



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
12.05.2010 Bulletin 2010/19

(51) Int Cl.:
D01D 13/02 (2006.01) B65H 54/70 (2006.01)

(21) Application number: **09013028.7**

(22) Date of filing: **15.10.2009**

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO SE SI SK SM TR
Designated Extension States:
AL BA RS

(72) Inventor: **Yoshioka, Seiji**
Kyoto-shi
Kyoto (JP)

(74) Representative: **HOFFMANN EITL**
Patent- und Rechtsanwälte
Arabellastrasse 4
81925 München (DE)

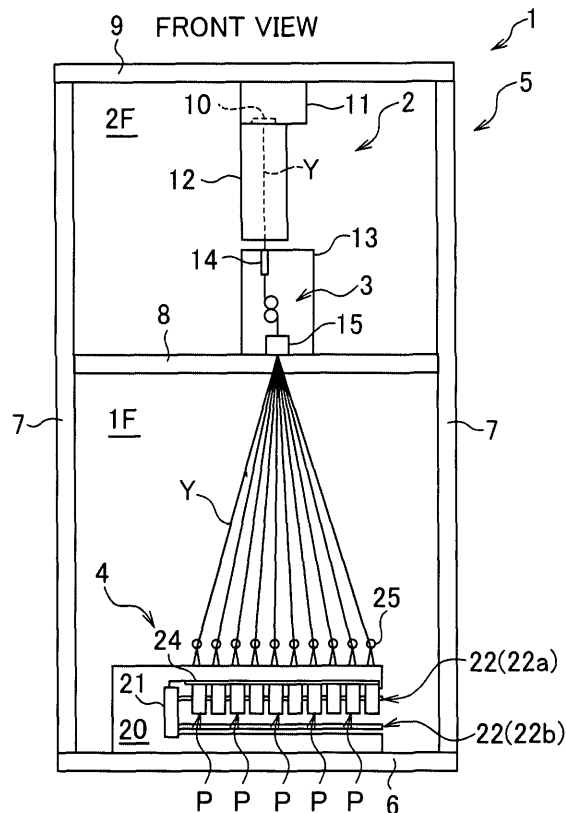
(30) Priority: **05.11.2008 JP 2008284064**

(71) Applicant: **TMT Machinery, Inc.**
Osaka-shi, Osaka 541-0041 (JP)

(54) **Device for melt-spinning and winding up synthetic filament yarns**

(57) The present invention provides a technique allowing facilitation of operations performed on the first floor, for example, setting of filament yarns in a take-up winder. The take-up winder 1 includes a spinning section 2 located on the second floor to spin filament yarns Y, a take-off section 3 taking off the filament yarns Y spun by the spinning section 2, from the spinning section 2, and a winding section 4 located on the first floor to wind the filament yarns Y, taken off by the take-off section 3. The take-off section 3 and the spinning section 2 are arranged on the same, second floor.

FIGURE 1A



Description

Field of the Invention

[0001] The present invention relates to a take-up winder.

Background of the Invention

[0002] As a technique of this kind, the Unexamined Japanese Patent Application Publication (Tokkai-Hei) No. 6-212509 discloses a general spinning system. That is, in a device layout for spinning of a synthetic filament yarn material from an extruder, the extruder and a spinning machine are generally arranged on the second floor. Furthermore, a godet roller is located in a mezzanine floor between the first floor and the second floor, and a take-up winder is located on the first floor. That is, a two-storied plant is adopted for the spinning system. In this configuration, the synthetic filament yarn material, that is, a material for synthetic filament yarn, is extruded by the extruder. The material then passes through a spinning nozzle and the like provided in the spinning machine and is cooled by a quench box. The material is thus formed into filament yarns, which are then pulled out to the lower floor. The filament yarns are then pulled by the godet roller and wound into packages by the take-up winder.

[0003] However, in the configuration in the Unexamined Japanese Patent Application Publication (Tokkai-Hei) No. 6-212509, because of the presence of the above-described mezzanine floor, on which the godet roller is located, operations on the first floor such as an operation of setting the yarns in the winder, cannot be achieved by a single operator. Thus, a plurality of operators need to be deployed on the first floor.

[0004] The present invention has been developed in view of the above-described points. A main object of the present invention is to provide a technique for facilitating operations performed on the floor on which the take-up winder is located, for example, the operation of setting filament yarns in the take-up winder.

