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(71) Applicant: **Murata Kikai Kabushiki Kaisha**
Minami-ku, Kyoto-shi, Kyoto 601 (JP)

(72) Inventor: **Sekitani, Noboru**
Otsu-shi, Shiga (JP)

(74) Representative: **Vogeser, Werner, Dipl.-Ing. et al**
Patent- und Rechtsanwälte
Hansmann, Vogeser, Dr. Boecker,
Alber, Dr. Strych, Liedl
Albert-Rosshaupter-Strasse 65
81369 München (DE)

(54) Bobbin supply system

(57) The present invention positions a magazine (20) on one end of an auto winder (5), supplies a bobbin to a tray (2) from the magazine, loads a bobbin on that tray and transports it to each winding position of the auto winder.

As a result, the present invention is advantageous in that the supply of bobbins to each winding unit can be carried out in one place in comparison to a magazine arranged at each winding unit.

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Description

Technical Field

The present invention relates to a bobbin supply system that supplies bobbins to each winding unit of a winding machine such as an auto-winder.

Background Art

Conventional bobbin supply systems are provided with a bobbin supply device as shown in Figure 5 For example, a plurality of full bobbins (Bf) on which yarn produced by a ring spinning machine is wound are inserted in a flat belt feeder (45) of the aforementioned bobbin supply device. The full bobbins (Bf) continuously delivered from the exit of the flat belt feeder (45) are supplied to a vibrating parts feeder (46) for bobbin separation and due to this parts feeder (46) and a flat belt (46a), the full bobbins (Bf) are separated one by one and top discrimination is carried out by a top discrimination feeler arranged on a top discrimination part (17). Based on that result, the aforementioned full bobbin (Bf) is dropped with the bottom side (Bb) facing downwards into a bobbin chute (18), supplied to a tray (2) and transported to each winding unit of an auto-winder (not shown in the drawing) with the full bobbin (Bf) loaded on the tray (2).

Problems to be solved by the Invention

On the conventional bobbin supply systems, the aforementioned bobbin supply device is large and the system is complicated thus the entire structure of the bobbin supply system increases in size and price.

Due to this, a system is known whereby a rotating magazine into which a plurality of bobbins can be inserted is arranged at every winding unit of the auto-winder and the operator manually and sequentially inserts full bobbins which have been yarn end finding processed into the magazine. However, as a magazine is arranged on each winding unit, the distance the operator must travel increases, the yarn end finding operation takes much time and the work for the operator increases. If the productivity is to be increased, many operators are necessary.

In view of the above mentioned problems, it is an aim of the present invention to propose a bobbin supply system of small size and low price that reduces the load on and effectively utilizes the operator.

Summary of the Invention

In order to achieve the aforementioned aim, in place of the conventional bobbin supply system where ther bobbin supply system is large and complicated, the bobbin supply system of the present invention utilises a bobbin supply device arranged with a magazine that individualises and stocks bobbins.

As the magazine of the aforementioned bobbin supply system is low in height and systematically simple, the aforementioned magazine has a rotating shaft, is positioned with a plurality of stockers that individualise and stock a bobbin around the periphery of a circle concentric with this rotating shaft and preferably is constructed so that the aforementioned individualising stockers rotate on the same plane as that rotation shaft at the center.

Furthermore, a tray return line that transports the trays to the bobbin supply device from each winding unit of the auto-winder is arranged, a bobbin removal device that removes the bobbin transported while loaded on the tray is positioned at some point along the tray return line, a yarn end finding device that positions the yarn end of the bobbin in a predetermined position is positioned at some point along the tray supply line, a defective bobbin transport line that transports defective bobbins which have not successfully completed the yarn end finding process is connected to a line between the bobbin removal device of the tray return line and the auto-winder, and both full bobbins which have not successfully completed the yarn end finding process and empty bobbins can be removed by the bobbin removal device.

Brief Description of the Drawings

Figure 1 is a front view of the bobbin supply system being a first embodiment of the present invention.

Figure 2 is a side view of the bobbin supply system being a first embodiment of the present invention.

Figure 3 is an enlarged view of the main part of the magazine of the present invention.

Figure 4 is a summarized view of the main part of another embodiment of the magazine of the present invention.

