



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
24.10.2007 Bulletin 2007/43

(51) Int Cl.:
D01H 7/86 (2006.01)

(21) Application number: **07106559.3**

(22) Date of filing: **20.04.2007**

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IS IT LI LT LU LV MC MT NL PL PT RO SE SI SK TR
Designated Extension States:
AL BA HR MK YU

(72) Inventor: **Kubota, Yasuhiko**
c/o Murata Kikai Kabushiki Kaisha
Kyoto-shi,
Kyoto 612-8686 (JP)

(74) Representative: **Gritschneider, Martin et al**
Hörselbergstrasse 5
81628 München (DE)

(30) Priority: **21.04.2006 JP 2006117449**

(71) Applicant: **MURATA KIKAI KABUSHIKI KAISHA**
Kyoto (JP)

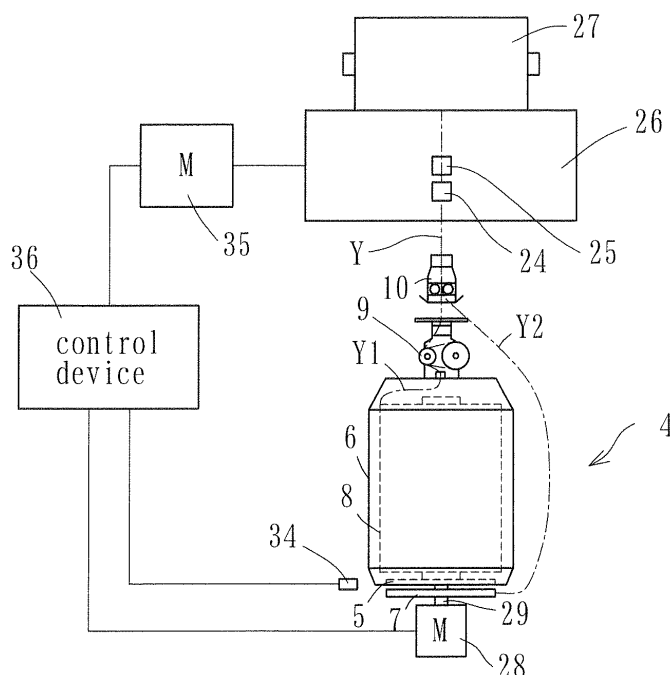
(54) **Twister with cheese cover**

(57) The present invention provides a twister capable of preventing the problems caused by a cheese cover, which is driven rotationally by a ballooning yarn.

A twister (1) comprising:
a plurality of twisting units (3), each of which includes a cheese cover (6), said cheese cover (6) covering a periphery of a supply package (8) placed on a stationary

disk (5) and being integrally provided on the stationary disk (5), and guides yarn (Y2) outward in a radial direction from a rotary disk (7) arranged below the stationary disk (5) to balloon the yarn (Y2) around the cheese cover (6); said twister further comprises a control device (36) provided to determine whether or not the stationary disk (5) or the cheese cover (6) remains stationary at a predetermined position.

Fig. 5



Description

BACKGROUND OF THE INVENTION

Field of the Invention

[0001] The present invention relates to a twister comprising a plurality of twisting units arranged in a line, each of which balloons and twists yarn by rotation of a spindle and then winds up the resultant twisted yarn.

Description of the Related Art

[0002] Conventionally, there is a known twister comprising a plurality of twisting units arranged in a line, each of which twists and winds up yarn unwound from a supply package. As disclosed in, for example, Japanese Laid-Open Patent Publication No. 2005-48311, the twisting unit in the twister arranges supply packages in lower and upper portions of a machine frame, respectively, and arranges a winding package of the resultant twisted yarn at a central portion of the machine frame. In such a construction the twisting unit twists first yarn and second yarn unwound from the upper and lower supply packages, respectively, to produce twisted yarn.

[0003] Here, the lower supply package is supported in a stationary state on a stationary disk which is rotatably mounted on a spindle in a twisting device arranged at a lower portion of the twisting unit (i.e., mounted such that the supply package can remain stationary independently of the rotation of the spindle), to release the first yarn. The second yarn released from the upper supply package guided into the twisting device, and then guided outward in a radial direction from a rotary disk which rotates together with the spindle, to form a balloon around the lower supply package by centrifugal force, so that the second yarn is twisted.