Summary of the Invention

[0005] The problems to be solved by the present invention have been described. Now, means for solving the problems and the effects of the means will be described.

[0006] An aspect of the present invention provides a take-up winder for filament yarn configured as follows. That is, the take-up winder includes a spinning section spinning filament yarns, a take-off section taking off the filament yarns spun by the spinning section, from the spinning section, and a winding section located on a floor below the spinning section to wind the yarns taken off by the take-off section. The take-off section and the spinning section are arranged on the same floor. This configura-

tion eliminates the need for the mezzanine floor described in the Unexamined Japanese Patent Application Publication (Tokkai-Hei) No. 6-212509. Thus, a larger space is created on the floor on which the take-up winder is located. This facilitates operations performed on the floor on which the take-up winder is located, for example, an operation of setting filament yarns in the take-up winder. Furthermore, the non-necessity of the mezzanine floor enables a reduction in the number of operators specializing in the operations on the mezzanine floor and in the ceiling height of the floor on which the take-up winder is located. As a result, air conditioning costs for the floor on which the take-up winder is located can be saved.

[0007] The above-described take-up winder is further configured as follows. That is, the take-off section includes a plurality of take-off roller pairs each corresponding to one of the filament yarns spun by the spinning section. Since the take-off section thus includes the plurality of take-off roller pairs each corresponding to one of the filament yarns, the operation of setting the filament yarns in the take-off section is facilitated.

[0008] The take-up winder is further configured as follows. That is, each of the take-off roller pairs includes roller advancing and retracting means for switching at least one of the paired take-off rollers included in each take-off roller pair, between an advanced state in which the take-off roller bends the filament yarn and a retracted state in which the take-off roller separates from the filament yarn. When the take-off roller is placed in the advanced state by the roller advancing and retracting means, the take-off roller pair is allowed to take off the filament yarn. In this configuration, to allow the filament yarn to be hooked on each of the take-off roller pairs, first, the roller advancing and retracting means is used to place the take-off roller pair in the retracted state. In this state, the filament yarn is pulled out from the spinning section and set in the winding section. Then, the roller advancing and retracting means is used to place the take-off roller pair in the advanced state. Thus, the take-off roller pair bends the filament yarn to hook the filament yarn on the take-off roller pair so that the filament yarn can be taken off. Thus, in this configuration, the operation of hooking the filament yarn on each of the take-off roller pairs is performed by the advancing and retracting motion of the take-off roller pair caused by the roller advancing and retracting means. This reduces the operation of the operators, enabling a reduction in the burden on the operators.

Other features, elements, processes, steps, characteristics and advantages of the present invention will become more apparent from the following detailed description of preferred embodiments of the present invention with reference to the attached drawings.

Brief Description of the Drawings

[0009]

Figure 1 is a diagram showing the appearance of a take-up winder according to a first embodiment of the present invention.

Figure 2 is a diagram similar to Figure 2 and showing the appearance of a take-up winder according to a second embodiment of the present invention.

Figure 3 is a diagram illustrating the operation of a take-off section.

Detailed Description of the Preferred Embodiments

<First Embodiment>

[0010] A first embodiment of the present invention will be described below with reference to the drawings.

[0011] As shown in Figure 1, a take-up winder 1 according to the present embodiment is composed mainly of a spinning section 2 spinning filament yarns Y, a take-off section 3 taking off the filament yarns Y spun by the spinning section 2, and a winding section 4 winding the filament yarns Y taken off by the take-off section 3. The spinning section 2, the take-off section 3, and the winding section 4 are supported in a support frame 5. The support frame 5 is composed of a first floor section 6 forming the floor surface of the first floor, a plurality of pillars 7 extending vertically from the first floor section 6, a second floor section 8 fixed to the center of the pillars 7 in the direction in which the pillars 7 extend, the second floor section 8 forming the floor surface of the second floor, and a second floor ceiling section 9 fixed to the upper end of the pillars 7 so as to form the ceiling surface of the second floor. In this configuration, the "first floor" means a space formed between the first floor section 6 and the second floor section 8, and the "second floor" means a space formed between the second floor section 8 and the second floor ceiling section 9. The above-described spinning section 2 is located on the second floor, and the winding section 4 is located on the first floor. In other words, the winding section 4 is located below the floor for the spinning section 2. Thus, the spinning section 2 and the winding section 4 are arranged opposite each other across the second floor section 8. This prevents heat generated by the spinning section 2 from being transferred to the winding section 4.

