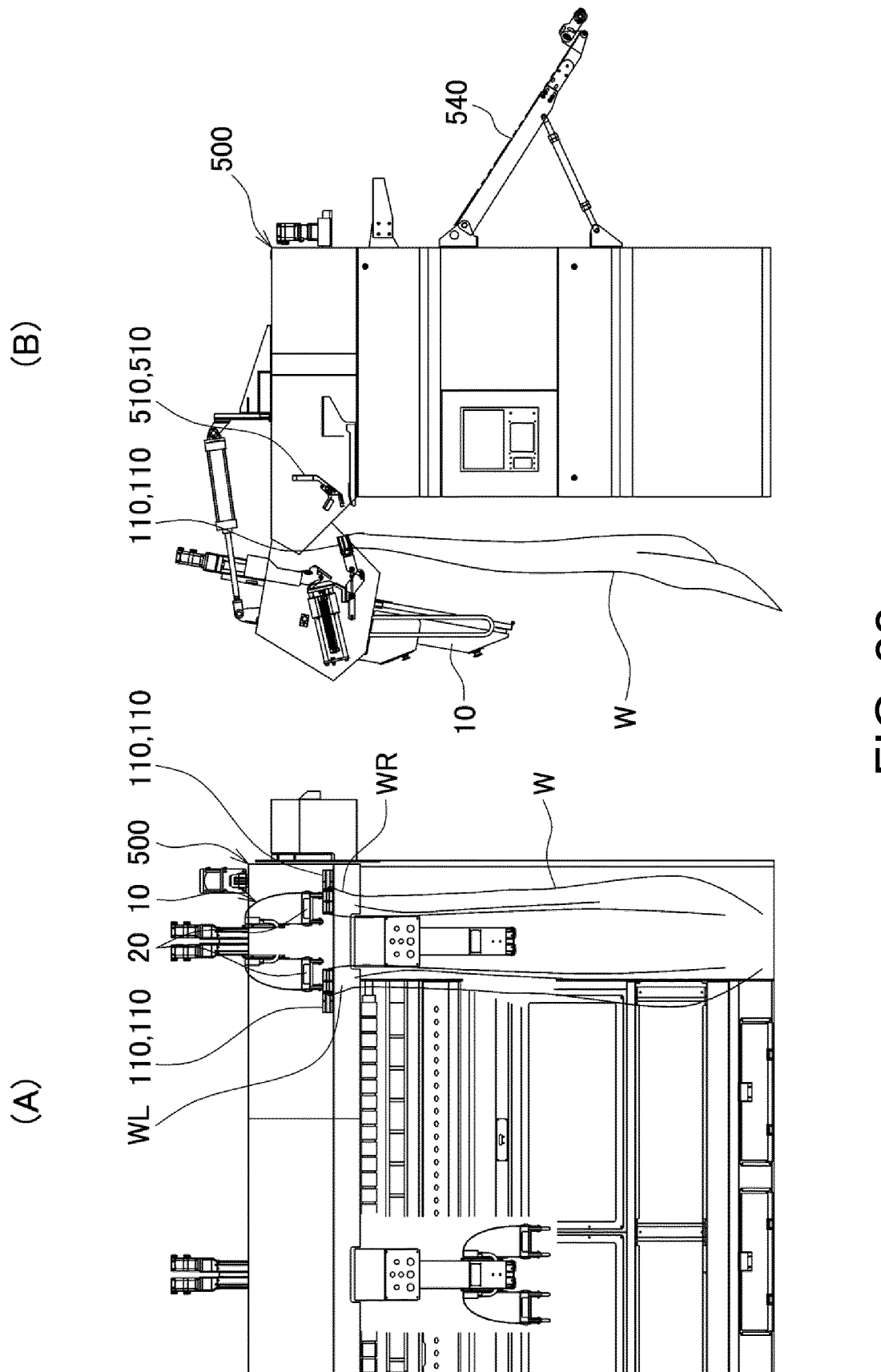


FIG. 22

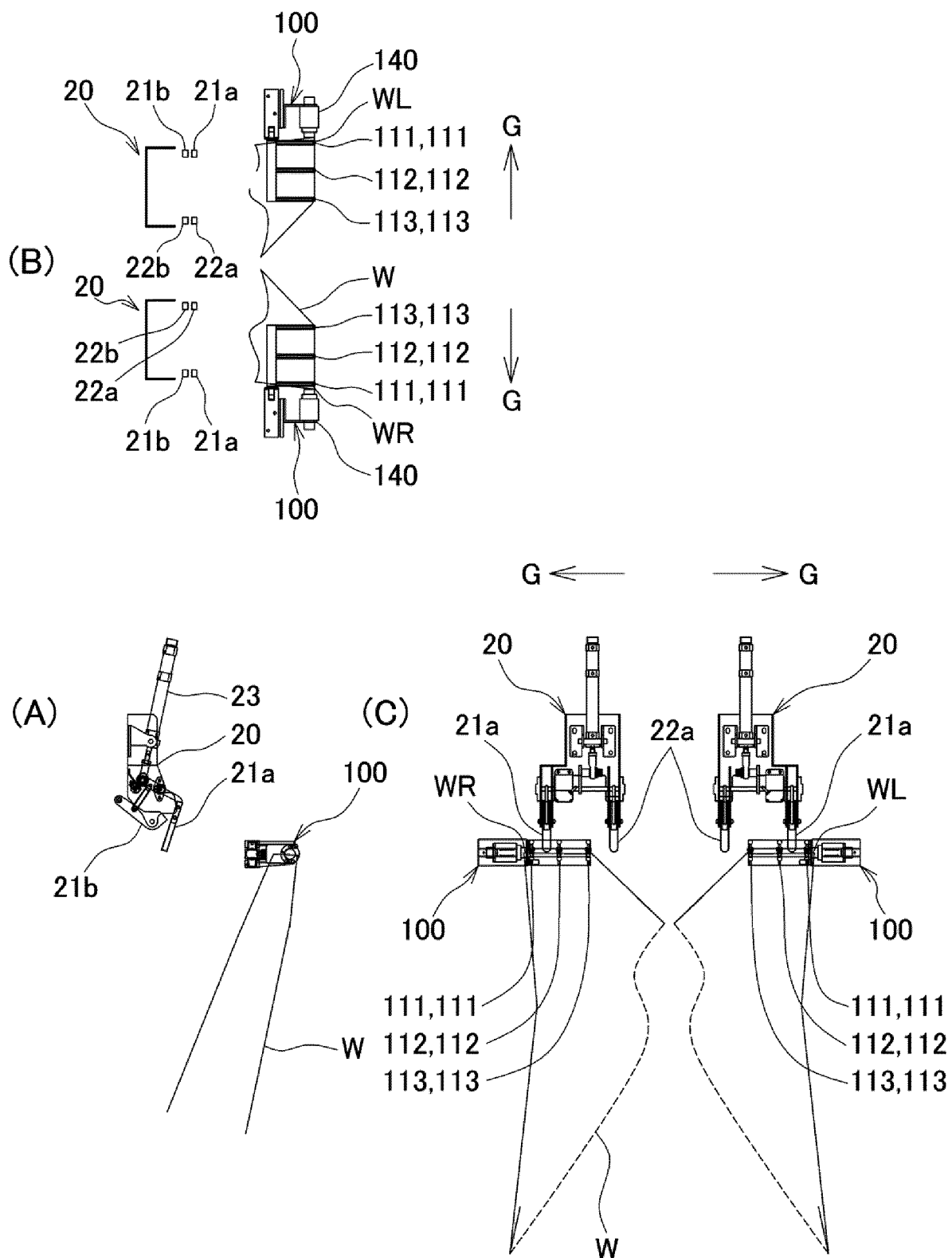


