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

(11) Publication number: **0 602 554 A1**

(12) EUROPEAN PATENT APPLICATION

(21) Application number: **93119896.4**

(51) Int. Cl.5: **B65H 54/00**

(22) Date of filing: **09.12.93**

(30) Priority: **12.12.92 JP 353313/92**

(43) Date of publication of application:
22.06.94 Bulletin 94/25

(84) Designated Contracting States:
CH DE GB IT LI

(71) Applicant: **TEIJIN SEIKI CO. Ltd.**
9-1 Edobori 1-chome
Nishi-ku
Osaka-shi Osaka-fu(JP)

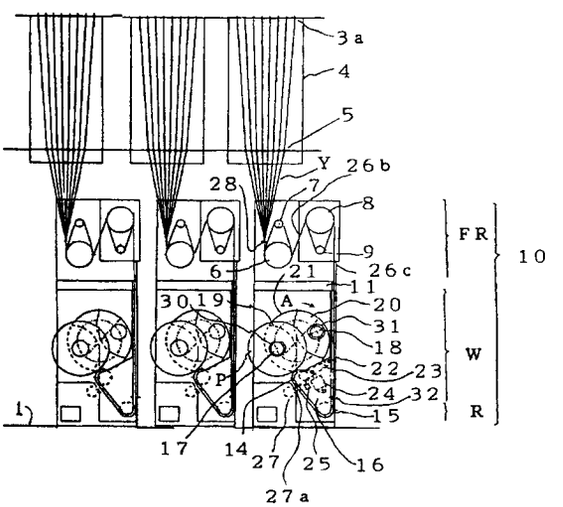
(72) Inventor: **Sugioka, Takami, c/o Teijin Seiki Co., Ltd.**
Matauyama Plant,
77 Kitayoshida-cho
Matsuyama-shi, Ehime-ken(JP)

(74) Representative: **von Hellfeld, Axel, Dr.**
Dipl.-Phys. et al
Wuesthoff & Wuesthoff
Patent- und Rechtsanwälte
Schweigerstrasse 2
D-81541 München (DE)

(54) A yarn winding apparatus.

(57) An apparatus for continuously winding a yarn (Y) comprises feed rollers (FR) for feeding the yarn (Y) at a predetermined speed, a reversing roller (15) for substantially reversing a moving direction of the yarn (Y) fed from the feed rollers (FR), and a take-up device (W) for taking up the reversed yarn (Y). A unit is portable and has the feed rollers (FR), the take-up device (W) and the reversing roller (15) integrally mounted thereon, the feed roller means (FR) is disposed above the take-up device (W), and the reversing roller (15) is disposed under the take-up device (W).

FIG. 1



EP 0 602 554 A1

This invention relates to an apparatus for winding a yarn onto a bobbin, especially an apparatus for winding a synthetic yarn of a thermoplastic material, which is continuously supplied at a high speed, for example at or more than 3,000 m/min, onto a bobbin, after it is fed or drawn by means of rollers.

In a conventional yarn winding apparatus, as illustrated in Figs. 5 and 6, a frame 50, the lower portion of which is formed in a gate shape, i.e., a reversed U-shape, is disposed on a floor 1, and a yarn take-up device 51 is arrayed within a cavity formed by the gate shaped portion of the frame 50, and a group of feed rollers 52, which feed a yarn after the yarn is heated, drawn and cooled by the feed rollers, are disposed above the gate shaped portion of the frame 50, while a nozzle (not shown) for spinning the yarn and a cooling chimney for cooling and solidifying the yarn spun from the nozzle are also disposed above the frame 50. In other words, the yarn take-up device 51 and the feed rollers 52 are separated from each other, and the feed rollers 52 are supported on the frame 50, which is disposed on the floor 1, independent from the take-up device 51.

According to such a conventional winding apparatus, the position of a yarn guide 54, which serves as a fulcrum for traverse motion while the yarn is wound by means of the yarn take-up device 51, becomes high. Accordingly, the position of the feed rollers 52, which are usually disposed above the yarn guide 54, correspondingly becomes high, and thus, the height of the total machine also becomes large. For example, assuming that the length of a bobbin holder, having eight bobbins inserted thereon, is 1,200 mm, the position of the feed roller 52a is 3,500 mm above the floor 1, and the height of the frame 50 is 4,000 mm. Consequently, there are problems that the operability is lowered since an operator needs a step when he threads a yarn onto the machine, and that the safety of the operation is extremely harmed because of a work high above the ground.

Since the height of the frame is high as described above, the size of a building, wherein the yarn take-up devices 51 and the frames 50 for accommodating the yarn take-up devices 51 are disposed, becomes great, and the base for supporting the frames 50 has to be tough. Thus, there also occurs a problem that the cost for constructing the yarn winding apparatus becomes expensive. In addition, since the frame has the feed rollers mounted thereon, an extensive frame 50 is necessary. Thus, this also contributes to enhance the equipment cost.