[0012] The above-described spinning section 2 is composed mainly of a hopper and an extruding device neither of which is shown in the drawings, a spinning beam 11 with spinnerets 10, and a quench box 12. The spinning section 2 is fixed to the above-described second floor ceiling section 9. In this configuration, a synthesis filament yarn material fed into the hopper is melted in the extruding device. The molten material is extruded into the spinning beam 11 and then discharged through the spinnerets 10. Filament yarns discharged through the spinnerets 10 are cooled and solidified by the quench box 12 to form filament yarns Y.

[0013] The above-described take-off section 3 is located on the second floor. Specifically, the take-off section

3 is supported by a take-off support 13 provided upright on the top surface of the second floor section 8. The take-off support 13 includes, besides the take-off section 3, an oiling device 14, and a yarn path regulating guide 15. Arrangements each composed of the take-off support 13, the take-off section 3, the oiling device 14, and the yarn path regulating guide 15 are individually and independently provided for the respective filament yarns Y, as shown in Figure 1B.

[0014] The above-described oiling device 14 is located downstream side of and immediately below the quench box 12. The oiling device 14 supplies lubricant to the filament yarns Y fed out from the quench box 12.

[0015] The above-described take-off section 3 is located downstream side of and immediately below the oiling device 14 to take off the filament yarn Y spun by the spinning section 2, from the spinning section 4. As shown in Figure 3B, the take-off section 3 is composed mainly of a first godet roller 16 located upstream side of the yarn path of the filament yarn Y, and a second godet roller 17 located downstream side of the yarn path of the filament yarn Y. The first godet roller 16 and the second godet roller 17 are rotatably supported on the above-described take-off support 13. The first godet roller 16 and the second godet roller 17 each have a small diameter of about ϕ 30 to 50 mm and can be rotated at a desired rotation number by a driving motor (not shown in the drawings). Moreover, a take-off roller pair 18 composed of the first godet roller 16 and the second godet roller 17 includes a solenoid type actuator 19 (roller advancing and retracting means) switching the first godet roller 16 and the second godet roller 17 between an advanced state and a retracted state. Specifically, the first godet roller 16 and the second godet roller 17 are each configured to be able to translate in the direction in which the godet roller retracts from the yarn path of the filament yarn Y. In the present embodiment, the first godet roller 16 and the second godet roller 17 are each configured to be able to translate perpendicularly to the yarn path of the filament yarn Y. The first godet roller 16 can travel between a retracted position 16a shown in Figure 3A and an advanced position 16b shown in Figure 3B. In the state in which the first godet roller 16 is at the retracted position 16a, that is, in the retracted state, the first godet roller 16 is separated from the filament yarn Y. In the state in which the first godet roller 16 is at the advanced position 16b, that is, in the advanced state, the first godet roller 16 bends the filament yarn Y. Similarly, the second godet roller 17 can travel between a retracted position 17a shown in Figure 3A and an advanced position 17b shown in Figure 3B. In the state in which the second godet roller 17 is at the retracted position 17a, that is, in the retracted state, the second godet roller 17 is separated from the filament yarn Y. In the state in which the second godet roller 17 is at the advanced position 17b, that is, in the advanced state, the second godet roller 17 bends the filament yarn Y. When both the first godet roller 16 and the second godet roller 17 are set to the advanced

state, the take-off roller pair 18 frictionally contacts with the filament yarn Y tightly. This enables the filament yarn Y to be taken off.

[0016] The above-described yarn path regulating guide 15 is located downstream side of the take-off section 3 to regulate the yarn path of the filament yarn Y fed out from the take-off section 3.