FIG. 23

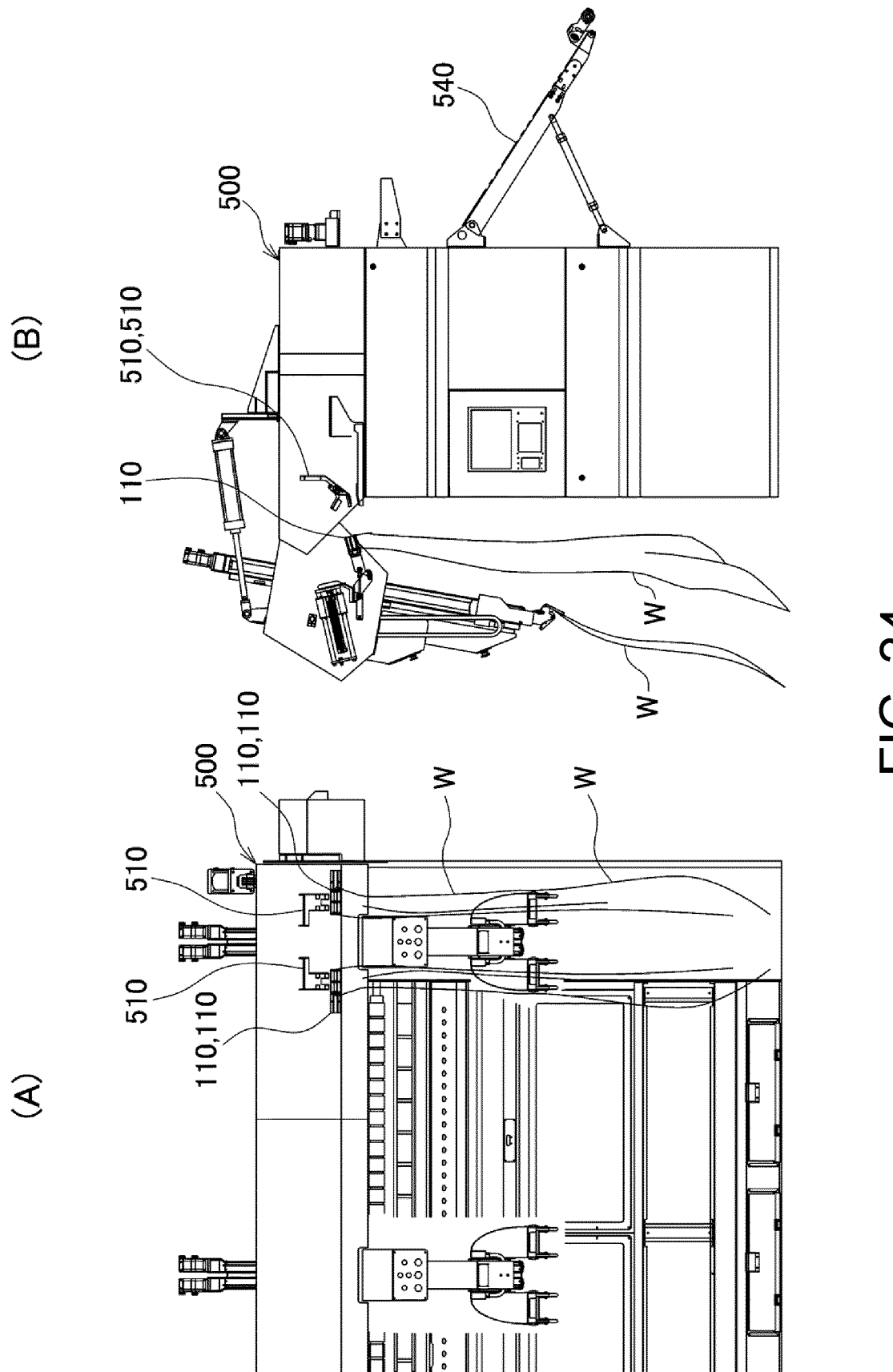