Further, since the machine height is large, the wound width of a wound package or the number of packages formed on one bobbin holder cannot be fully increased when a factory is rebuilt, i.e., is scraped and built.

It is an object of the present invention to obviate the above-described problems inherent to the conventional yarn winding apparatus.

It is another object of the present invention to provide a yarn winding apparatus, the machine height of which is low, the equipment cost of which is inexpensive, the operation efficiency of which is high, and the safety of which is high.

According to the present invention, the above-described objects are achieved by an apparatus for continuously winding a yarn comprising feed roller means for feeding said yarn at a predetermined speed, a reversing roller for substantially reversing a moving direction of said yarn fed from said feed roller means, and a take-up means for taking up said reversed yarn, characterized in that a unit which is portable has said feed roller means, said take-up means and said reversing roller integrally mounted thereon, said feed roller means is disposed above said take-up means, and said reversing roller is disposed under said take-up means.

The present invention will now be explained in detail with reference to the accompanying drawings showing some embodiments of the present invention and a conventional apparatus, wherein:

Fig. 1 is an elevation of one embodiment of the present invention;

Fig. 2 is a side view of the embodiment illustrated in Fig. 1;

Fig. 3 is a detailed view of portion III in Fig. 2;

Fig. 4.is a partial elevation of another embodiment of the present invention;

Fig. 5 is an elevation of a conventional apparatus; and

Fig. 6 is a side view of the conventional apparatus.

In Fig. 2, reference numeral 1 denotes a floor of the building, 2a denotes an upper floor, and 2b denotes a ceiling.

A spin block 3 is mounted on the upper floor 2a, and the lower portion of the spin block 3a has a plurality of, eight in this embodiment, nozzles 3a mounted thereon so that yarns Y are spun downwardly through an opening 2c formed in the upper floor 2a.

A cooling chimney 4 is disposed in such a manner that it surrounds a plurality of nozzles 3a and that it penetrates through the opening 2c. Cooling air is blown from the side 4a of the cooling chimney 4 so that the yarns Y spun from the nozzles 3a are cooled and solidified.

As illustrated in Fig. 1, a finish applying nozzle 5 for applying finish to the yarns Y is disposed under the cooling chimney 4. A yarn winding apparatus 10 according to the present invention is disposed on the floor 1. The yarn winding appara-

tus 10 comprises feed roller means FR for feeding the yarn Y at a predetermined speed, a reversing roller R for substantially reversing a moving direction of the yarn Y fed from the feed roller means FR, and a yarn take-up device W for taking up the reversed yarn Y. The feed roller means FR is disposed above the yarn take-up device W, and the reversing roller R is disposed under the yarn take-up device W. The feed roller means FR, the yarn take-up device W and the reversing roller R are integrally mounted on a unit to form an integrally portable unit. In the present embodiment, a plurality of units are substantially arranged on a line.

A shielding plate 11 projects from the upper portion of the machine frame 12 of the yarn take-up device W towards the operator's space in front of the yarn take-up device W so that it cuts off heats from the feed roller means FR or protects the take-up device W from materials dropping from above.

As illustrated in Fig. 1, the feed roller means FR includes a pair of first feed rollers comprising a heating roller 6 and a separate roller 7, and a pair of second feed roller means comprising a heating roller 8 and a separate roller 9. All the rollers 6-9 are rotatably supported on a support 13 as illustrated in Fig. 2. More specifically, the heating roller 6 and the heating roller 8 are attached to the spindles of electric motors 6a and 8a (Fig. 2), respectively. The separate roller 7 and the separate roller 9 are rotatably supported on shafts 7a and 9a, respectively, which project from the support 13, respectively. The separate roller 7 and the separate roller 9 of the present embodiment can rotate at a high speed, since they are supported by pneumatic bearings.

The yarns Y fed from above are wrapped around the heating roller 6 and the separate roller 7 for several turns, and then, they are fed to and wrapped around the heating roller 8 and the separate roller 9 for several turns so that the yarns Y are heated by the heating rollers 6 and 8 and are drawn between the pairs of rollers 6, 7 and 8, 9.

The heating roller 8 and the separate roller 9 are shielded by a warmer 26 secured to the support 13 since their temperatures will be high. The warmer 26 has slit-like openings 26b and 26c which serve as yarn passages of the yarns Y. Further, the warmer 26 has a swingable door 26a (Fig. 2) pivoted thereon for facilitating a threading operation.

The yarn take-up device W has a supporter 16 projecting from the lower portion of the frame 12, and the supporter 16 supports an arm 23 in such a manner that the arm 23 is swingable about a pivot pin 22. A contact roller 14, which contacts with a yarn package P and is rotated thereby during a yarn winding operation, is rotatably supported on another end of the arm 23. The arm 23 is pushed upwardly by means of a pneumatic cylinder 24 so as to exert a predetermined contact pressure between the contact roller 14 and the yarn package P during the yarn winding operation.

