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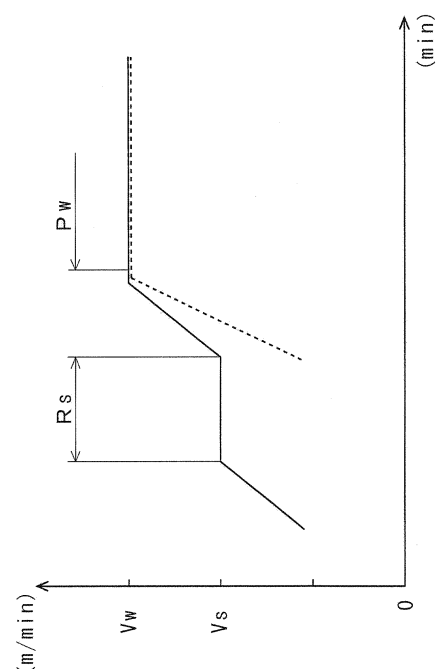
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(54) **Take-up apparatus**

(57) [OBJECT] A take-up apparatus is provided such that an air nozzle is not provided in a yarn path leading from a melt spinning machine to a godet roller, but filaments are not wound around the godet roller.

[MEANS OF REALIZING THE OBJECT] A take-up apparatus (100) includes a melt spinning machine (10) configured to spin filaments (F), a godet roller group (20) configured to feed yarns (Y) made by combining the filaments (F), and a take-up winder (30) configured to wind the yarns (Y) fed from the godet roller group (20) around bobbins (B). While a yarn threading operation is performed on godet rollers (21) and (22), a circumferential speed of the godet rollers (21) and (22) forming the godet roller group (20) is set to a threading speed ( $V_s$ ) lower than a circumferential speed in a winding period ( $P_w$ ) and is increased to a winding speed ( $V_w$ ) after the threading on the godet rollers (21) and (22) is completed and before winding of the yarns (Y) through a threading on the bobbins (B) is started. A circumferential speed of the bobbins (B) is increased to the winding speed ( $V_w$ ) before the winding of the yarns (Y) through the threading on the bobbins (B) is started.

Fig. 4



## Description

### [TECHNICAL FIELD]

**[0001]** The present invention relates to a technique for a take-up apparatus.

### [BACKGROUND ART]

**[0002]** Take-up apparatuses have been known that combine spun filaments into yarns and wind the yarns to form packages (see patent document 1).

**[0003]** In the take-up apparatus of this kind, a yarn threading operation needs to be performed as a preparation before the package is started to be formed. To be more specific, in the take-up apparatus of this kind, an operator has to perform the yarn threading operation to thread yarns onto godet rollers and guides being aspirated yarns with a suction gun, as the preparation before the package is started to be formed.

**[0004]** As illustrated in FIG. 5, when the yarn is threaded onto the godet roller rotating at a high speed, the filaments F constituting the yarn Y might be wound around the godet roller G. To address this, a conventional take-up apparatus has been developed that includes an air nozzle provided in a yarn path leading from a melt spinning machine to the godet roller (see patent document 2). In this configuration, air is blown to the yarn to spread supplied oil evenly on the yarn and make the filaments entangle with each other. In this way, the conventional take-up apparatus prevents the filaments from being wound around the godet rollers.

**[0005]** Unfortunately, the conventional take-up apparatus that includes the air nozzle provided in the yarn path leading from the melt spinning machine to the godet roller is provided with an air pipe and the like, and thus has a complicated structure, and require a higher cost. Moreover, a higher running cost is required because the air needs to be constantly blown to the yarns guided to the godet rollers.

**[0006]** There has also been proposed a method in which the godet rollers or bobbins are rotated at a low speed, and then the speed thereof is increased to a winding speed after the yarn is wrapped around the bobbin, in order to facilitate the yarn threading operation performed on the godet rollers or the bobbins (for example, see patent document 3 and patent document 4). However, in this method, the yarns wound around the bobbins while the speed is being increased to the winding speed need to be discarded, and thus the amount of waste yarns increases. In particular, in the following process for partially oriented yarns (POY), generally, the yarn of the innermost layer of the package is coupled with the yarn of the outermost layer of another package, and thus the process is continuously carried out. Thus, defective yarns cannot be wound around the inner layer of the package. Accordingly, as disclosed in patent document 4, a take-up winder having a function of automatically cutting the

yarns needs to be used. Specifically, the yarns are switched once the operation speed reaches the winding speed. Thus, the winding of the package formed of a normal yarn starts from the innermost layer, and the entire package of the yarns wound around the bobbins while the speed is being increased to the winding speed is discarded.