FIG. 24

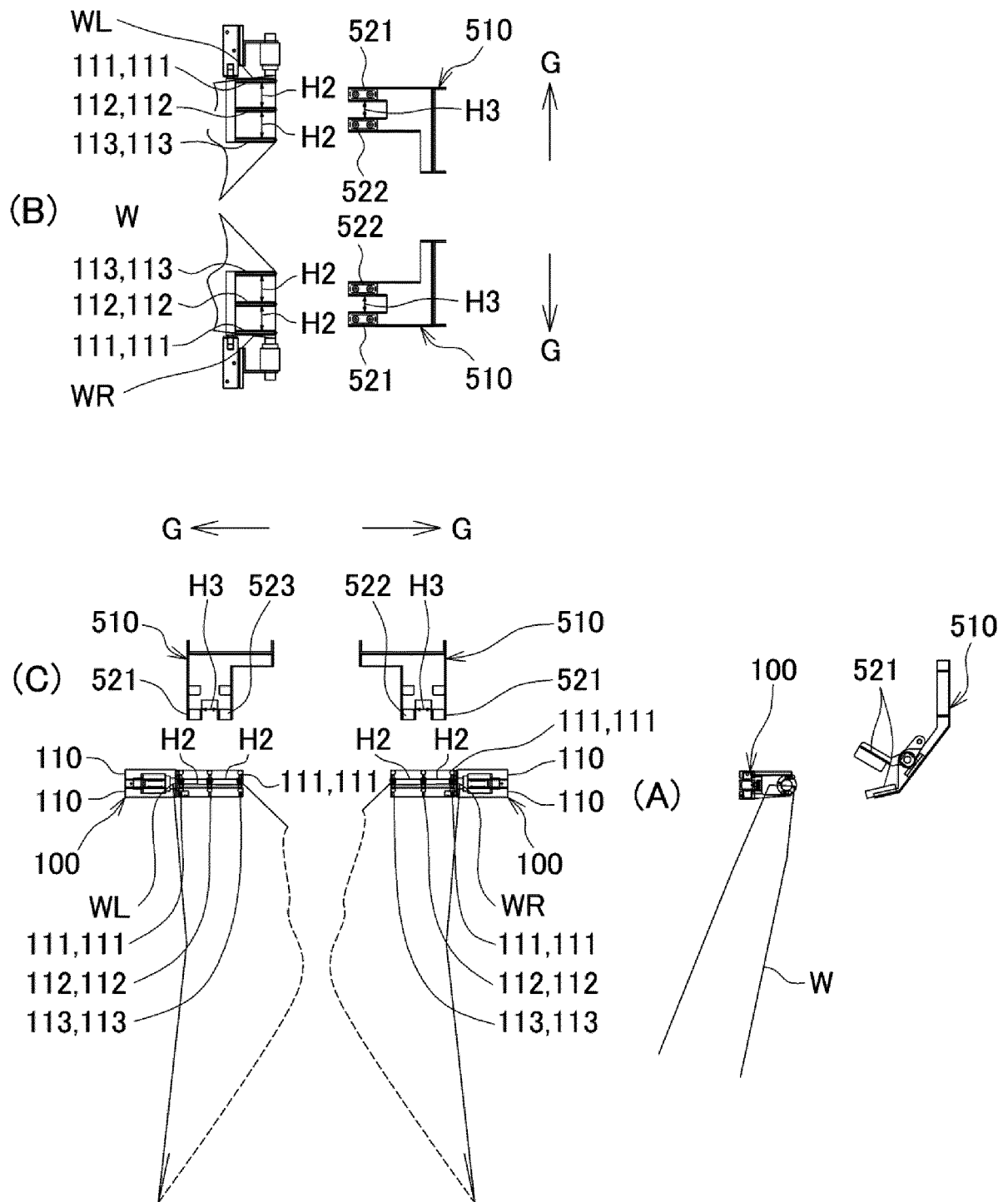


FIG. 25