A reversing roller 15, which reverses the direction of the yarn Y fed from the heating roller 8, is rotatably supported on the supporter 16 beneath the contact roller 14 and is driven at a predetermined speed by means of an electric motor (not shown).

A pair of bobbin holders 17 and 18 are rotatably supported on sliders 19 and 20 above the contact roller 14, and the sliders 19 and 20 can circulate along a circular rail 21 (Fig. 1). The sliders 19 and 20 are driven by an electric servo motor (not shown).

Bobbins 30 and 31 are inserted onto the bobbin holders 17 and 18, respectively, and the yarn Y is wound onto the bobbins 30 and 31. The bobbin holders 17 and 18 are driven by electric motors (not shown), respectively, and are controlled by a controller (not shown) in such manner that the rotating speed of the contact roller 14, which is in contact with the bobbins 30 and 31 inserted onto bobbin holders 17 and 18 or yarn layers formed on the bobbins 30 and 31 and driven by the bobbin holders 17 and 18, is maintained at a predetermined amount.

A traverse device 27 is disposed at a position facing the contact roller 14 and yarn guide 27a of the traverse device 27 traverses the yarn Y to and fro. In the present embodiment, a traverse device comprising a scroll cam having a surface groove at a peripheral thereof and a yarn guide engaging with the surface groove is used as the traverse device 27. However, other well known traverse devices, such as a traverse device comprising rotary blades, may be used. The movement of the traverse device 27 is stopped upon change of winding operation from a bobbin holder 17 or 18 to another bobbin holder 18 or 17, and the yarn guide 27a, and accordingly the yarn Y, are located at an end of the wound package P near the yarn engaging groove formed at the end of the bobbin 30 or 31, and the passage of the yarn Y is temporarily restricted near the end of the yarn package P.

When the diameter of the yarn package P wound onto the bobbin holder 17 reaches a predetermined amount during the winding operation, the contact roller 14 lowers for a small distance and actuates a sensor 25. Then, the servo motor is started and the slider 19 is moved in a direction A (Fig. 1) along the rail 21. When the sensor 25 is cut off, the rotation of the servo motor is stopped and the slider 19 stops.

Upon change of bobbin onto which the yarn is wound, the bobbin holder 18 is moved in an axial direction by means of a pneumatic cylinder (not shown) to such an extent that the yarn engaging groove (not shown) formed at the end of the bobbin 31 engages with the yarn, the passage of which is restricted at the end of the traverse region.

The supporter 16 has a guide 32 at the side thereof in such a manner that the guide 32 is located at the center of the traverse motion. The guide 32 is moved to a front end of the contact roller 14 facing the operator's space by means of a pneumatic cylinder (not shown) upon the yarn threading operation so as to facilitate easy threading.

The yarn guides 27a are moved to positions, i.e., the standby positions of the yarn guides 27a, near corresponding packages P upon the changing operation of the winding bobbin.

A guide 28 (Fig. 1) is attached to the support 13 and gathers the yarns Y directing to the heating roller 6 at a predetermined distance between the adjacent yarns Y. A guide 29 (Figs. 2 and 3) is located at the opening 26c of the warmer 26 so that it restricts the distance between the yarns Y departing from the heating roller 8.

The operation of the above-described embodiment will now be explained. Cooling air is blown against the yarns Y spun from a plurality of nozzles 3a so as to solidify the yarns Y, and finish is applied to the yarns Y by means of the finish applying nozzle 5. The yarns Y having finish applied thereto are gathered at a predetermined distance between the adjacent yarns Y by means of the guide 28, and further they are wrapped around the heating roller 6 and the separate roller 7 for several turns, and then, they are wrapped around the heating roller 8 and the separate roller 9 for several turns. The heating roller 6 and the heating roller 8 are driven at a predetermined rotational speed ratio and are heated at a predetermined temperature, so that the yarns Y are heated and drawn.

The yarns Y are heated and drawn at the feed roller means FR, and the passages of the yarns Y are restricted by means of the guide 32 so that a predetermined distance is formed between the adjacent yarns Y. Then the yarns Y are wrapped around the reversing roller 15 driven at a predetermined rotational speed, and they are introduced into the yarn guide 27a of the traverse device 27.

The yarns Y are traversed to and fro by means of the yarn guides 27a, and a predetermined amount of contact pressure is exerted between the yarns Y and the contact roller 14. Thereafter, the yarns Y are wound onto the bobbin 30 inserted onto the bobbin holder 17.