[0004] The stationary disk of the twisting device on which the lower supply package is placed is provided with a cheese cover for covering an outer periphery of the supply package. Yarn may be caught on the cheese cover in some cases due to such causes as errors in yarn threading before the operation is started or a flaw of the cheese cover. If the twisting unit is brought into operation in such a state, the cheese cover, i.e., the stationary disk which should be remain stationary during operation is driven rotationally by the ballooning yarn at high speed, causing problems that not only may twisted yarn be produced poorly but also the spindle may be damaged.

[0005] The present invention has been accomplished in view of the above circumstances, and it is an object of the present invention to provide a twister capable of preventing the above-described problems caused by the cheese cover, which is driven rotationally by the ballooning yarn.

SUMMARY OF THE INVENTION

[0006] The present invention provides a twister for solving the above-described problems. More precisely, this twister comprises a plurality of twisting units, each of which includes a cheese cover covering a periphery of a supply package placed on a stationary disk and integrally provided on the stationary disk, and guides yarn outward in a radial direction from a rotary disk arranged below the stationary disk to balloon the yarn around the cheese cover. The twister is provided with one or more control devices, which determine whether or not the stationary disk or the cheese cover remain stationary at a predetermined position, and when the control device determines that the stationary disk or the cheese cover does not remain stationary at the predetermined position, the control device stops the twisting unit.

[0007] Further, the present invention provides the twister constructed as described in the paragraph [0006], in which the twisting unit includes a sensor arranged at a position corresponding to the stationary disk or the cheese cover, and when the sensor detects that the stationary disk or the cheese cover does not remain stationary at the predetermined position and sends a signal to the control device, the control device stops the twisting unit.

[0008] Furthermore, the present invention provides the twister constructed as described in the paragraph [0007], in which the stationary disk can be kept stationary by attraction between at least one first magnet provided on an outer periphery of the stationary disk, and a second magnet arranged outside of the stationary disk and at a position corresponding to the first magnet, and the sensor detects that the stationary disk or the cheese cover does not remain stationary at the predetermined position by detecting a magnetic field of the first magnet.

Effect of the Invention

[0009] According to the twister of the present invention having the above-described construction, the control device determines whether or not the stationary disk or the cheese cover remains stationary at a predetermined position, and when the control device determines that the stationary disk or the cheese cover does not remain stationary, the control device stops the twister. Therefore, according to the twister of the present invention, even when a twisting unit is brought into operation in a state where yarn is caught on its cheese cover and when the cheese cover and its stationary disk are driven rotationally by the ballooning yarn, since the operation of the twisting unit can be swiftly stopped, it is possible to avoid the occurrence of problems such as production of defective twisted yarn or spindle damage.

[0010] The stationary disk is constructed to remain stationary by attraction force between a first magnet provided on the stationary disk and a second magnet arranged outside thereof, and a sensor provided such as to detect

a magnetic field of the first magnet allows the control device to determine whether or not the stationary disk or the cheese cover remain stationary at the predetermined position. This construction can eliminate the need to separately provide a to-be detected member corresponding to the sensor for the stationary disk or the cheese cover, etc. and thus can make the twisting unit simple and inexpensive.

BRIEF DESCRIPTION OF THE DRAWINGS

[0011]

[Figure 1]

Fig. 1 is a side view showing one embodiment of a twister to which the present invention is applied;

[Figure 2]

Fig. 2 is a side view showing the operation of a hoisting and lowering device for supply bobbins in the twister shown in Fig. 1;

[Figure 3]

Fig. 3 is a sectional view of an essential portion of a twisting device in the twister shown in Fig. 1;

[Figure 4]

Figs. 4A and 4B are sectional views each taken along the line X-X in Fig. 3; and

[Figure 5]

Fig. 5 is a schematic diagram showing a control device for a twisting unit in the twister shown in Fig. 1.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0012] A preferred embodiment of the present invention will be explained with reference to the drawings.

Fig. 1 is a side view showing a twister to which the present invention is applied, Fig. 2 is a side view showing the operation of a hoisting and lowering device for supply bobbins in the twister shown in Fig. 1, Fig. 3 is a sectional view of an essential portion showing a twisting device in the twister shown in Fig. 1, Figs. 4A and 4B are sectional views each taken along the line X-X in Fig. 3, and Fig. 5 is a schematic diagram showing a control device for a twisting unit in the twister shown in Fig. 1.