[0017] The winding section 4 is composed mainly of a turret disk 21 rotatably attached to a side surface of the main body 20 of the winding section 4, two bobbin holders 22 projecting from the turret disk 21 in the horizontal direction and driven by an induction motor (not shown in the drawings), a traverse device 23, and a contact roller 24. In the present embodiment, a plurality of (in the present embodiment, 10) take-up bobbins can be attached to the bobbin holder 22. Traverse support point guides 25 are each provided upstream side of the corresponding one of the take-up bobbins attached to the bobbin holder 22 so as to serve as a traverse support point for the filament yarn Y with respect to the take-up bobbin. The take-up winder 1 according to the present embodiment is laid out such that the direction in which the bobbin holders 22 project is at right angles, as seen in a plan view, to the direction in which the take-off sections 3 are juxtaposed. That is, in broad perspective, the plurality of filament yarns Y fed out from the respective yarn path regulating guides 15 are twisted by 90 degrees as seen in a plan view before reaching the winding section 4. In this configuration, while being traversed by the traverse device 23 using the traverse support point guide 25 as a support point, each of the filament yarns Y fed out from the yarn path regulating guide 15 is wound on the corresponding take-up bobbin rotating in a predetermined direction in contact with the contact roller 24 rotated by a driving source (not shown in the drawings). Thus, a package P with a predetermined shape and a predetermined diameter is formed on the take-up bobbin.

[0018] Now, an operation of hooking the above-described filament yarn Y spun by the above-described spinning section 2 on the take-off roller pair 18 will be described.

[0019] First, an operator deployed on the second floor uses the solenoid type actuator 19 to place the take-off roller pair 18 in the retracted state shown in Figure 3A. In the retracted state, the first godet roller 16 and the second godet roller 17 are separated from each other as seen in a plan view. In this state, the operator uses what is called a suction gun sucking and holding the filament yarn Y, to pull out the filament yarn Y. The operator then sequentially sets the filament yarn Y in the oiling device 14, the take-off roller pair 18, and the yarn path regulating guide 15. Here, the setting of the filament yarn Y in the take-off roller pair 18 means an operation of simply inserting the filament yarn Y between the first godet roller 16 and the second godet roller 17, which are separated from each other as seen in a plan view as described above. Then, the operator drops the filament yarn Y set in the yarn path regulating guide 15, into a hole (not

shown in the drawings) drilled in the second floor section 8.

[0020] On the other hand, an operator deployed on the first floor uses a suction gun to suck and hold the filament yarn Y. The operator further pulls out and sets the filament yarn Y in the winding section 4. Thereafter, the operator on the second floor uses the solenoid type actuator 19 to place the take-off roller pair 18 in the advanced state shown in Figure 3B. Thus, the take-off roller pair 18 bends the filament yarn Y in a substantial S form to allow the filament yarn Y to be hooked on the take-off roller pair 18 so as to prevent the take-off roller pair 18 and the filament yarn Y from slipping relative to each other. This enables the take-off section 3 to take off the filament yarn Y.

[0021] As described above, in the present embodiment, the take-up winder 1 is configured as follows. That is, the take-up winder 1 includes the spinning section 2, located on the second floor to spin the filament yarns Y, the take-off section 3, taking off the filament yarns Y spun by the spinning section 2, from the spinning section 2, and the winding section 4, located on the first floor to wind the filament yarns Y taken off by the take-off section 3. The take-off section 3 is located on the second floor. This configuration eliminates the need for the presence of the mezzanine floor described in the Unexamined Japanese Patent Application Publication (Tokkai-Hei) No. 6-212509. A larger space is thus created on the first floor. This facilitates operations performed on the first floor, for example, an operation of setting the filament yarns Y in the winding section 4. Furthermore, the non-necessity of the mezzanine floor enables a reduction in the number of operators specializing in the operations on the mezzanine floor and in the ceiling height of the first floor. As a result, air conditioning costs for the first floor can be saved.

[0022] Additionally, since the take-off section 3 is located on the second floor, the distance between the take-off section 3 and the winding section 4 increases, thus reducing the angle of bend of the filament yarn Y at the traverse support point guide 25. The reduced angle of bend contributes to improving the quality of the filament yarn Y.

[0023] In the above-described embodiment, the spinning section 2 is located on the second floor, and the winding section 4 is located on the first floor. However, the spinning section 2 is located on the third floor, and the winding section 4 is located on the second floor. In this case, according to the technical concept disclosed in the above-described embodiment, the take-off section 3 is located on the same floor as that on which the spinning section 2 is located, that is, the third floor. Even in this case, the excellent effects produced by the above-described embodiment are sufficiently exerted.