As the amount of the packages P wound onto the bobbin 30 increases, the contact roller 14 lowers for a small distance and actuates a sensor 25. Then, the servo motor for driving the slider 19 is started and the slider 19 is moved for a small distance in a direction A (Fig. 1) along the rail 21. As the slider 19 rotates in a direction designated by an arrow A, the contact roller 14 is lifted for a small distance, and the sensor 25 is cut off, the rotation of the servo motor is stopped and the slider 19 stops. The foregoing operation is repeated and the winding of the yarn Y is continued.

When the wound quantity of the package P reaches a predetermined amount, the rotation of the bobbin holder 18 is started by means of the electric motor (not shown), and when the rotational speed of the bobbin holder 18 reaches a predetermined amount, the slider is released from the contact roller 14 by means of the servo motor. When the distance between the contact roller 14 and the yarn package P becomes a predetermined amount, the bobbin holder 18 is moved in an axial direction (to the right in Fig. 2) so that the yarn engaging groove formed on the bobbin 31 corresponds to the position of the yarn Y wound onto the yarn package P upon change of the winding bobbin. The drive of the traverse device 27 is stopped and the yarn guide 27a is positioned near an end of the traverse motion, and thus bunch windings are formed at the outer periphery of the yarn package P.

Then, when the slider 20 supporting the bobbin holder 18 is moved by the servo motor to a position where the bobbin holder 18 and the contact roller 14 are in contact with each other, the yarn Y extending between the contact roller 14 and the package P engages with the yarn engaging groove formed on the bobbin 31. Thus, the yarn Y is caught by the yarn engaging groove, and a predetermined amount of bunch windings are formed near the yarn engaging groove. Thereafter, the bobbin holder 18 is axially moved (to the left in Fig. 2), and simultaneously, the traverse device 27 is started. Thus, the yarn guide 27a moves to the right in Fig. 2 and forms a transfer tail, i.e., a so called pig tail, on the bobbin 31.

Thereafter, the traversing speed is gradually increased to a predetermined amount, and the winding operation of another yarn package begins. The foregoing operation is repeated to wind up yarn packages and to effect the changing operation of the winding bobbins.

Although the bobbin holders are moved in an axial direction upon the change of the winding bobbin in the present embodiment, other known bobbin changing methods may be carried out.

Further, a yarn take-up device of a spindle drive type, wherein the bobbin holders are directly

driven by means of electric motors, is exemplified in the present embodiment. However, the present invention is also applicable to a yarn take-up device of a friction drive type, wherein the bobbin holders are frictionally driven by means of a contact roller.

Although two bobbin holders are supported on individual sliders, respectively, in the above-described embodiment, the present invention may be carried out in a yarn take-up device wherein two bobbin holders are supported on a single turret table.

In addition, although the take-up device provided with the sliders or turret table supporting the bobbin holders, which move in a direction opposite to the rotational direction of the bobbin holders, is exemplified in the present embodiment, the moving direction of the sliders or turret table may be the same as the rotational direction of the bobbin holders.

Although the bobbin holders move away from the contact roller as increase of the amount of the wound yarn in the exemplified take-up device of the present embodiment, the contact roller may move away from the bobbin holders as increase of the amount of the wound yarn while the position of the bobbin holder is stationary.

Furthermore, in the above-explained embodiment, two heating rollers and two separate rollers are furnished. However, the number of the rollers or the arrangement of the rollers is not limited. for example, two sets of heating rollers, each set comprising two heating rollers, may be used. Further combination of two heating rollers and heating roller and a separate roller is also applicable.

An winding apparatus provided with a finish applying nozzle is exemplified in the embodiment, however, a finish applying roller may be used to apply finish to a yarn. Further, the finish applying nozzle or the finish applying roller may be integrally secured to a yarn take-up device.

Fig. 4 shows another embodiment, wherein the sliders or the turret table are moved in a direction the same as the rotational direction of the bobbin holders, and the reversing roller 15 is disposed below the traverse device 27.

The control, such as an inverter or a micro computer, for controlling the take-up device, feed rollers, the reversing roller and so on, and the lubricating device may also be integrally disposed in the unit.

According to the present invention, a unit which is portable has feed roller means, take-up means and a reversing roller integrally mounted thereon, the feed roller means is disposed above the take-up means, and the reversing roller is disposed under the take-up means. Accordingly, as it is apparent from the comparison between Figs. 1 and 2 showing an embodiment of the present invention and Figs. 5 and 6 showing a conventional apparatus, a yarn winding apparatus is obtained, the machine height of which is low, the equipment cost of which is inexpensive, the operation efficiency of which is high, and the safety of which is high.

Claims

1. An apparatus for continuously winding a yarn (Y) comprising feed roller means (FR) for feeding said yarn (Y) at a predetermined speed, a reversing roller (15) for substantially reversing a moving direction of said yarn (Y) fed from said feed roller means (FR), and a take-up means (W) for taking up said reversed yarn (Y), characterized in that a unit which is portable has said feed roller means (FR), said take-up means (W) and said reversing roller (15) integrally mounted thereon, said feed roller means (FR) is disposed above said take-up means (W), and said reversing roller (15) is disposed under said take-up means (W).