Figure 5 is a summarized view of the main part of a conventional auto-bobbin supply apparatus.

Detailed Description of the Preferred Embodiments

A first embodiment of the present invention will be described using the drawings.

(1) is a bobbin supply device, the structure of which will be described hereafter. (2) is a tray and the tray (2) is transported by a transport line in a state where a bobbin is loaded on to it. (3) is a bobbin removal device and is so constructed that it removes all the bobbins transported along a tray return line (7) from the aforementioned trays (2). (4) is a yarn end finding device which positions the yarn end of the bobbin in a predetermined position on the bobbin so that auto-yarn joining can be performed by the auto-winder (5) . (11) is a separation device that sends the defective bobbins (Bl) that have failed the yarn end finding process to the defective bobbin transport line (10) and the full bobbins (Bf) that have successfully completed the yarn end finding process to the tray supply line (14). (12) is a control device that

controls all of the winding units of the auto-winder and the bobbin supply system.

A transport line using a belt conveyor is used for the transport of trays (2). The transport lines from each winding unit of the auto-winder (5) to the bobbin supply device (1) are called the tray return lines (6,7,8), the transport lines as far as each winding unit of the auto-winder (5) and which supply bobbins to the trays (2) by the bobbin supply device (1) are called the tray supply lines (9, 14) and the transport line of defective bobbins (Bl) is called the defective bobbin transport line (10).

Hereafter the flow of the bobbins supplied to and returned from each winding unit of the auto-winder (5) will be described.

At each winding unit of the auto-winder (5), transport of the full bobbins (Bf) by a conveyor while loaded on the tray (2), rewinding of the yarn from the full bobbin (Bf) to the winding packages and ejection of the empty bobbin (Be) (including residual yarn bobbins) is carried out. The empty bobbin or residual yarn bobbins (Be) ejected by each winding unit of the auto-winder (5) is transported to the tray return line (6) while loaded on the tray (2).

In continuance, the empty bobbin or residual yarn bobbin (Be) loaded on the trays (2) enter the tray return line (7) where the bobbin removal device (3) is positioned, are removed from the tray (2) by the friction of the removal belt of the bobbin removal device (3), ejected to the bobbin storage box (19), the trays (2) with bobbins (Be) become just the tray (2) and are transported to the tray return line (8).

The bobbin supply device (1) is arranged along the tray return line (8). The tray (2) is temporarily stopped by a stopper (13), a full bobbin (Bf) is supplied with the bottom side (Bb) facing downwards by the bobbin chute (18) and the trays (2) with the full bobbins (Bf) are transported to the tray supply line (9) in a state where the full bobbin (Bf) is loaded on the tray (2).

A bottom bunch cutting device (101) that cuts the bottom bunch wind on the base of the bobbin, a back wind yarn cutting device (102) that cuts the back wound yarn wound on the outer layer of the bobbin and the yarn end finding device (4) are arranged in sequential order from the bobbin supply device (1) along the tray supply line (9). Those that have successfully completed yarn end finding are sent to the tray supply line (14) via the separation device (11).

Further, the full bobbins (Bf) which have failed the yarn end finding process are sent to the defective bobbin transport line (10) by the switching of the separation device (11) by the control device (12) which receives a yarn end finding failure signal from the yarn end finding device (4).

The aforementioned defective bobbin transport line (10) is connected to the tray return line (7) and the defective bobbins (Bl) are removed from the trays (2) by the bobbin removal device (3) without exception. The defective bobbins (Bl) and the empty bobbin or residual yarn bobbin (Be) all enter the bobbin storage box (19) in a mixed state.

The bobbins which have entered the storage box (19) are differentiated from the bobbins having enough yarn remaining to be wound off by the auto-winder and other bobbins by the operator. The bobbins (Bl) which can be rewound are supplied to the magazine (20) of the bobbin supply device (1) after procedures are carried out to facilitate the yarn end finding process by the operator.

The storage box (19) is positioned inside the operator's operating space (S) where supply of bobbins to the magazine (20) is carried out. In short, the bobbins removed by the bobbin removal device (3) are sent to the storage box (19) inside the operation space (S). Accordingly, the operator need only take out the rewindable bobbins from the storage box (19) in the operating space (S) and supply them to the magazine (20) after correcting them.