[0013] First, referring to Fig. 1, the entire construction of the twister 1 to which the present invention is applied will be explained. As shown in Fig. 1, the twister 1 comprises a large number of twisting units 3, which are arranged on left and right sides thereof, respectively, and arranged in a line along a longitudinal direction (paper thickness direction in Fig. 1) of a machine frame 2.

[0014] A twisting device 4 which twists two yarns into one yarn is provided at a lower portion of the twisting unit 3. The twisting device 4 includes a stationary disk 5, a cheese cover 6 which is integrally provided on the stationary disk 5, and a rotary disk 7 arranged below the stationary disk 5. A supply package 8 is provided in the cheese cover 6, and first yarn Y1 released from the supply package 8 is guided to a tension device 9 and then

reaches a length-adjuster 10.

[0015] A hoisting and lowering device 11 for supply bobbins is provided on an upper portion of each twisting unit 3, and supply packages 13 can be supported on bobbin support shafts 12a, 12b and 12c of the hoisting and lowering device 11 for supply bobbins, respectively.

[0016] The hoisting and lowering device 11 for supply bobbins includes a support frame 14, a bobbin support frame 15, and a first link arm 16 provided between a rotary shaft 16a provided on the support frame 14 and a rotary shaft 16b provided on the bobbin support frame 15, and a second link arm 17 provided between a rotary shaft 17a on the support frame 14 and a rotary shaft 17b on the bobbin support frame 15. The hoisting and lowering device 11 for supply bobbins further includes a spring 18 provided between the first link arm 16 and a bobbin support frame 21, a rocker arm 19 rotatably provided on a lower end of the first link arm 16, a spring 20 provided between the first link arm 16 and the rocker arm 19, and a damper 21 provided between the rotary support shafts 16a and 17b.

[0017] As shown in Fig. 2, the hoisting and lowering device 11 for supply bobbins having the above-described construction makes it possible for the operator to remove an empty bobbin on the bobbin support frame 15 or to resupply a new supply package 13, by lowering the bobbin support frame 15.

[0018] Second yarn Y2 released from the supply package 13 supported by the hoisting and lowering device 11 for supply bobbins is guided through a nip tensor 22 into a guide tube 23, and then reaches a lower end of the twisting device 4. The second yarn Y2 is discharged from the rotary disk 7 in the radial direction to rotate and balloon around the cheese cover 6, and then is guided to the length-adjuster 10. The length-adjuster 10 equalizes the lengths of the first yarn Y1 and the second yarn Y2 to be twisted.

[0019] The twisted yarn Y produced after going through the length-adjuster 10 is gone through a guide roller 24 and a feed roller 25 and then guided between a winding roller 26 and a take-up package 27 to be wound up around the winding package 27.

[0020] Next, referring to Figs. 3 to 5, the twisting device 4 will be explained in detail. As shown in Fig. 3, the twisting device 4 includes a spindle driving motor 28, a spindle 29 driven by the spindle driving motor 28, the stationary disk 5 and the rotary disk 7, both of which are arranged with respect to the spindle 29, and the cheese cover 6 integrally provided on the stationary disk 5.

[0021] The spindle driving motor 28 holds the spindle 29 therein and is arranged such that the spindle 29 is directed in vertically upward direction. The spindle 29 includes a hole 29a in the center portion thereof, which guides the second yarn Y2 from the guide tube 23 (see Fig. 1) into the rotary disk 7.

[0022] The stationary disk 5 is rotatably fitted onto and supported on an upper portion of the spindle 29 via a bearing 31, and places the supply package 8 thereon.

The stationary disk 5 is provided at its outer periphery with stationary magnets 32 and 32. The stationary disk 5 can be kept stationary by attraction force between the stationary magnets 32 and 32, and attracting magnets 33 and 33 arranged lateral to and without contact with the stationary disk 5. This construction allows the stationary disk 5 to remain stationary even when the spindle 29 rotates.