2. A yarn winding apparatus according to claim 1, wherein a plurality of said units are substantially arranged on a line.

FIG. 1

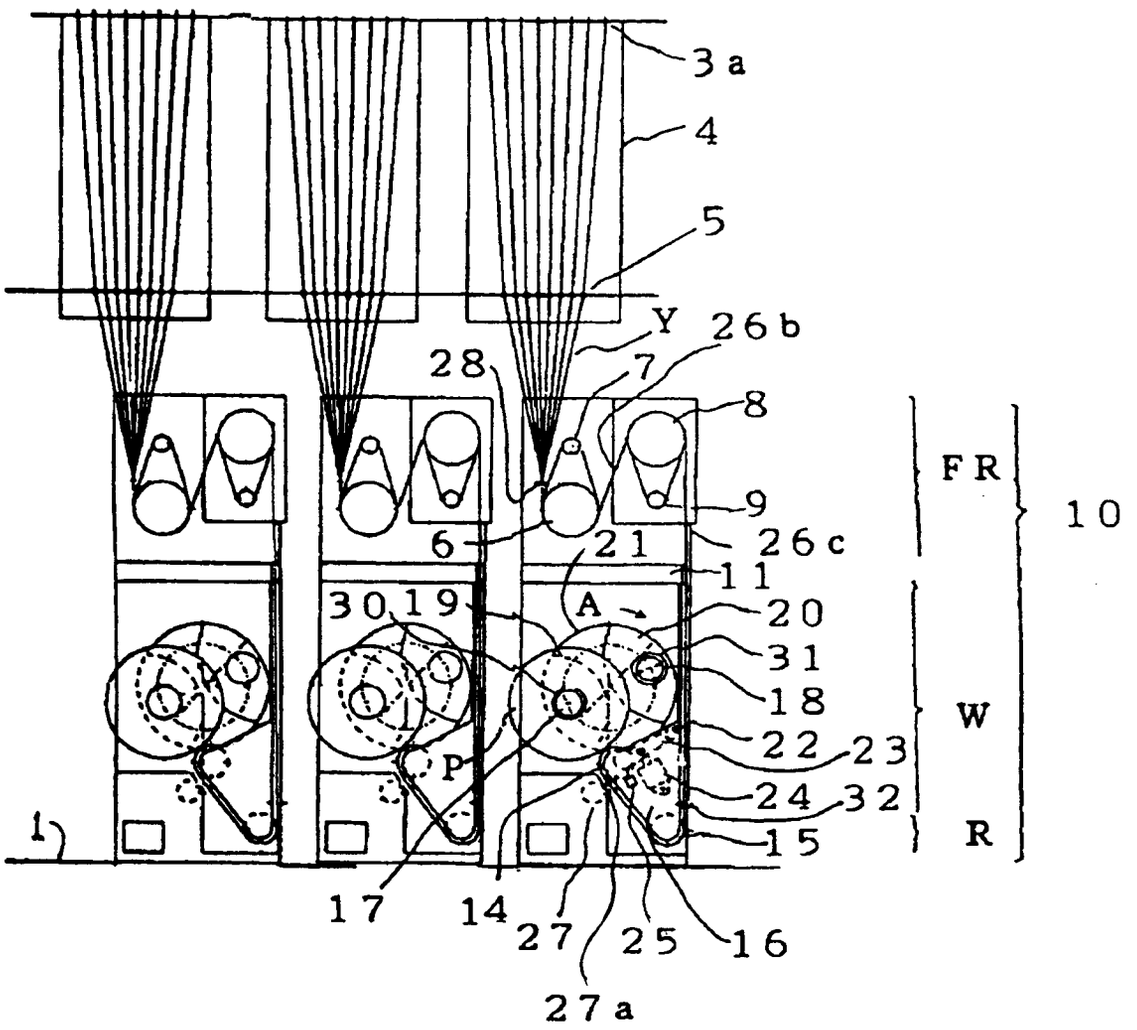

3a
4
5
Y
26b
28
7
8
9
6
21
26c
11
30
19
A
20
31
18
22
23
P
24
32
15
1
17
14
27
25
16
27a
FR
W
R
10