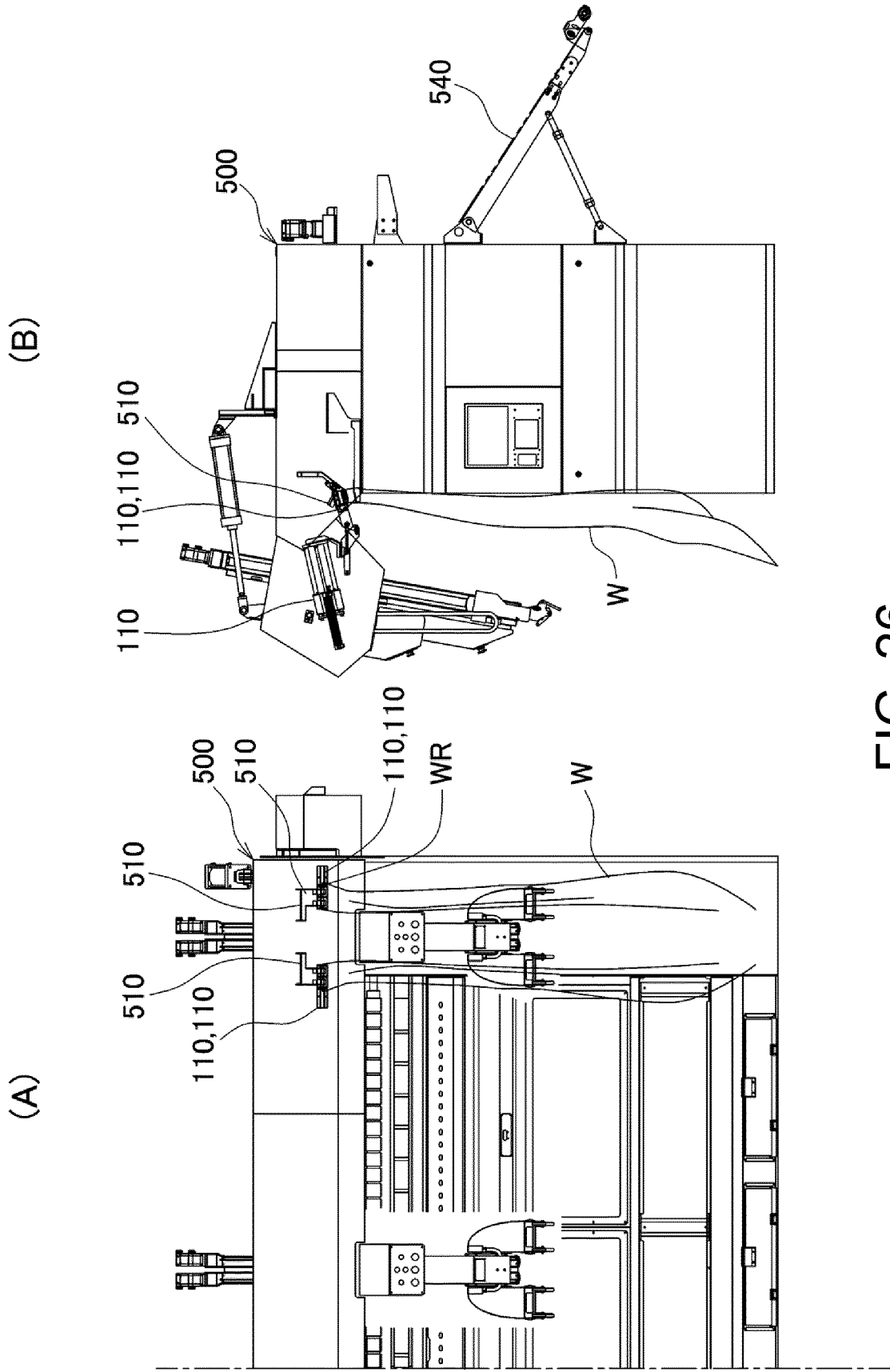
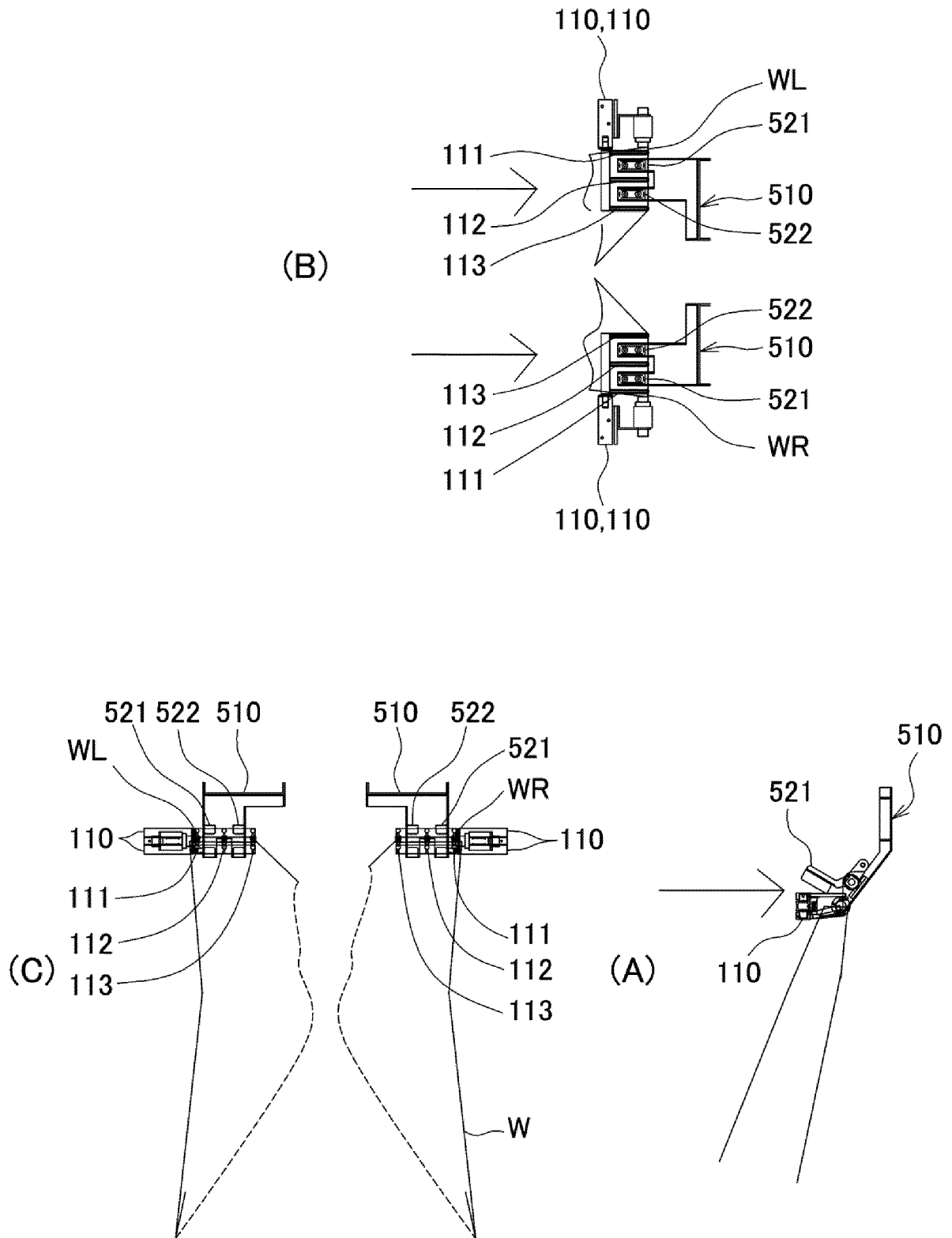