[0023] The stationary disk 5 is integrally provided with the cheese cover 6. The cheese cover 6 covers the outer periphery of the supply package 8, and is provided at its top with the tension device 9. The first yarn Y1 unwound from the supply package 8 is gone through the cheese cover 6 and guided to the tension device 9, which applies a predetermined tension thereto. After that, the first yarn Y1 is guided to the length-adjuster 10.

[0024] The rotary disk 7 is unrotatably fitted onto and supported by the spindle 29 and arranged below the stationary disk 5. That is, the rotary disk 7 can rotate together with the spindle 29. The rotary disk 7 further includes a hole 7a, which extends in the radial direction thereof and is connected to the hole 29a of the spindle 29. In this construction, the rotary disk 7 allows the second yarn Y2 guided from the hole 29a to be discharged in the radial direction.

[0025] The second yarn Y2 discharged from the rotary disk 7 is ballooned by the high speed rotation of the spindle 29 and the rotary disk 7, which are rotated by the spindle driving motor 28, and then guided to the length-adjuster 10.

[0026] As shown in Figs. 4A and 4B, the twisting device 4 further includes a magnetic sensor 34. The magnetic sensor 34 is arranged lateral to or beside one of the attracting magnets 33, which are arranged outside of the cheese cover 6, and at a height position corresponding to the stationary magnet 32. As shown in Fig. 5, the magnetic sensor 34 is connected to a control device(s) 36 which controls the spindle driving motor 28 and a motor 35 for driving the take-up roller 26.

[0027] As shown in Fig. 4A, the magnetic sensor 34 does not detect a magnetic field of the stationary magnets 32 when the stationary disk 5 is in the predetermined position where the stationary disk 5 is kept stationary by the attraction force between the stationary magnets 32 and 32, and the attracting magnets 33 and 33. Further, as shown in Fig. 4B, when the stationary disk 5 is deviated from the predetermined position and rotated to a position where the magnetic sensor 34 can detect the magnetic field of the stationary magnet 32, the magnetic sensor 34 detects the magnetic field of the stationary magnet 32 and sends a signal to the control device 36, and detects that the stationary disk 5 is not in the predetermined position.

[0028] When the control device 36, which controls the spindle driving motor 28 and the take-up roller driving motor 35, receives from the magnetic sensor 34 a signal indicating that the magnetic sensor 34 detected the magnetic field of the stationary magnet 32, i.e., a signal indi-

cating that the stationary disk 5 does not remain stationary at the predetermined position, the control device 36 controls the spindle driving motor 28 and the take-up roller driving motor 35 to stop swiftly so that the twisting unit 3 and the twisting unit 4 stop.

[0029] The twister 1 constructed as above provides the following effects. For example, when yarn Y2 is caught on a cheese cover 6 due to such causes as error in yarn threading before the operation is started or a flaw of the cheese cover 6, if a twisting unit 3 with the cheese cover 6 is started in that state, the cheese cover 6 and the corresponding stationary disk 5 starts to be driven rotationally by the ballooning yarn Y2 at high speed. At that time, the corresponding magnetic sensor 34 detects the magnetic field of a stationary magnet 32 on the stationary disk 5, and sends, to the control device 36, a signal indicating that the stationary disk 5 does not remain stationary at the predetermined position. When receives this signal, the control device 36 swiftly stops the twisting unit 3 (the twisting device 4) by stopping the spindle driving motor 28 and the take-up roller driving motor 35, making it possible to avoid the problems such as production of defective twisted yarn or spindle damage which would be caused when the motors keep rotating.

[0030] The magnetic sensor 34 which detects the magnetic field of the stationary magnet 32 serves as the sensor which detects that the stationary disk 5 does not remain stationary at the predetermined position. This construction can eliminate the need to provide the stationary disk 5 or the cheese cover 6 with a new or additional to-be detected member, and thus can make the twisting device 4 simple and inexpensive.

[0031] The sensor, which detects that the stationary disk 5 does not remain stationary at the predetermined position is not limited to the concrete example shown in the above embodiment. Various sensors such as an inductive proximity sensor, which detects magnetic metal, a capacitance proximity sensor, and a photoelectric sensor may be appropriately used.

[0032] Further, on the stage where before a twisting unit 3 starts operation its stationary disk 5 is detected not to remain stationary at the predetermined position, not only may the twister 1 alerts the operator by an alarm sound or an alarm display, but also the twisting unit 3 may be controlled not to operate, thus avoiding the problems from occurring.