[0024] The above-described take-up winder 1 is further configured as follows. That is, the take-off section 3 is composed of a plurality of the take-off roller pairs 18 each provided for one of the filament yarns Y spun by

the spinning section 2. Since the take-off section 3 is composed of the plurality of take-off roller pairs 18 each provided for one of the filament yarns Y, this configuration facilitates the operation of hooking the filament yarn Y on the take-off section 3 compared to the configuration in the Unexamined Japanese Patent Application Publication (Tokkai-Hei) No. 6-212509 described above. This is because unlike the above-described embodiment, the configuration in the Unexamined Japanese Patent Application Publication (Tokkai-Hei) No. 6-212509 requires the following cumbersome operation if a plurality of the filament yarns Y are hooked on a pair of take-off rollers at a time: the filament yarns Y are brought together to form a yarn path of pitch 2 to 10 mm, and then the pitch is increased to the appropriate value at which the filament yarns Y are introduced into the winding section 4. Furthermore, a guide arrangement for introduction into the yarn path needs to be complicated.

[0025] The above-described embodiment adopts the first godet roller 16 and second godet roller 17, which have a much smaller diameter than those in the prior art. The smaller diameter can be achieved because the take-off roller pair 18 takes off a single filament yarn Y instead of a plurality of filament yarns Y. The take-off roller pairs 18 configured as described above allows the space on the second floor to be saved and contributes to reducing the ceiling height of the second floor ceiling section 9.

[0026] The above-described take-up winder 1 is further configured as follows. That is, each of the take-off roller pairs 18 includes the solenoid type actuator 19 (roller advancing and retracting means) switching the first godet roller 16 and the second godet roller 17, included in the take-off roller pair 18, between the advanced state in which the take-off roller pair 18 bends the filament yarn Y and the retracted state in which the take-off roller pair 18 separates from the filament yarn Y. When the solenoid type actuator 19 places the first godet roller 16 and the second godet roller 17 in the advanced state, the take-off roller pair 18 can take off the filament yarn Y. In this configuration, the filament yarn Y is pulled out from the spinning section 2 and set in the winding section 4. Then, the solenoid type actuator 19 is used to place the take-off roller pair 18 in the advanced state. Thus, the take-off roller pair 18 bends the filament yarn Y to hook the filament yarn Y on the take-off roller pair 18 so that the filament yarn Y can be taken off. Thus, in this configuration, the operation of hooking the filament yarn Y on each of the take-off roller pairs 18 is performed by the advancing and retracting motion of the take-off roller pair 18 caused by the solenoid type actuator 19. This reduces the operation of the operators, enabling a reduction in the burden on the operators.

[0027] The preferred embodiment of the present invention has been described above. However, the above-described embodiment may be changed as follows.

[0028] That is, for example, in the above-described embodiment, the first godet roller 16 and the second godet roller 17, included in the take-off roller pair 18, are

each configured to be advanced and retracted with respect to the filament yarn Y by the above-described solenoid type actuator 19. However, alternatively, it is possible that only one of the first godet roller 16 and the second godet roller 17, included in the take-off roller pair 18, is configured to be advanced and retracted with respect to the filament yarn Y.

[0029] Furthermore, instead of the solenoid type actuator 19 according to the above-described embodiment, a rack and pinion mechanism or a pneumatic or hydraulic cylinder may be adopted.

[0030] Additionally, if the filament yarns Y need to be interlaced with each other, then for example, an interlacing device may be provided on the first floor and upstream side of and close to the winding section 4. The interlacing device may be laid out downstream side of and immediately below the yarn path regulating guide 15 instead of being located upstream side of and close to the winding section 4.

[0031] Furthermore, in the above-described embodiment, the above-described spinning section 2, take-off section 3, and winding section 4 are supported in the support frame 5. However, alternatively, the support frame 5 may be omitted, and the spinning section 2, the take-off section 3, and the winding section 4 may be attached to the arrangement of the building using an auxiliary material.

[0032] Additionally, in the above-described embodiment, the first godet roller 16 is driven by the driving motor not shown in the drawings, and the second godet roller 17 is driven by the different driving motor not shown in the drawings. Alternatively, the first godet roller 16 and the second godet roller 17 may be driven at a time using a single driving motor and a transmission device (for example, an arrangement using a transmission belt and a pulley) transmitting the power of the driving motor to the first godet roller 16 and the second godet roller 17. Moreover, a plurality of the first godet rollers 16 may be driven at a time using a single driving motor and a transmission device. This also applies to the second godet roller 17.