FIG. 26



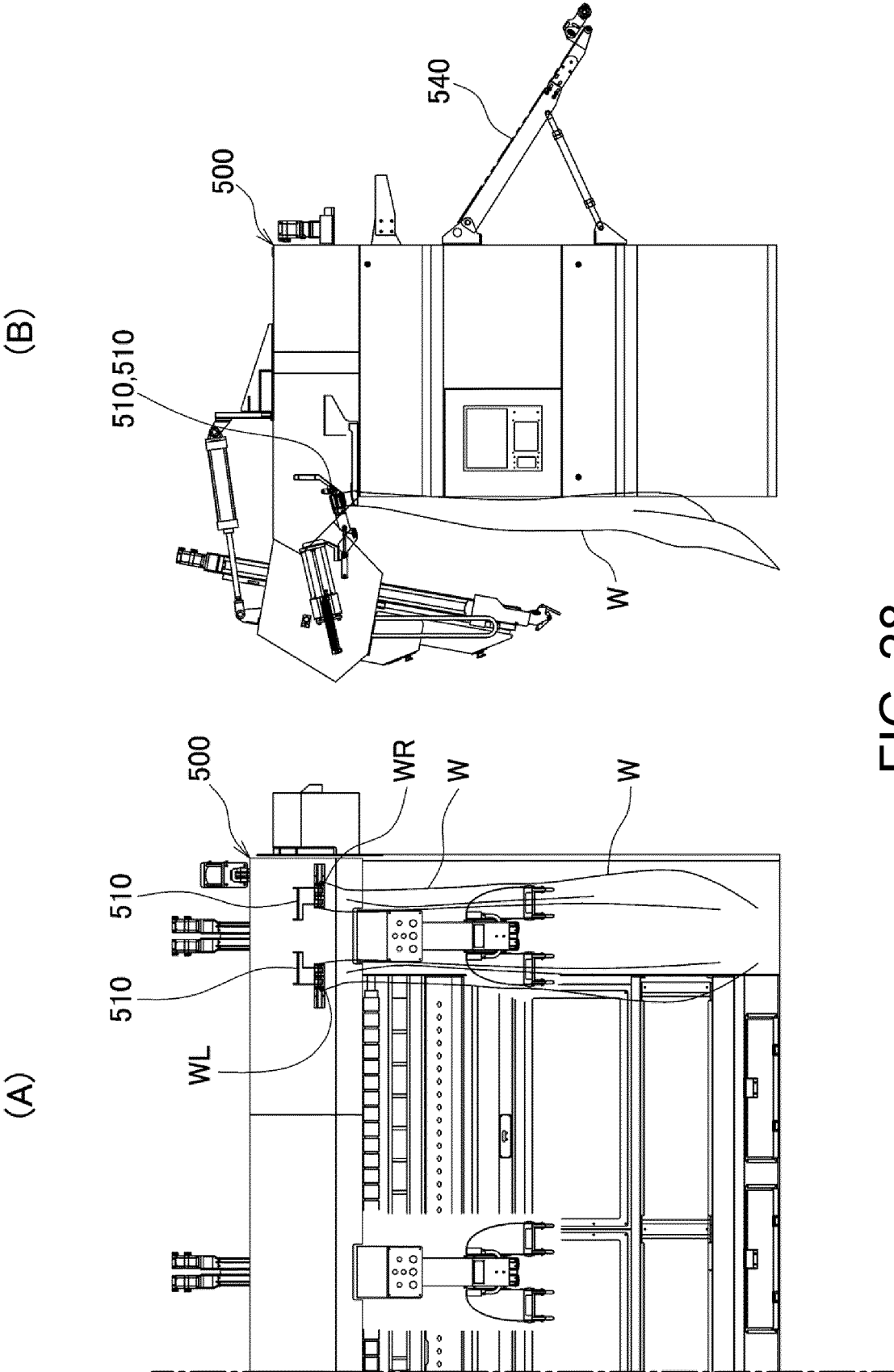


FIG. 28

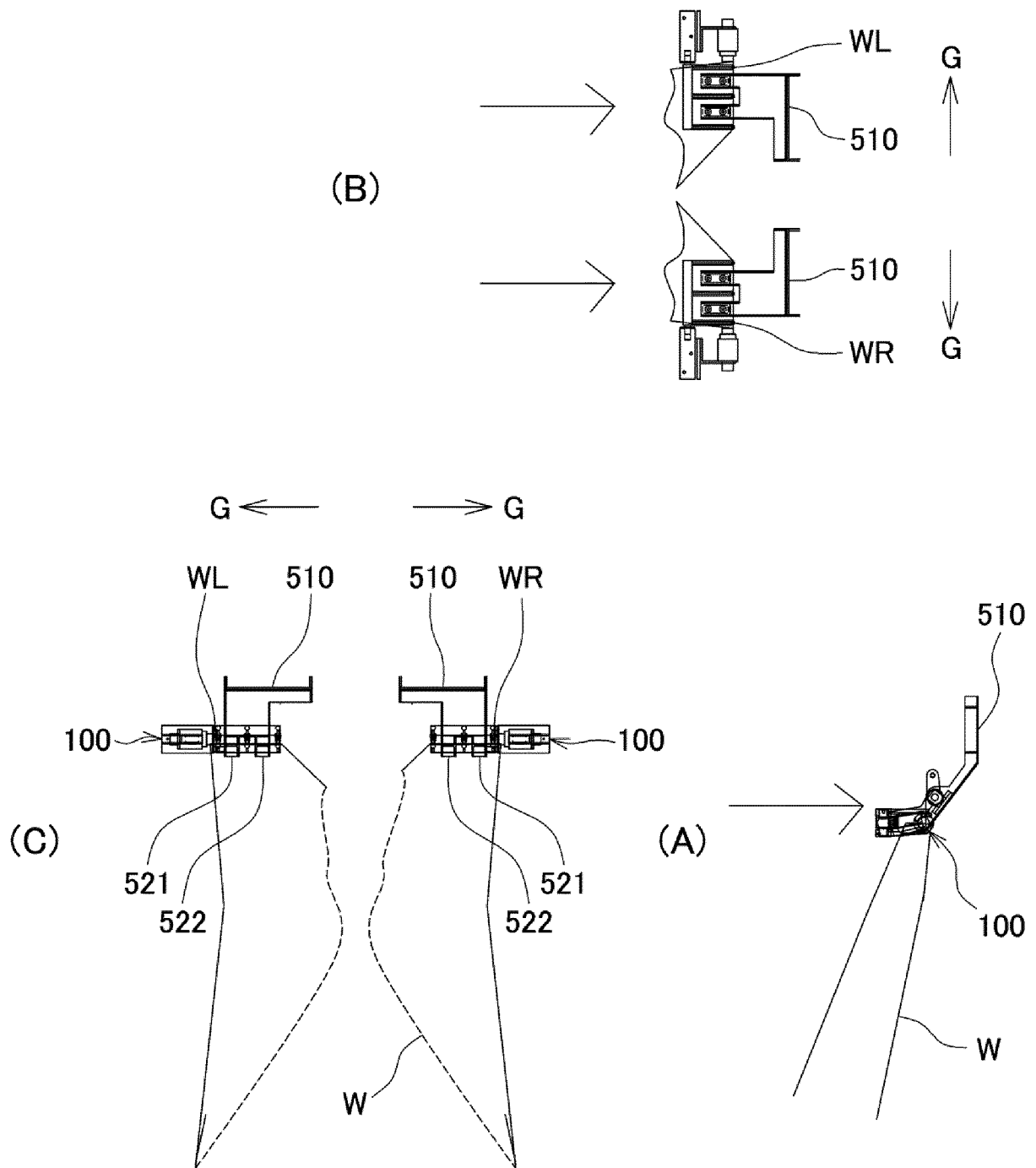