Then, full bobbins (Bf) which are loaded on the tray (2) and have finished the yarn end finding process are transported to each winding unit of the auto-winder (5) from the tray supply line (14).

A detailed description of the bobbin supply device (1) will be given hereafter.

The bobbin supply device (1) is provided with the magazine (20) and the bobbin chute (18). A spur gear (29), being one part of the drive part of the magazine (20), forms a ratchet with the number of teeth being the same as the number of the bobbin insertion holes (37) for inserting the full bobbins (Bf). A spur gear (30) is arranged to stop the rotation of the spur gear (29) with the number of teeth being the same as the spur gear (29). The spur gear (29) and the spur gear (30) are fixed by a bolt (not shown in the drawings) so that they are stacked vertically and are made to rotate simultaneously.

A arm (25) is supported by the support point (34) of the rod (23) of the cylinder (21) and the rotating shaft (33) being a fixed point. Furthermore, a claw (27) corresponding to the ratchet spur gear (29) is supported so as to be freely rotatable by the support point (31). A arm (26) is supported by the support point (35) of the rod (24) of the cylinder (22) and a support point (32) being a fixed point. Yet further, the support point (32) supports so as to be freely rotatable a claw (28) which is a stopper of the spur gear (30).

The magazine (20) comprises a cylindrical bobbin insertion member (42) which is arranged with a same number of the cylindrical bobbin insertion holes (37) having a diameter larger than the winding diameter of the full bobbin (Bf) as the number of teeth as the spur gear (29) on a circle concentric with the rotating shaft (33) of the spur gear (29), a bobbin reception member (43) that has a bobbin delivery opening (38) cut away only directly above the bobbin chute (18) and enough so that there is no hindrance to droppage of the full bobbin (Bf), and that drive part. The aforementioned bobbin insertion member (42) and the bobbin reception member (43) comprise a stocker for individualising and

stocking the bobbins. Also, the drive part is provided with the aforementioned spur gears (29,30).

The tray (2) from which the bobbin has been taken by the bobbin removal device (3) is transported by the tray return line (8) and stopped by the bobbin stopper (13) in a predetermined position where the full bobbin (Bf) can be reliably loaded on the empty tray from the bobbin chute (18).

When the tray (2) stops, a tray detection sensor (15) operates and sends a signal to the control device (12). Due to the signal of the control device (12), the bobbin chute (18) goes from a open state (18a) being a standby state, to an closed state (18b) for guiding the full bobbin (Bf) to the tray (2).

Next, when the rod (24) of the cylinder (22) is pushed in direction (c) by a signal from the control device (12), the arm (26) supported by the connected support point (35) moves to position (26b) in direction (c) and the connected claw (28) moves higher than the height of the tooth of the spur gear (29) to position (28b) in direction (e) so that spur gears (29, 30) become able to rotate.

Next, when the rod (23) of the cylinder (21) is pushed in the direction (a) by a signal from the control device (12), the arm (25) supported by the support point (31) moves to position (25b) in direction (g) with the rotating shaft (33) as a support point, the claw (27) moves to position (27b) by the force of the cylinder (21) rotating the spur gear (29) in direction (g) being an anticlockwise direction and the bobbin insertion member (42) is rotated in the anticlockwise direction (g) by one tooth, in short, by one bobbin insertion hole (37).

Following that, when the rod (24) of the cylinder (22) is returned in direction d by a signal from the control device (12), the arm (26) supported by the support point (35) moves to position (26a) and the claw (28) moves to position (28a) where restriction of the movement of the spur gear (30) is possible by movement in direction (f).

Further, when the rod (23) of the cylinder (21) is pushed in the direction (b) by a signal from the control device (12), the arm (25) moves to position (25a) in a direction opposite direction (g) and the claw (27) moves in direction (h) along the surface (36) of the teeth of the spur gear (29) stopping in position (27a).

When the bobbin insertion member (42) rotates by one the bobbin insertion hole (37), a new full bobbin (Bf) drops by gravity from the bobbin delivery opening (38) and is loaded onto the tray (2) after passing through the bobbin chute (18).