<Second embodiment>

[0033] Now, with reference to Figure 2, a second embodiment of the present invention will be described. Figure 2 is similar to Figure 1 and shows the appearance of a take-up winder according to the second embodiment of the present invention. The difference between the present embodiment and the above-described first embodiment will be mainly described. Duplicate descriptions are appropriately omitted.

[0034] The above-described embodiment adopts the layout in which the direction in which the take-off sections 3 are juxtaposed is at right angles to the direction in which the bobbin holders 22 project, as seen in a plan view. In contrast, the present embodiment adopts the layout in which the direction in which the take-off sections 3 are juxtaposed is parallel to the direction in which the bobbin

holders 2 project, as seen in a plan view. Then, the yarn paths of the plurality of filament yarns Y extend from the spinning section 2 to the winding section 4 while remaining parallel to one another. Thus, the yarn paths of the filament yarns Y are simpler than those in the above-described first embodiment. 5

While the present invention has been described with respect to preferred embodiments thereof, it will be apparent to those skilled in the art that the disclosed invention may be modified in numerous ways and may assume many embodiments other than those specifically set out and described above. Accordingly, it is intended by the appended claims to cover all modifications of the present invention that fall within the scope of the invention. 10

15

Claims

1. A take-up winder **characterized by** comprising: 20

a spinning section spinning filament yarns;
a take-off section taking off the filament yarns spun by the spinning section, from the spinning section; and
a winding section located on a floor below the spinning section to wind the filament yarns taken off by the take-off section, and
in that the take-off section and the spinning section are arranged on the same floor. 25

30

2. The take-up winder according to Claim 1, **characterized in that** the take-off section includes a plurality of take-off roller pairs each corresponding to one of the filament yarns spun by the spinning section. 35

3. The take-up winder according to Claim 2, **characterized in that** each of the take-off roller pairs includes roller advancing and retracting means for switching at least one of the paired take-off rollers included in each take-off roller pair, between an advanced state in which the take-off roller bends the filament yarn and a retracted state in which the take-off roller separates from the filament yarn, and when the take-off roller is set in the advanced state by the roller advancing and retracting means, the take-off roller pair is allowed to take off the filament yarn. 40