Claims

1. A twister (1) comprising:

a plurality of twisting units (3), each of which includes a cheese cover (6), said cheese cover (6) covering a periphery of a supply package (8) placed on a stationary disk (5) and being integrally provided on the stationary disk (5), and guides yarn (Y2) outward in a radial direction

from a rotary disk (7) arranged below the stationary disk (5) to balloon the yarn (Y2) around the cheese cover (6);

characterized in that

5

a control device (36) is provided to determine whether or not the stationary disk (5) or the cheese cover (6) remains stationary at a predetermined position, and when the control device (36) determines that the stationary disk (5) or the cheese cover (6) does not remain stationary at the predetermined position, the control device (36) stops the twisting unit (3) .

10

15

2. The twister (1) according to claim 1, wherein the twisting unit (3) includes a sensor (34) arranged at a position corresponding to the stationary disk (5) or the cheese cover (6), and when the sensor (34) detects that the stationary disk (5) or the cheese cover (6) does not remain stationary at the predetermined position and sends a signal to the control device (36), the control device (36) stops the twisting unit (3).

20

3. The twister (1) according to claim 2, wherein the stationary disk (5) can be kept stationary by attraction between at least one first magnet (32) provided on an outer periphery of the stationary disk (5), and a second magnet (33) arranged outside of the stationary disk (5) and at a position corresponding to the first magnet (32), and the sensor (34) detects that the stationary disk (5) or the cheese cover (6) does not remain stationary at the predetermined position by detecting a magnetic field of the first magnet (32).