FIG. 29

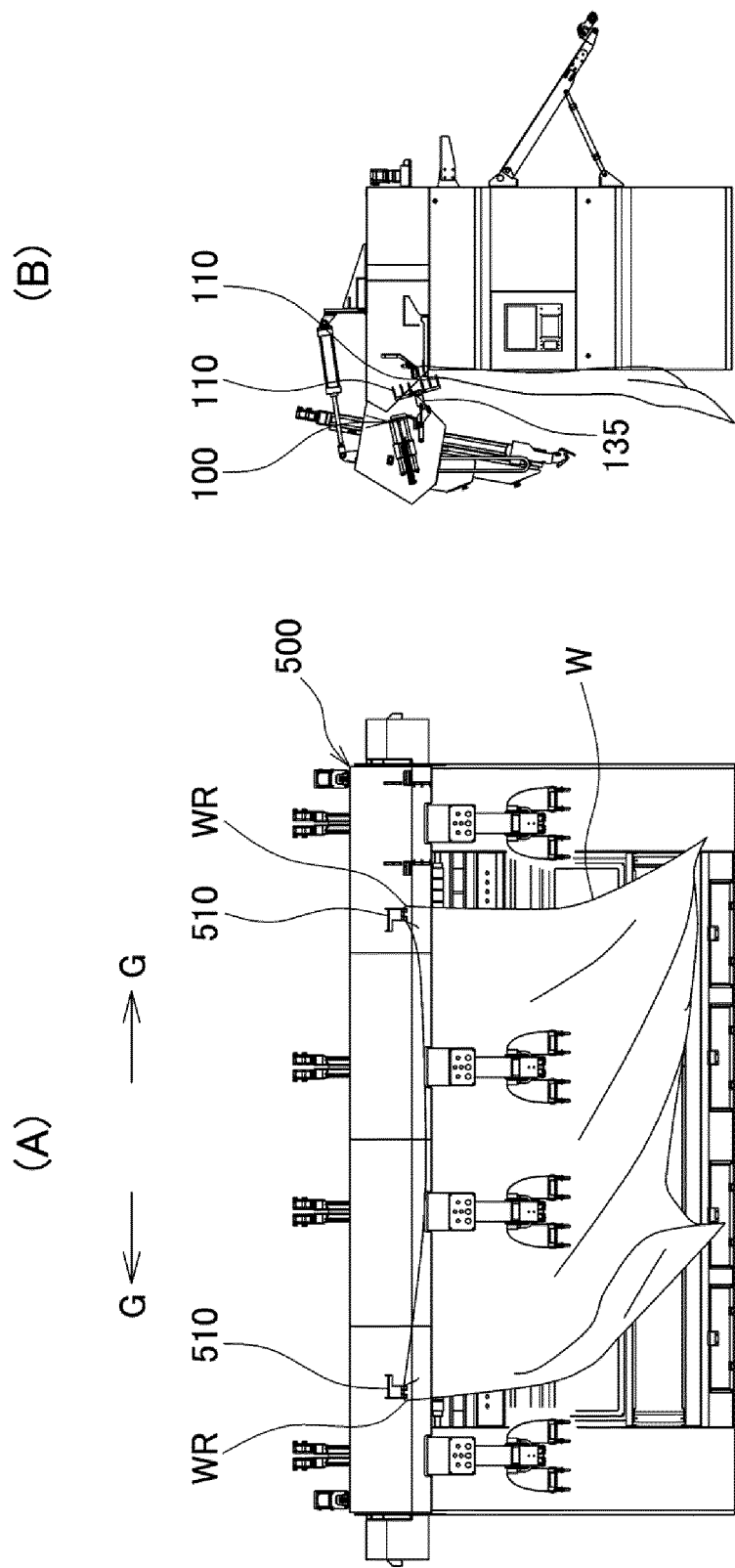


FIG. 30