45

50

55

FIGURE 1A

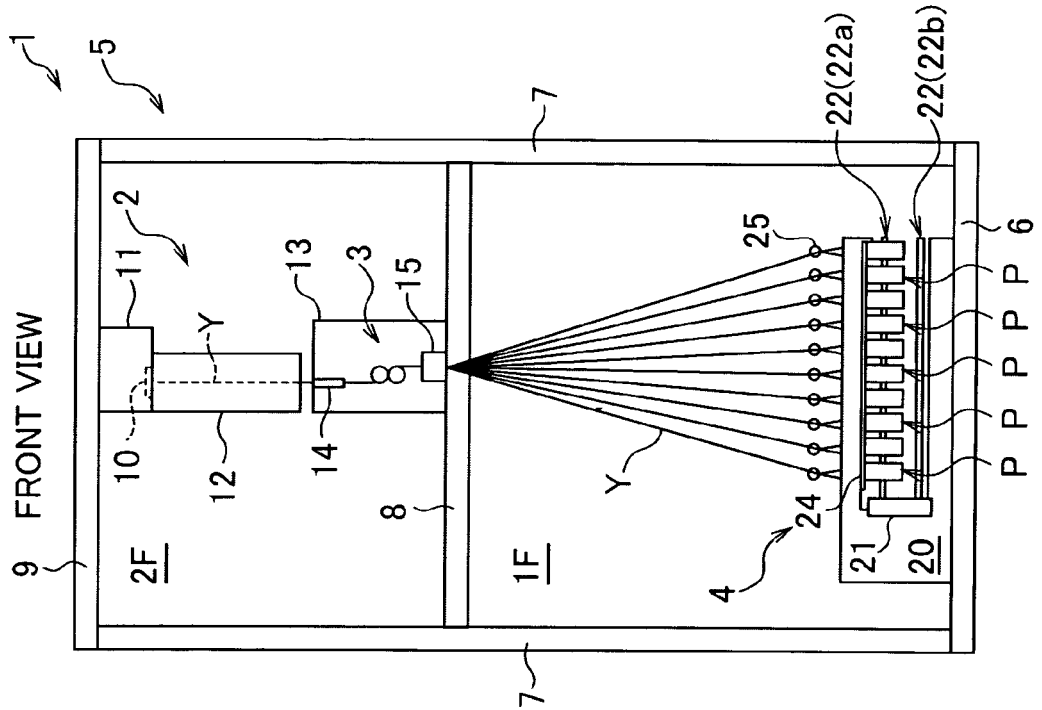


FIGURE 1B

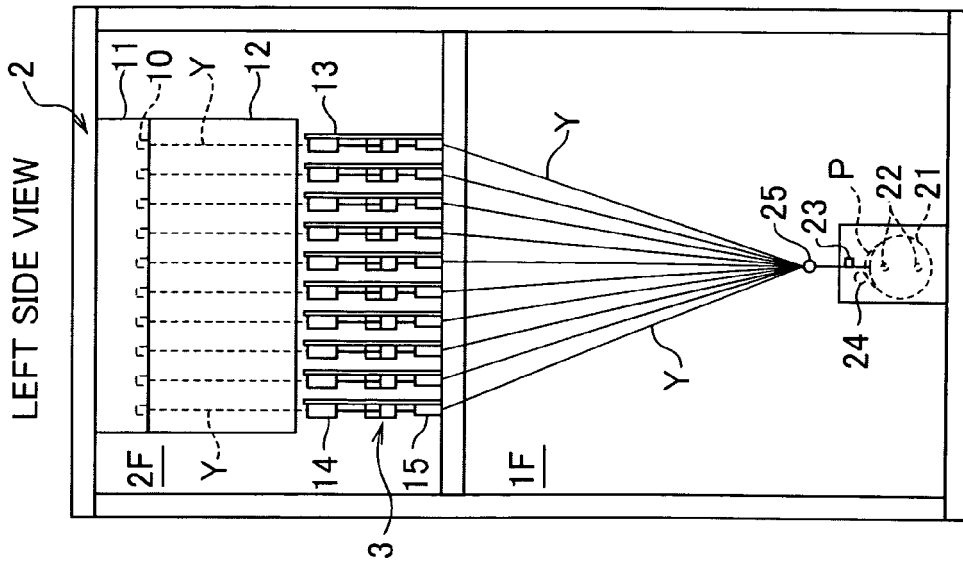


FIGURE 2A

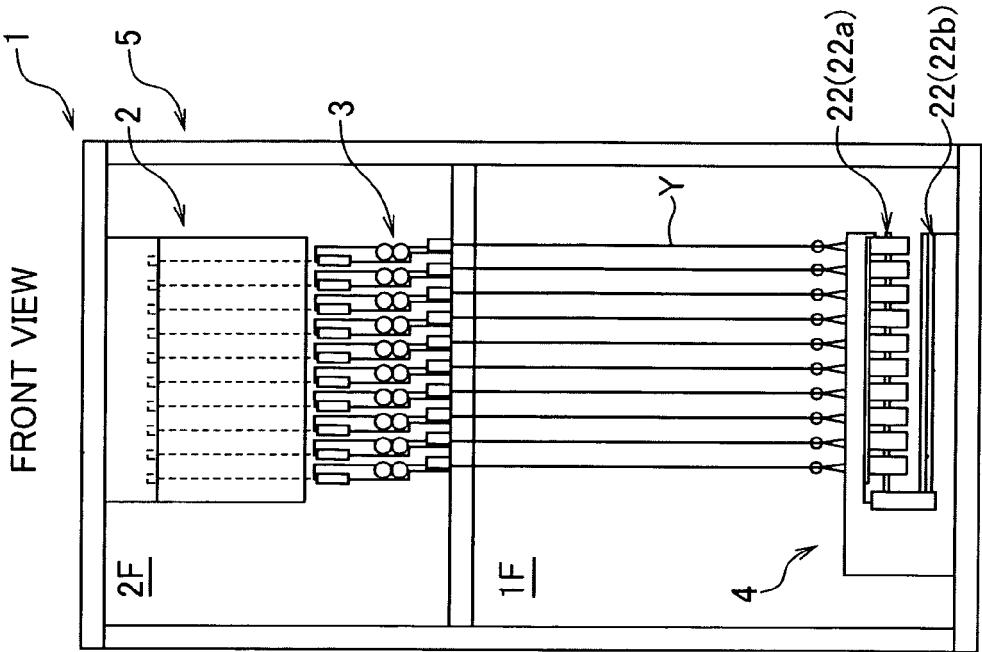


FIGURE 2B

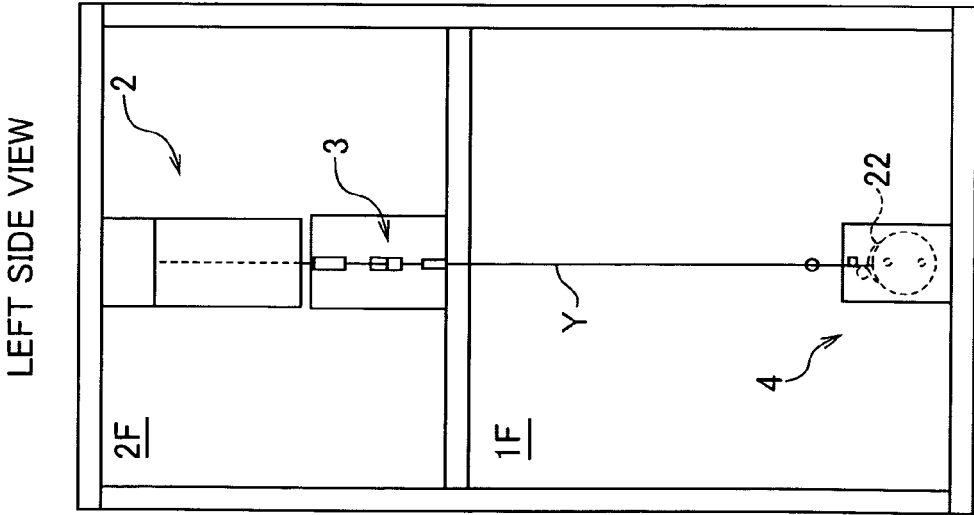