25

30

35

40

45

50

55

Fig. 1

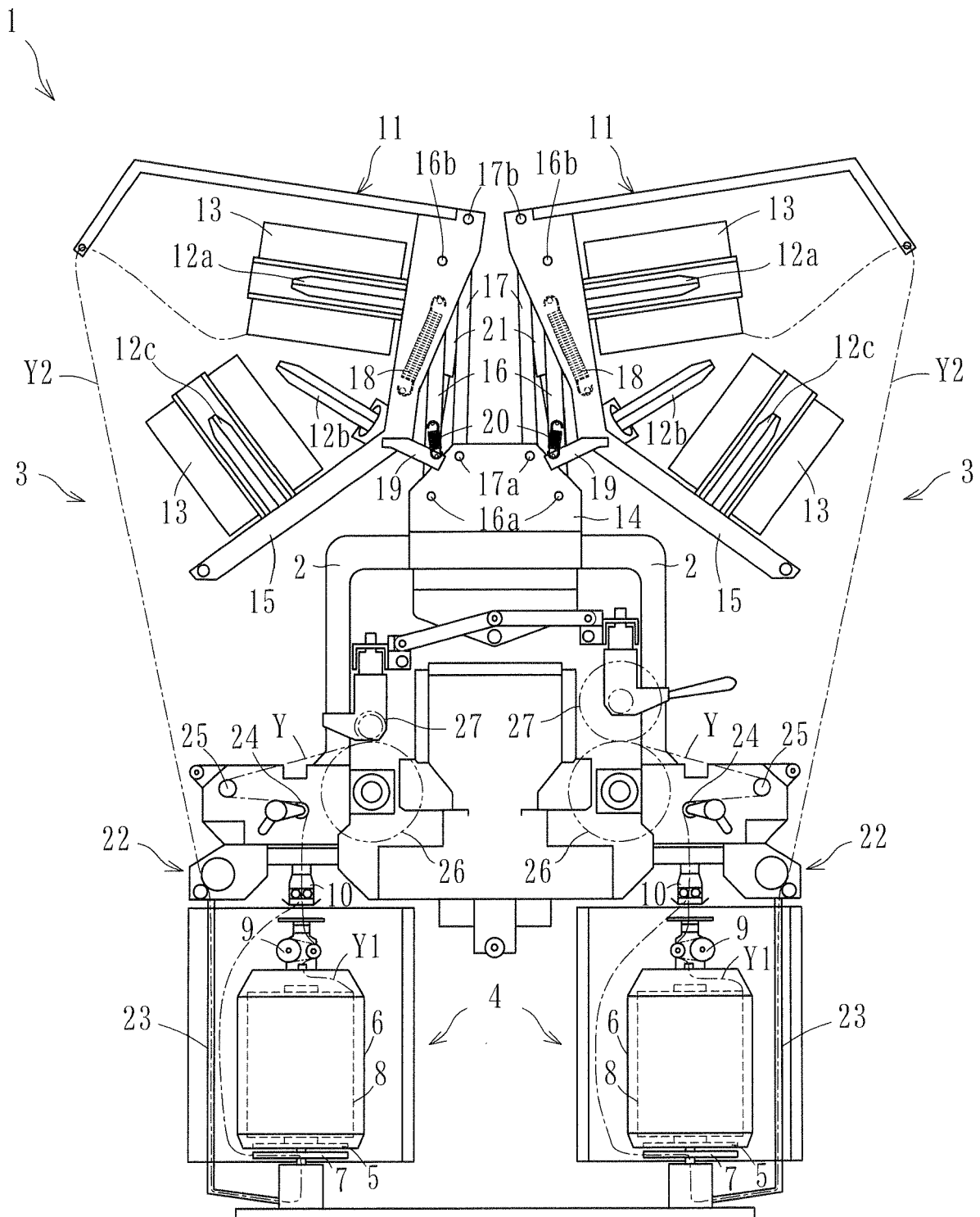


Fig. 2

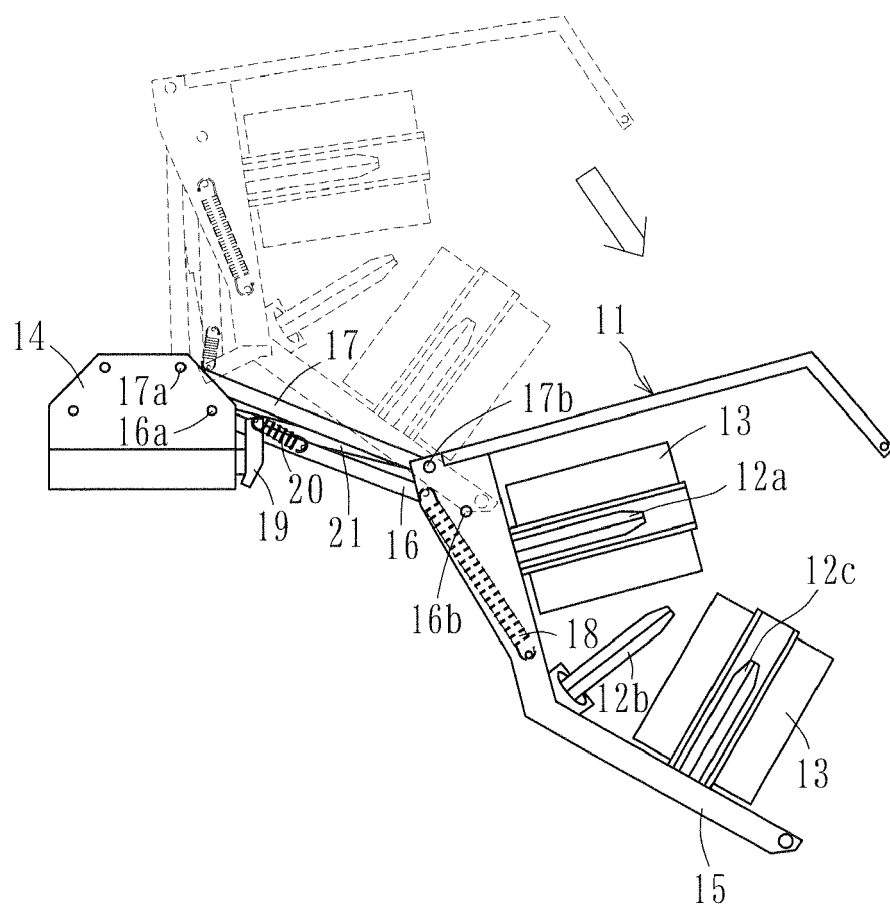