When the full bobbin (Bf) has been loaded, a bobbin detection sensor (16) sends a signal to the control device (12), a signal is sent from the control device (12) and the bobbin chute (18) goes to the open state (18a) also being the standby state. Furthermore, a signal is also sent to the stopper (13), the stopper (13) separates from the full bobbin (Bf) and the full bobbin (Bf) proceeds along the tray return line (8) while loaded on the tray (2).

The above operations are repeated and the full bobbin (Bf) is supplied to the empty tray (2) but as for the insertion of the full bobbin (Bf) in the magazine (20), the operator must determine the top/bottom of the full bobbin (Bf) and insert one bobbin (Bf) at a time into the bobbin insertion hole (37) with the bottom side (Bb) facing downwards.

Further, the number of bobbins insertable into the magazine (20) of a first embodiment of the present invention is (24) but may be changed according to the scale of the operation.

As the rotating magazine used in a first embodiment of the present invention is large and heavy, it has a large inertia moment and as it is difficult to stop at a predetermined position, is arranged with the stopping cylinder (22) and the spur gear (30). However, one type of the spur gear (29) may be arranged with a plurality of excessive rotation prevention claws that press the spur gear with an elastic body.

Further, by attaching a motor to the rotation shaft (33) and without pressure from the cylinder (21), the bobbin insertion member (42) may be rotated by the drive force of the motor.

It should be noted that the magazine (20) of the present invention is not limited to a rotating style. Although it increases the height, a projection (40) that moves in and out in connection with the opening and closing of the bobbin ejection board (39) as shown in Figure 4 may be arranged. When the aforementioned bobbin ejection board (39) is closed, the upper stopper (41) projects and when the bobbin ejection board (39) opens, the lower stopper (41) projects. Thus after the top/bottom of the full bobbin (Bf) from the bobbin insertion opening (44) arranged on the upper part has been determined manually, they may be inserted and stacked in the magazine.

Further, apart from this, others method of determining automatically the top/bottom of the full bobbin (Bf) and manually inserting it into the magazine are possible.

As a result of the structure as described above, the present invention demonstrates the following effects.

According to a first aspect of the present invention, by the arrangement of a magazine that individualises and stocks bobbins in a bobbin supply device, there is no need for a large scale complicated device such as a parts feeder for automatically individualising the bobbins, the device structure becomes smaller and moreover, a cheaper bobbin supply system can be proposed.

Further, as operations such as insertion of the bobbin in the tray, the yarn end finding process, empty bobbin removal and the like being troublesome and inefficient when carried out manually are automated, in comparison with a winding machine of a system that inserts bobbins that have been manually yarn end finding processed into a magazine arranged on every machine, the load on the operator can be reduced and also the number of operators may be reduced.

According to a second aspect of the present invention, by making the magazine a rotating type, the height

of the bobbin supply device can be reduced, the operatability improves and as the structure is simple, a low price bobbin supply system with excellent maintainability can be supplied.

According to a third aspect of the present invention, as all of the bobbins loaded on the trays, even if they are defective bobbins or partial bobbins, are removed by the bobbin removal device and only empty trays are supplied to the bobbin supply device, complicated control on the bobbin supply device and bobbin removal device is not required and control of the entire system becomes simple.

According to a fourth aspect of the present invention, the operator supplying bobbins to the magazine does not need to continuously move to the position of the bobbin removal device to recover removed bobbins.

Further, the operator transporting removed bobbins to the magazine is unnecessary. Moreover, as the operator supplying bobbins to the magazine may determine whether a removed bobbin is possible/not possible for rewinding, the entire structure of the system can be simplified.

According to a fifth aspect of the present invention, it is possible to remove all bobbins which have failed the yarn end finding process.

Claims

1. A bobbin supply system provided with a tray supply line that transports trays to each winding unit of a winding machine from a bobbin supply device that supplies a bobbin to the tray, and is arranged with a magazine that individualises and stocks bobbins in the bobbin supply device.

2. A bobbin supply system as in claim 1, wherein the magazine has a rotating shaft, positions a plurality of stockers that individualise and stock bobbins around a periphery concentric with this rotating shaft, and is comprised so that the individual stocker rotates about the rotating shaft on the same plane.