FIGURE 3A

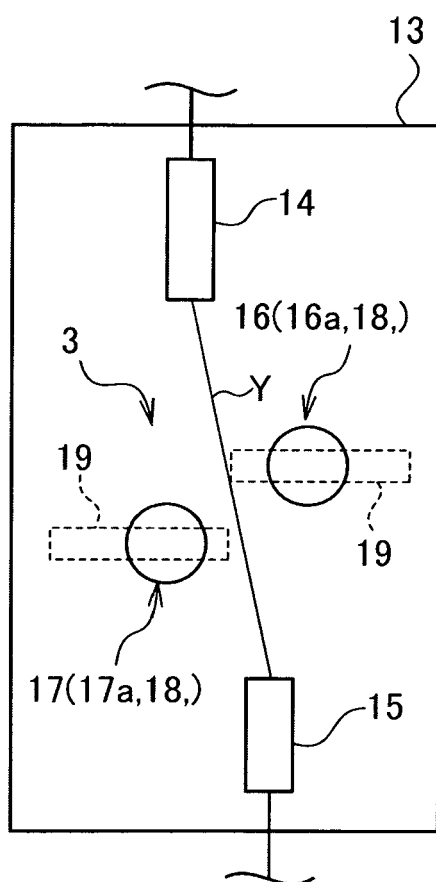
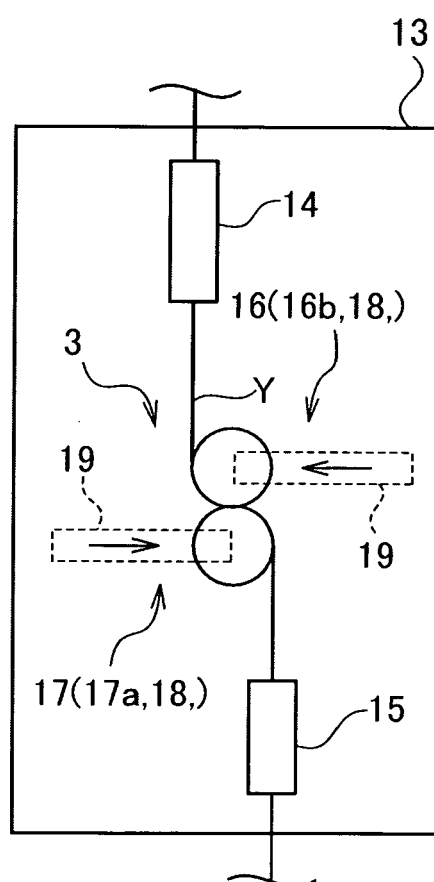


FIGURE 3B



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 6212509 A [0002] [0003] [0006] [0021] [0024]