Fig. 3

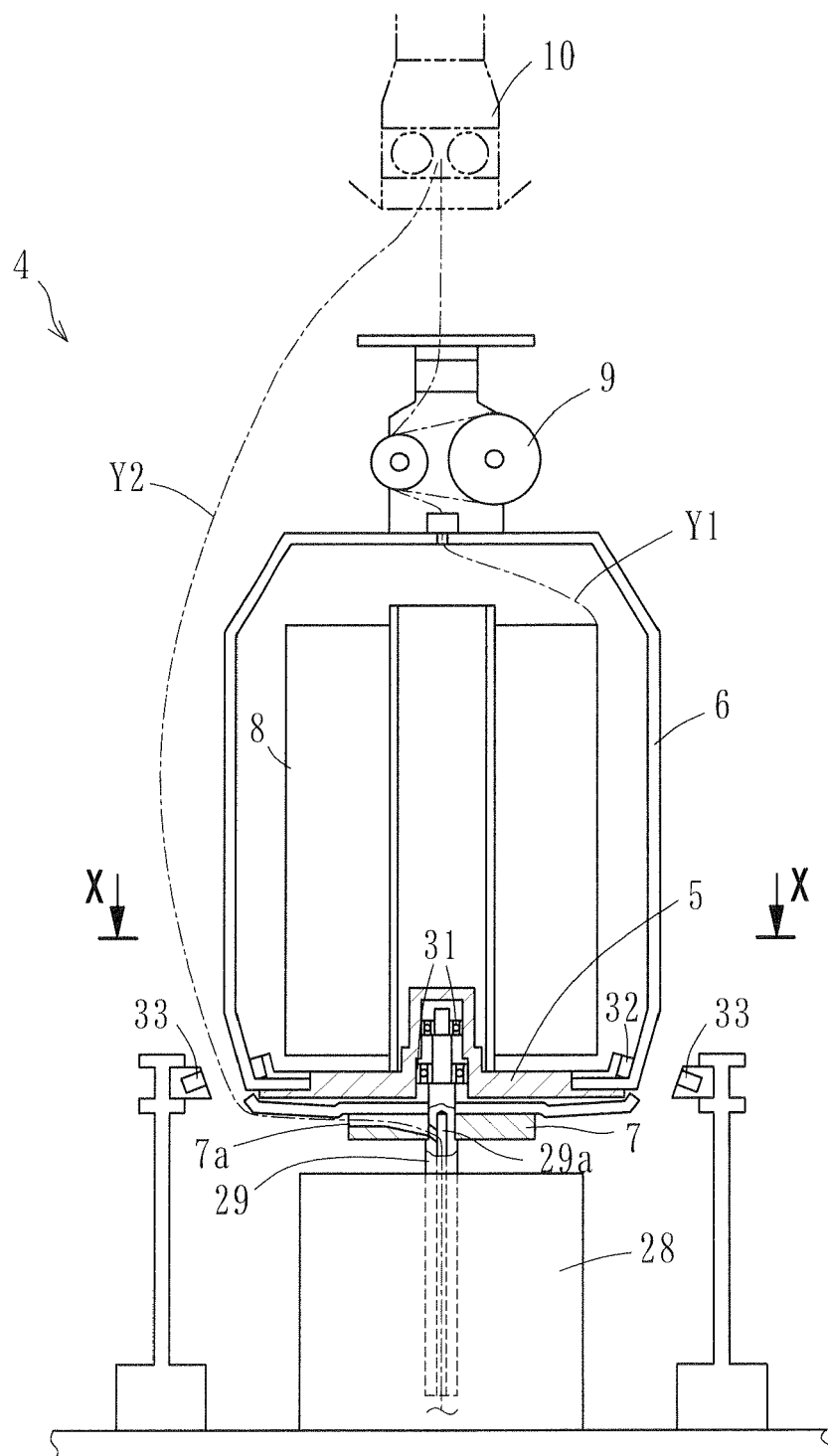


Fig. 4

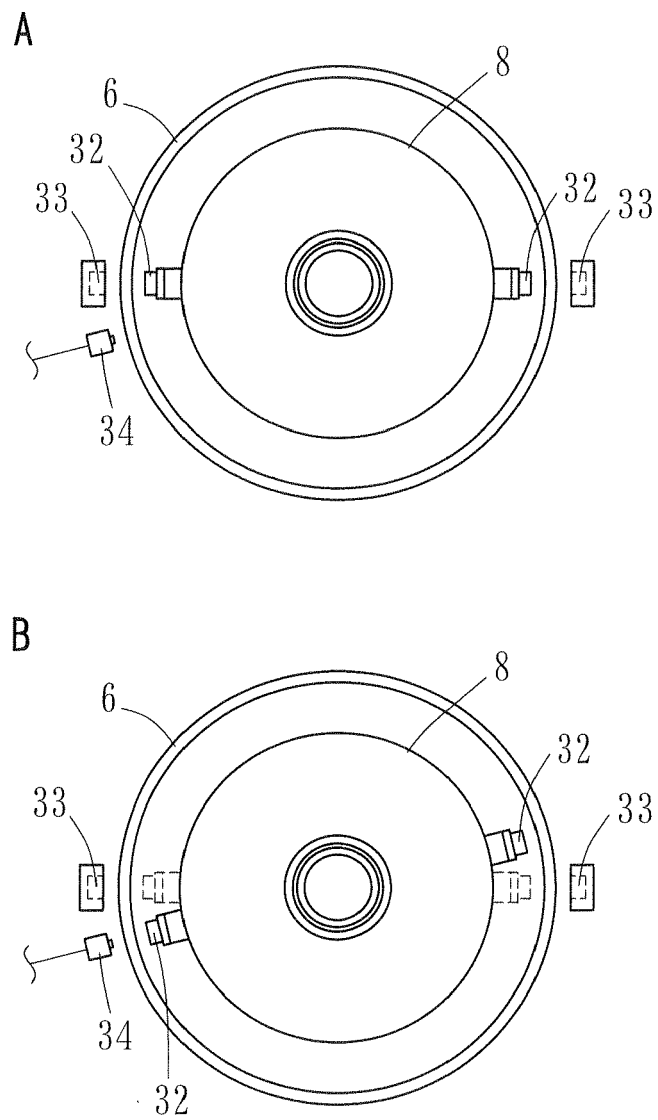