3. A bobbin supply system as in claims 1 or 2, that is arranged with a tray return line that transports trays from each winding unit of the winding machine to the bobbin supply device, positions a bobbin removal device that removes a bobbin transported in a state where it is loaded on the tray at some point along the tray return line, and removes all transported bobbins at the bobbin removal device.

4. A bobbin supply system as in claim 3, wherein the bobbin removed at the bobbin removal device is transported towards the operation space of the operator who supplies bobbins to the magazine.

5. A bobbin supply system as in one of claims 1 through 4, that positions a yarn end finding device at some point in the tray return line which positions the yarn end of the bobbin in a predetermined position and connects the defective bobbin transport line that transports defective bobbins that have failed the yarn end finding process between the bobbin removal device of the tray return line and the winding machine.

FIG. 1

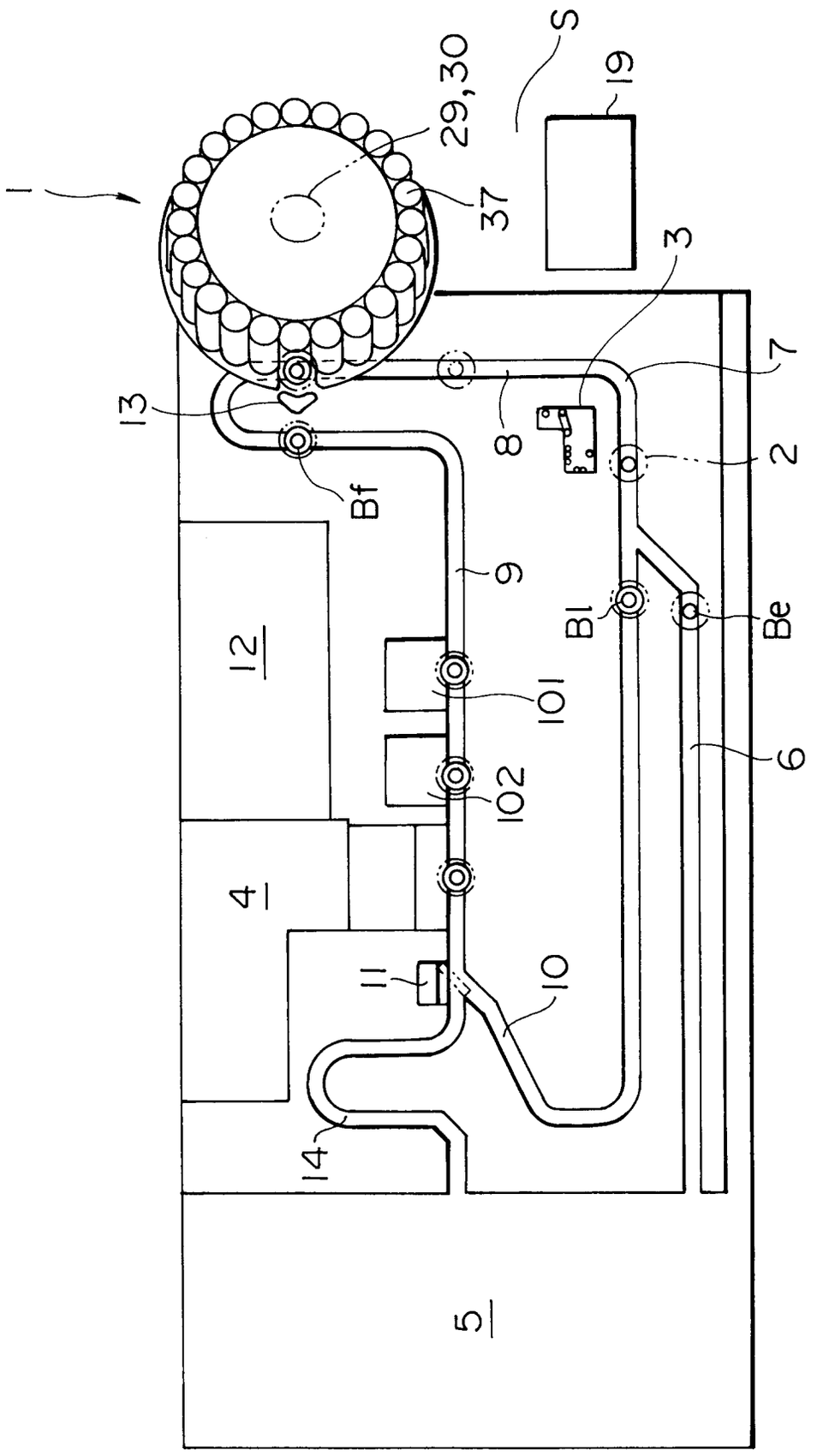


FIG. 2

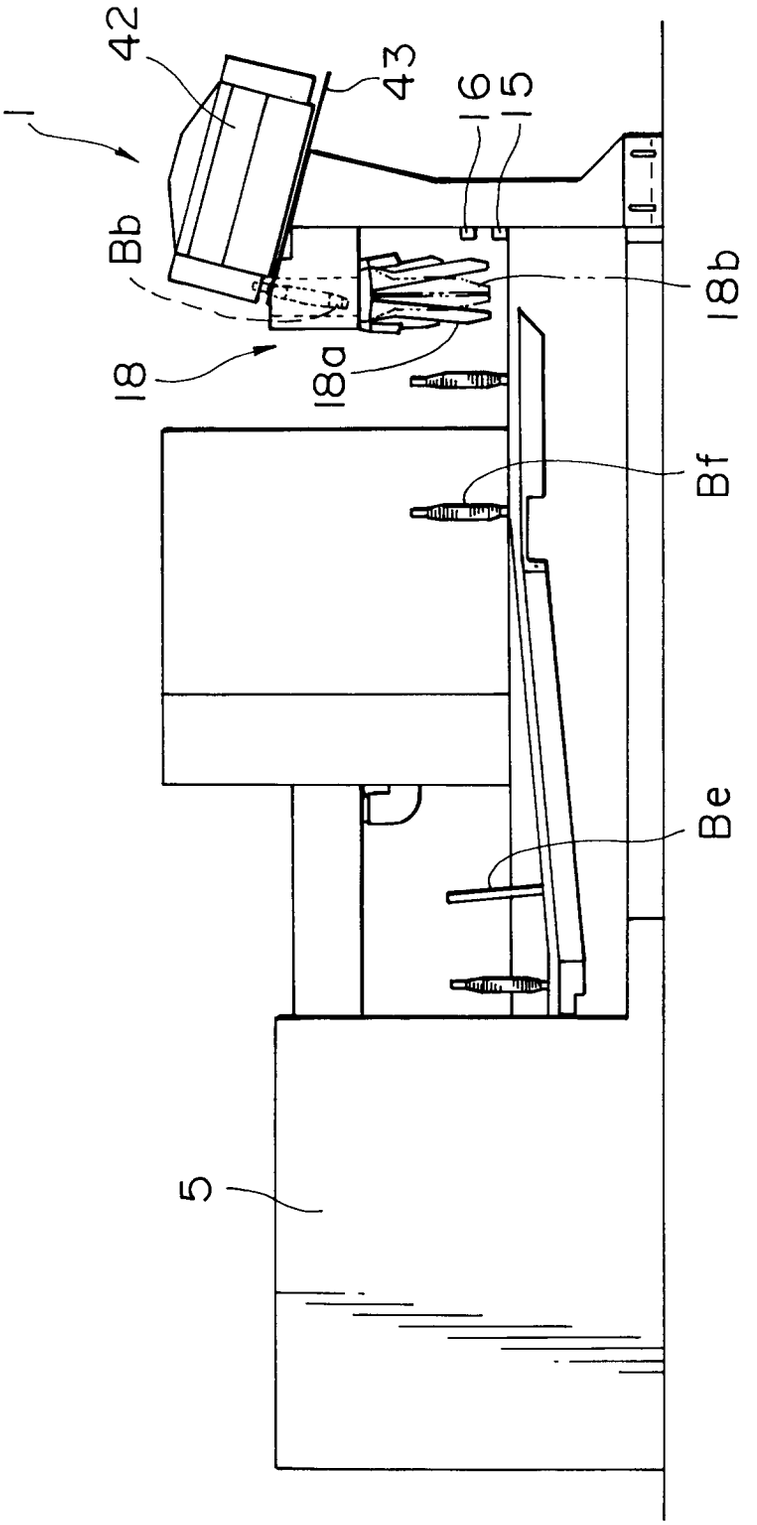
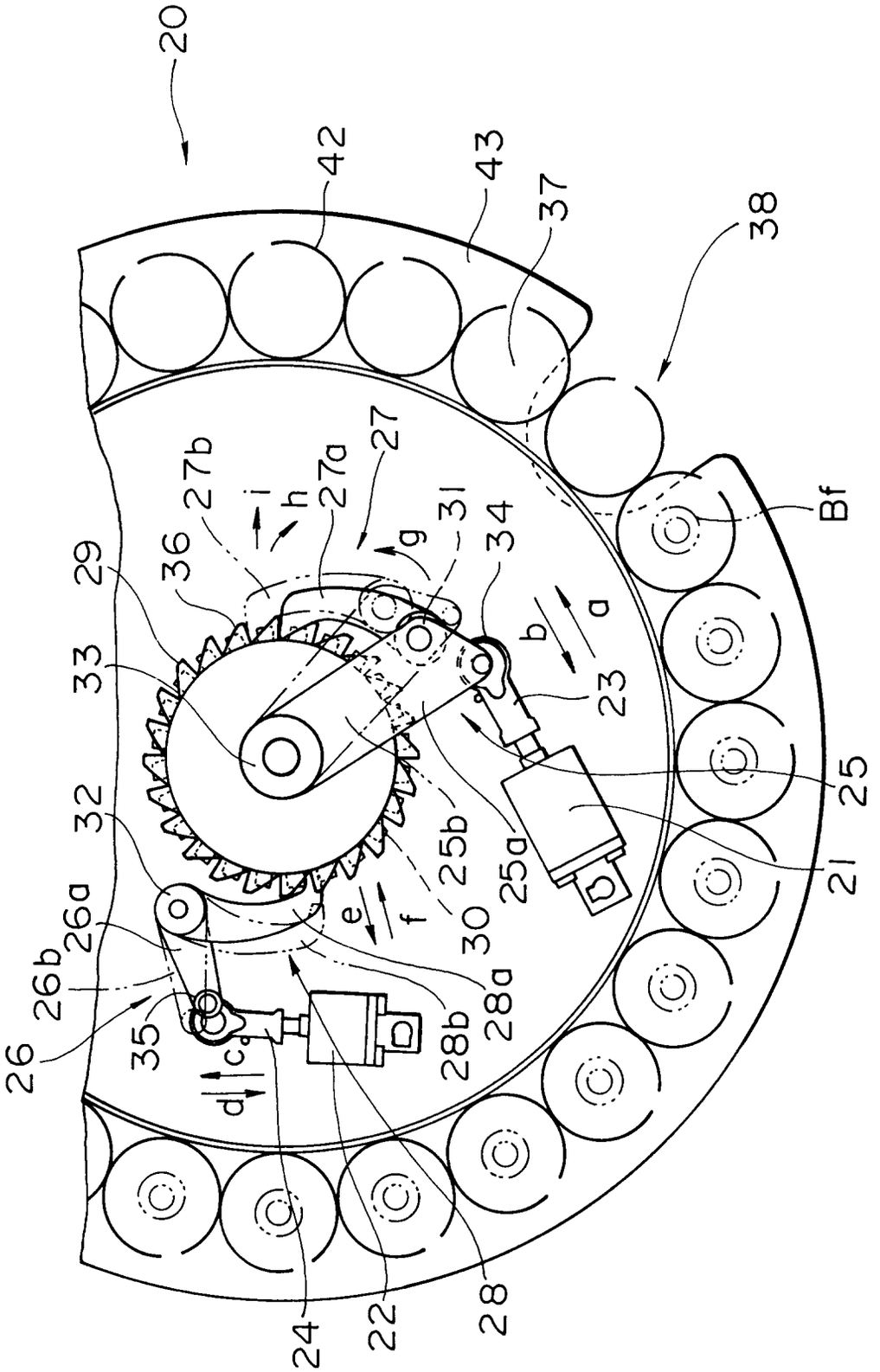