FIG. 2

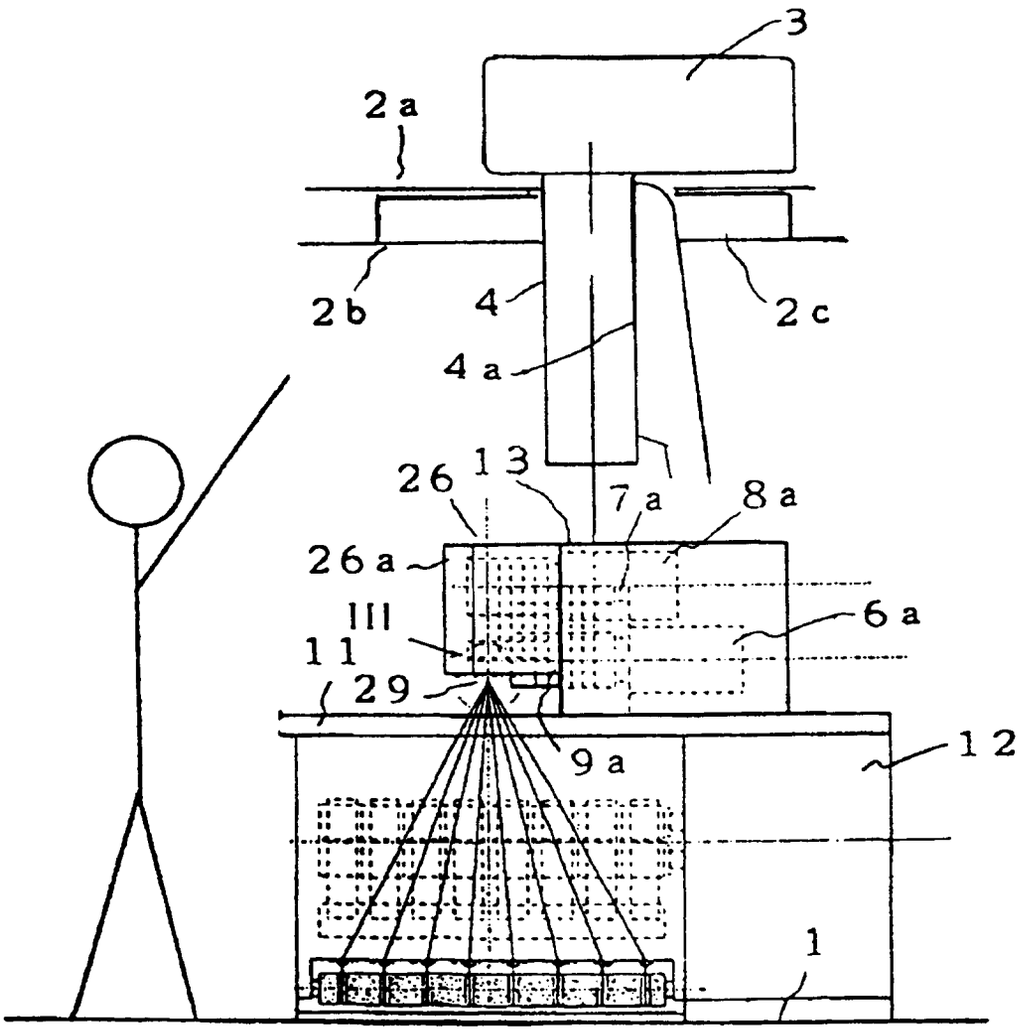


FIG. 3

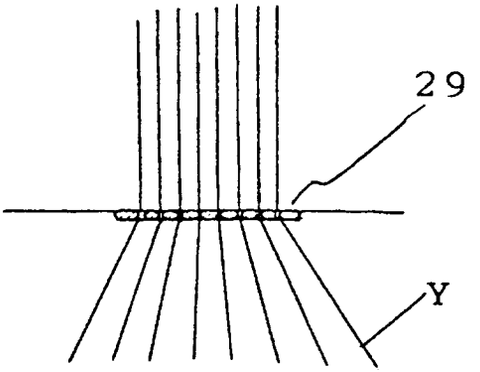


FIG. 4

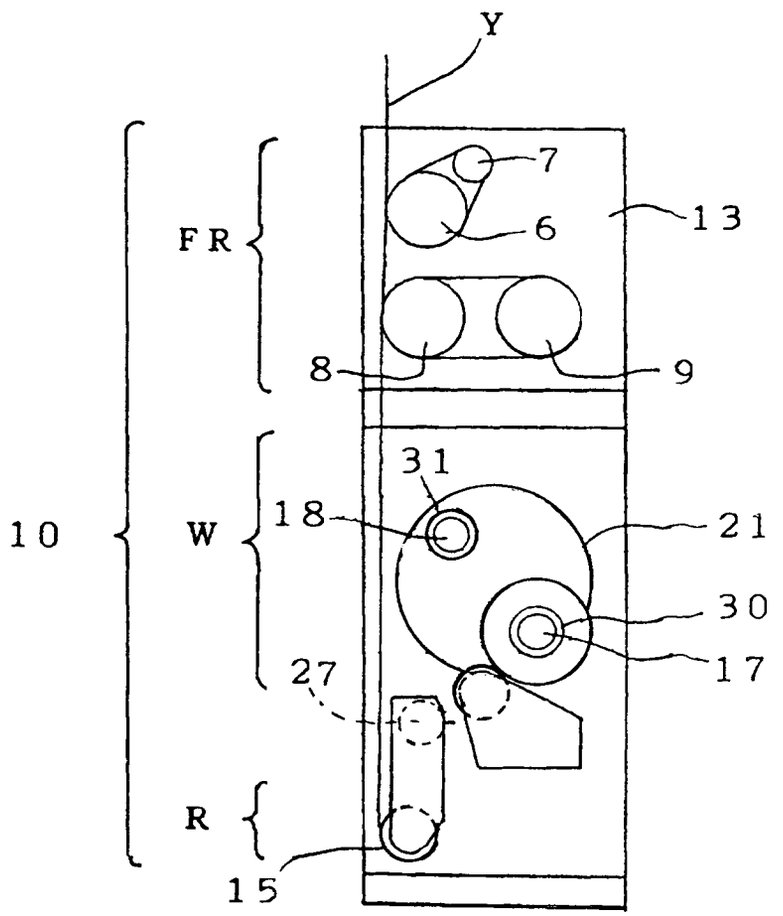


FIG. 5

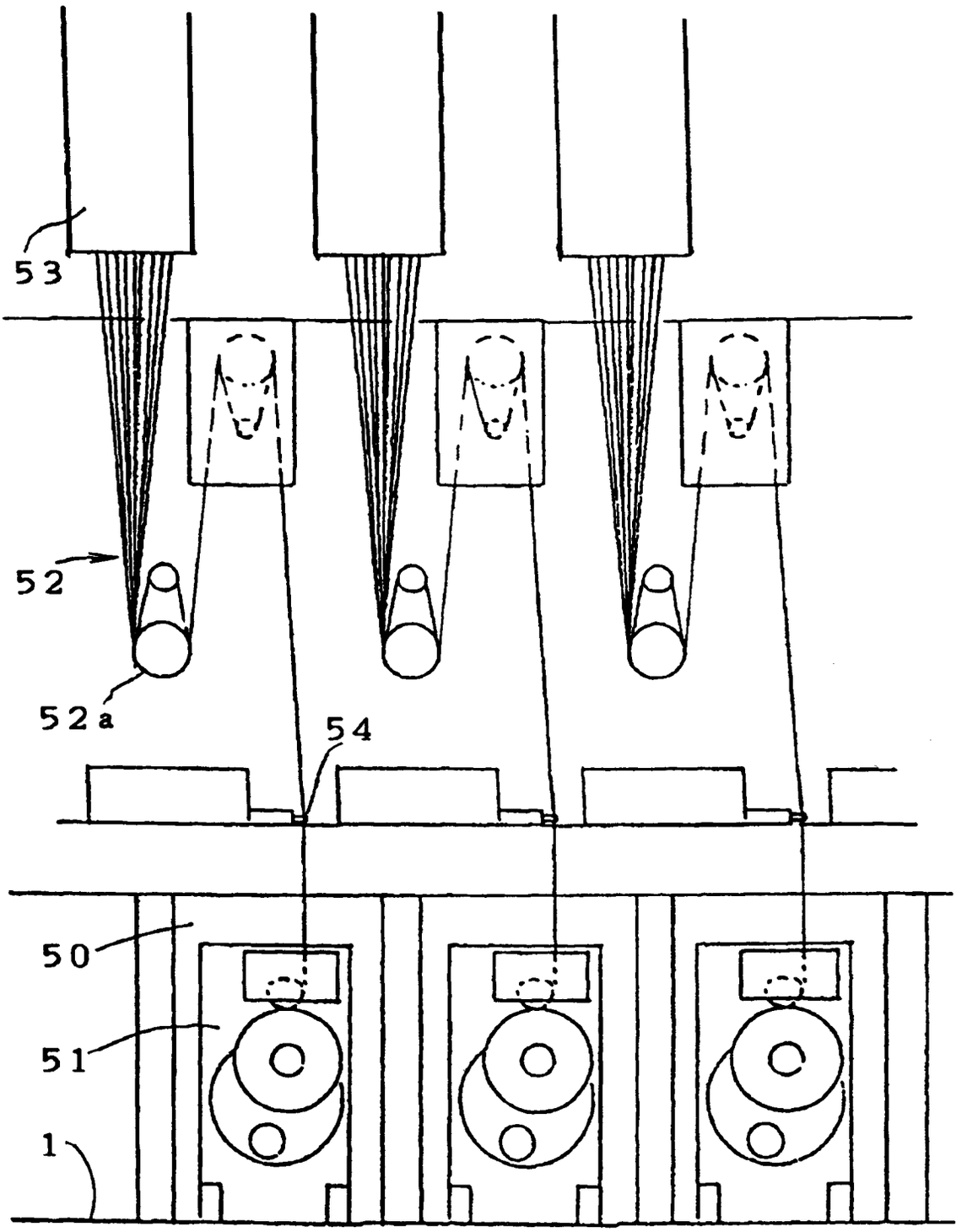
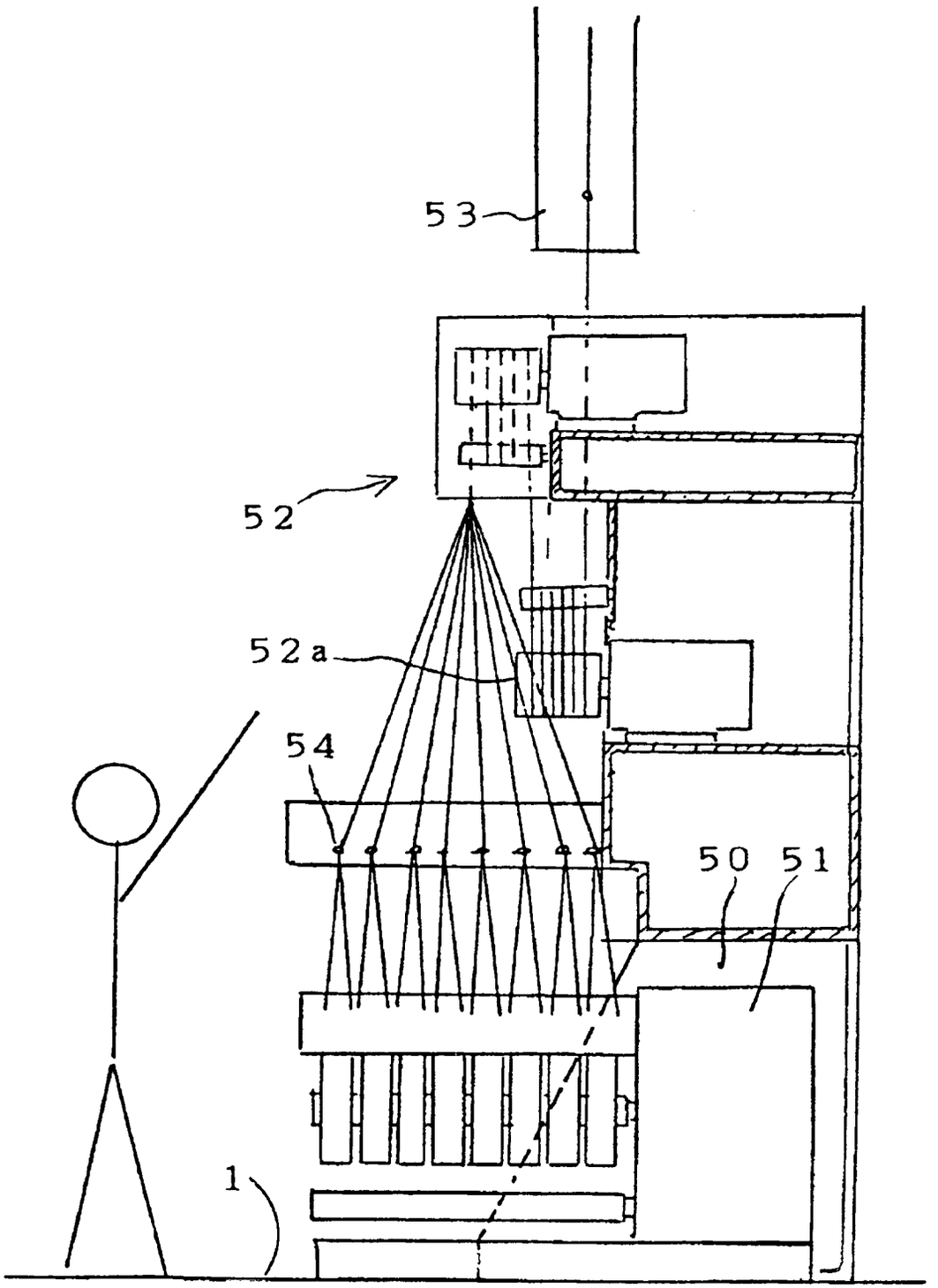


FIG. 6



European Patent Office

EUROPEAN SEARCH REPORT

Application Number

DOCUMENTS CONSIDERED TO BE RELEVANT

EP 93119896.4

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
A	US - A - 4 398 677 (HENRICH) * Fig. * --	1	B 65 H 54/00
A	DE - A - 1 938 307 (LEESONA CORP.) * Totality * --	1	
A	DE - A - 3 819 885 (JOHN BROWN INC.) * Totality * ----	1	

TECHNICAL FIELDS SEARCHED (Int. Cl.5)

B 65 H

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
VIENNA	24-01-1994	NETZER

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

EPO FORM 1503 03.82 (P0401)