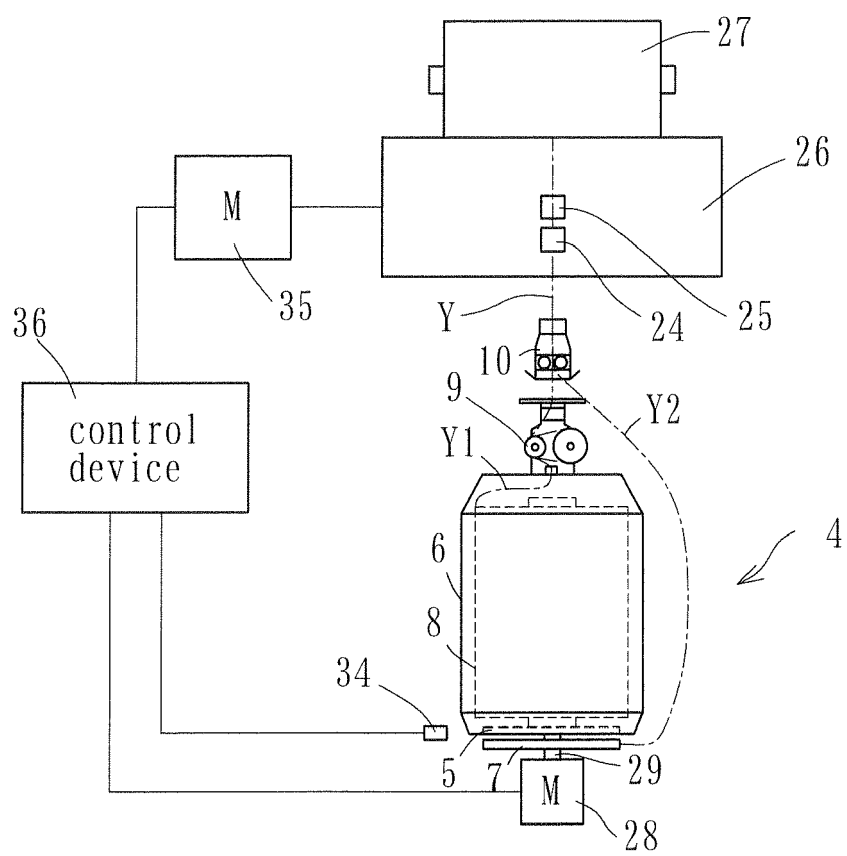


Fig. 5



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 2005048311 A [0002]