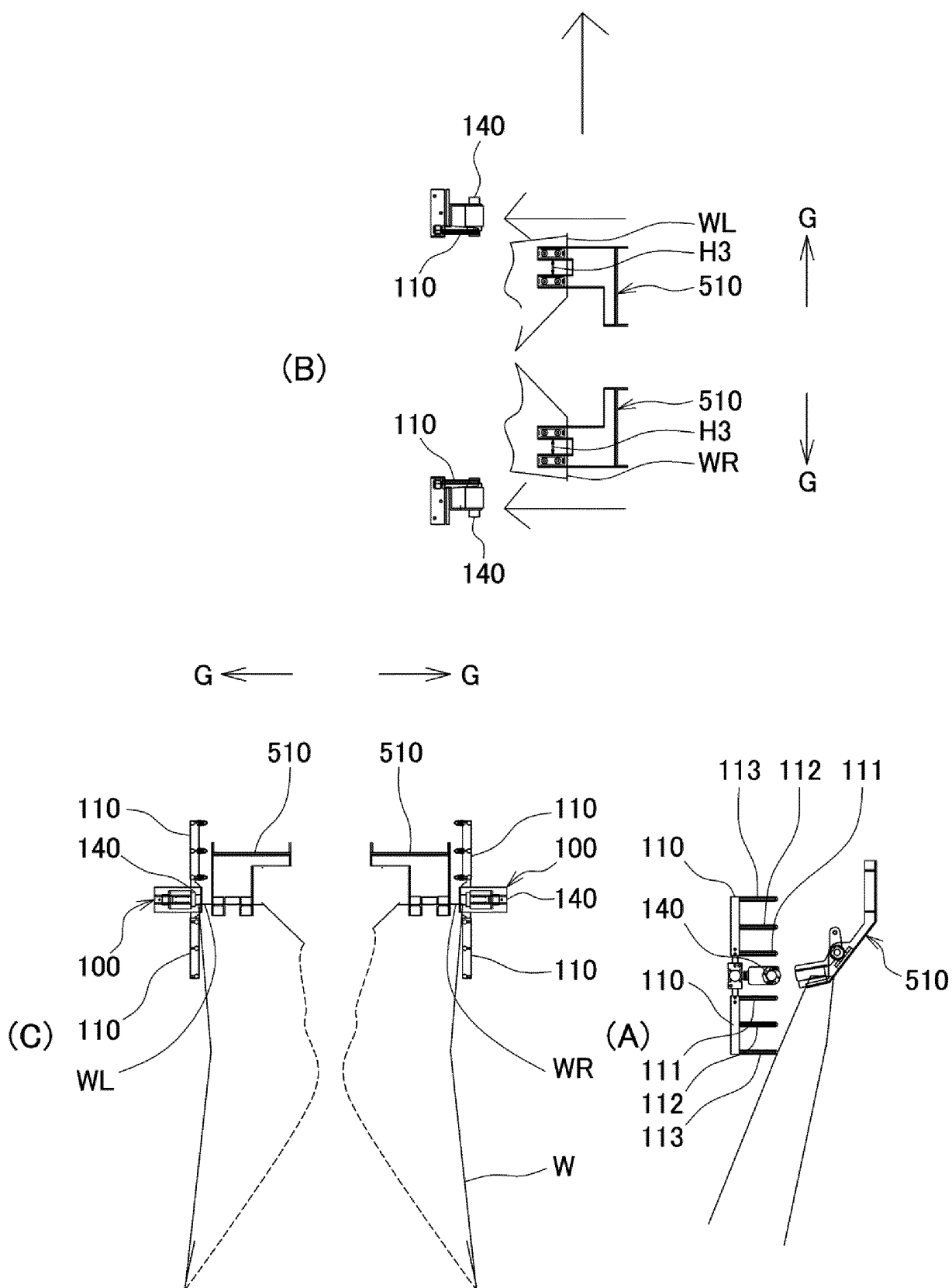
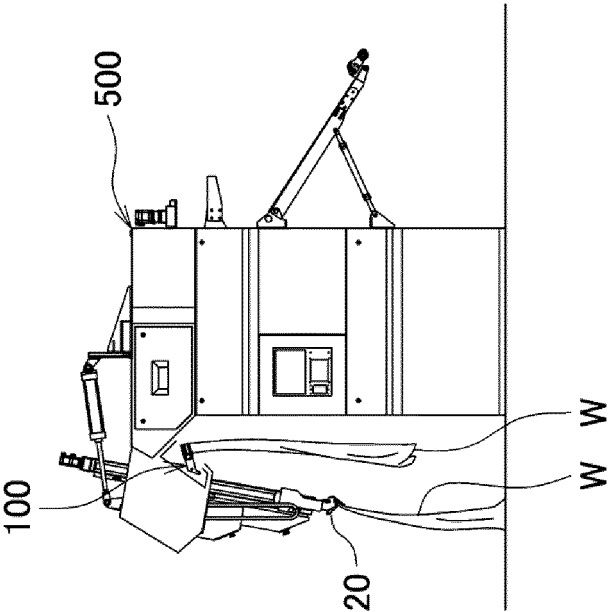