FIG. 3


20
42
43
37
38
Bf
27b
27a
27
i
h
g
31
34
36
29
33
32
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26b
26
35
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28b
28a
24
22
28

FIG. 4

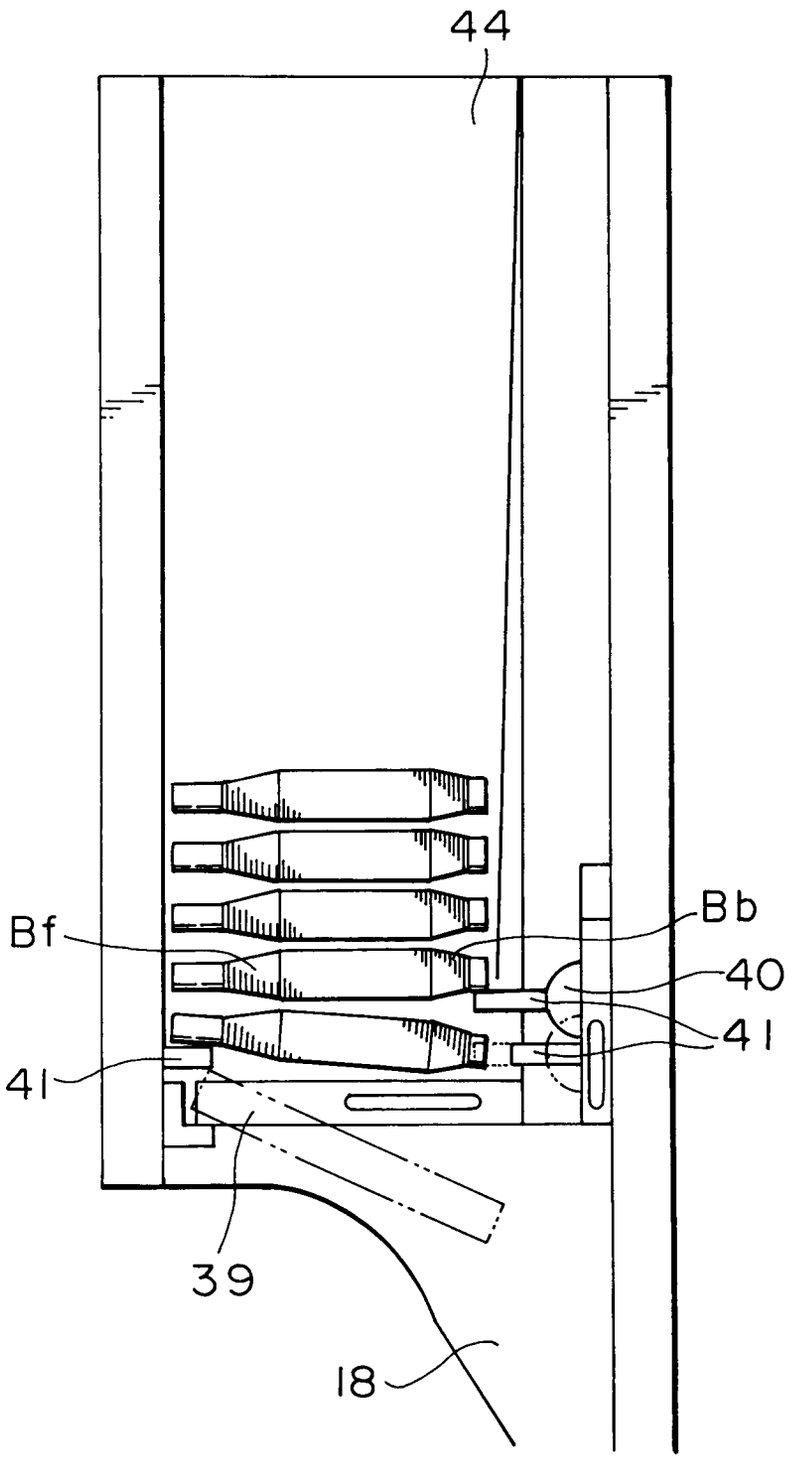

FIG. 5