FIG. 31

(B)



(A)

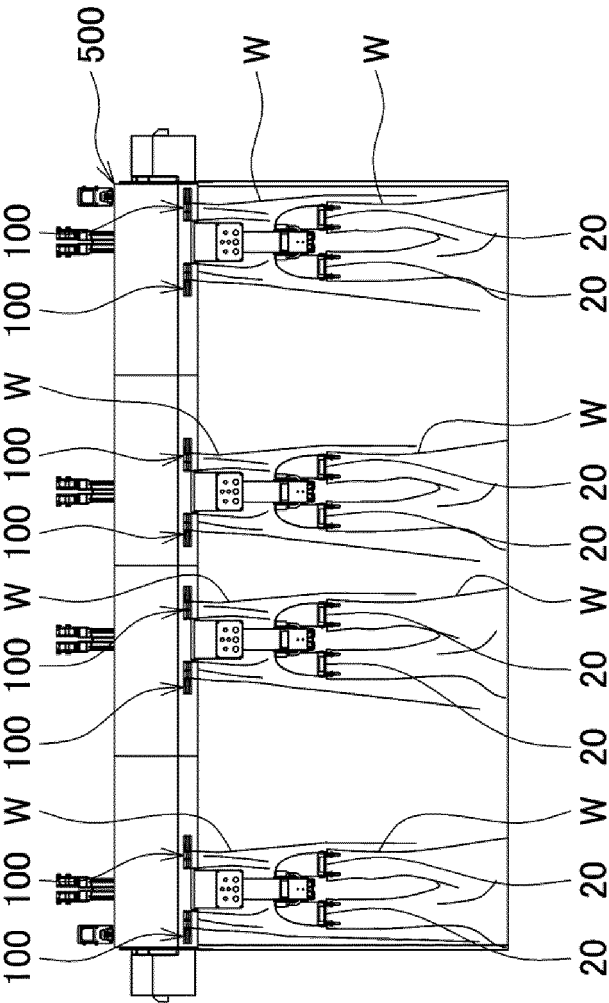


FIG. 32

INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2021/007552

A. CLASSIFICATION OF SUBJECT MATTER

Int.Cl. D06F67/04 (2006.01) i

FI: D06F67/04

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

Int.Cl. D06F67/04

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Published examined utility model applications of Japan 1922-1996

Published unexamined utility model applications of Japan 1971-2021

Registered utility model specifications of Japan 1996-2021

Published registered utility model applications of Japan 1994-2021

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	JP 2019-206777 A (PLEX INT DESIGN CO., LTD.) 05 December 2019 (2019-12-05), paragraphs [0001]-[0082], fig. 1-11	1-6
Y	WO 2020/008915 A1 (PLEX INT DESIGN CO., LTD.) 09 January 2020 (2020-01-09), paragraphs [0001]-[0037], fig. 1-10	1-6
Y	JP 2019-58520 A (PLEX INT DESIGN CO., LTD.) 18 April 2019 (2019-04-18), paragraphs [0001]-[0050], fig. 1-15	1-6
Y	JP 2002-113294 A (MAEJIMA, Yozo) 16 April 2002 (2002-04-16), paragraphs [0001]-[0017], fig. 1-5	4, 6
A	JP 2016-97170 A (TOTO FUORUDAA KOGYO KK) 30 May 2016 (2016-05-30)	1-6
A	JP 2018-95979 A (PLEX INT DESIGN CO., LTD.) 21 June 2018 (2018-06-21)	1-6
A	JP 2010-110574 A (MAEJIMA, Yozo) 20 May 2010 (2010-05-20)	1-6



Further documents are listed in the continuation of Box C.



See patent family annex.

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"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

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Date of the actual completion of the international search

07 May 2021

Date of mailing of the international search report

18 May 2021

Name and mailing address of the ISA/

Japan Patent Office

3-4-3, Kasumigaseki, Chiyoda-ku,

Tokyo 100-8915, Japan

Authorized officer

Telephone No.

INTERNATIONAL SEARCH REPORT
 Information on patent family members

International application No.

PCT/JP2021/007552

JP 2019-206777 A 05 December 2019 (Family: none)
 WO 2020/008915 A1 09 January 2020 JP 2020-7083 A
 JP 2019-58520 A 18 April 2019 WO 2019/064840 A1
 EP 3587662 A1
 paragraphs [0001]-[0061],
 fig. 1-15
 CN 110869551 A
 KR 10-2020-0058379 A
 JP 2002-113294 A 16 April 2002 (Family: none)
 JP 2016-97170 A 30 May 2016 US 2017/0335505 A1
 WO 2016/084401 A1
 EP 3225732 A1
 TW 201619468 A
 CA 2966475 A1
 CN 107002344 A
 JP 2018-95979 A 21 June 2018 US 2019/0301081 A1
 WO 2018/105363 A1
 EP 3553215 A1
 KR 10-2019-0075132 A
 CN 110023552 A
 JP 2010-110574 A 20 May 2010 (Family: none)

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- JP 2019206777 A [0005] [0007]