### [RELATED ART DOCUMENTS]

### [PATENT DOCUMENTS]

#### [0007]

[Patent Document 1] Japanese Unexamined Patent Application Publication No. 2011-144019.

[Patent Document 2] Japanese Unexamined Patent Application Publication No. 2010-116648.

[Patent Document 3] Japanese Examined Patent Publication No. 1988-5485.

[Patent Document 4] Japanese Examined Patent Publication No. 1972-35929.

### [DISCLOSURE OF THE INVENTION]

### [PROBLEMS TO BE SOLVED BY THE INVENTION]

**[0008]** It is an object of the present invention to provide a take-up apparatus (to be more specific, a take-up apparatus that produces partially oriented yarns (POY)) having a configuration in which an air nozzle in a yarn path leading from a melt spinning machine to a godet roller is not provided and still can prevent filaments from being wound around the godet roller.

### [MEANS OF SOLVING THE PROBLEMS]

**[0009]** First, the means of solving the problems will be described below.

**[0010]** A take-up apparatus according to a first aspect of the present invention includes: a melt spinning machine configured to spin filaments; a godet roller group configured to feed yarns made by combining the filaments; and a take-up winder configured to wind the yarns fed from the godet roller group around bobbins. While a yarn threading operation is performed on godet rollers, a circumferential speed of the godet rollers forming the godet roller group is set to a threading speed lower than the circumferential speed in a winding period, and is increased to a winding speed after the threading on the godet rollers is completed and before winding of the yarns through a threading on the bobbins is started. A circumferential speed of the bobbins is increased to the winding speed before the winding of the yarns through the threading on the bobbins is started.

**[0011]** A take-up apparatus according to a second aspect of the present invention is the take-up apparatus according to the first aspect of the present invention in which the godet roller group may include a first godet roller on which the yarns are first wrapped; and a second godet roller on which the yarns are wrapped after the yarns are wrapped around the first godet roller. While a yarn threading operation is performed on the second godet roller, the second godet roller may be at a threading position close to a position of the first godet roller, and the second godet roller may move to a winding position after the yarn threading operation on the second godet roller is completed and before the winding of the yarns through the threading on the bobbins is started.

**[0012]** A take-up apparatus according to a third aspect of the present invention is the take-up apparatus according to the second aspect of the present invention in which a circumferential speed of the first godet roller and the second godet roller may be increased from the threading speed to the winding speed as the second godet roller moves from the threading position to the winding position.

**[0013]** A take-up apparatus according to a fourth aspect of the present invention is the take-up apparatus according to any one of the first to third aspects of the present invention in which the threading speed may not be higher than 2300 m/min.

**[0014]** A take-up apparatus according to a fifth aspect of the present invention is the take-up apparatus according to any one of the first to fourth aspects of the present invention in which the threading speed may not be lower than 50% of the winding speed.

#### [EFFECTS OF THE INVENTION]

**[0015]** The embodiments of the present invention provide the following advantageous effects.

**[0016]** According to the first aspect of the present invention, while the yarn threading operation is performed on godet rollers, the circumferential speed of the godet rollers forming the godet roller group is set to the threading speed lower than the circumferential speed in a winding period, and is increased to a winding speed after the threading on the godet rollers is completed and before the winding of the yarns through the threading on the bobbins is started. The circumferential speed of the bobbins is increased to the winding speed before the winding of the yarns through the threading on the bobbins is started. Thus, in the take-up apparatus, while the yarn threading operation is performed on the godet roller, the friction between the godet roller and the yarns is low, and thus the static electricity is less likely to be produced. Thus, the filaments forming the yarns can be prevented from being wound around the godet rollers. Moreover no waste yarns are wound around the bobbins.

**[0017]** According to the second aspect of the present invention, while the yarn threading operation is performed on the second godet roller, the second godet roller is at the threading position close to the position of the first

godet roller. The second godet roller moves to the winding position after the threading on the second godet roller is completed and before the winding of the yarns through the threading on the bobbins is started. Accordingly, in the take-up apparatus, while the yarn threading operation is performed on the second godet roller, the first godet roller and the second godet roller are close to each other, and thus the operator can readily carry out the yarn threading operation.

**[0018]** According to the third aspect of the present invention, the circumferential speed of the first godet roller and the second godet roller is increased from the threading speed to the winding speed along with the movement of the second godet roller from the threading position to the winding position. Thus, in the take-up apparatus, the operation of moving the second godet roller to the winding position is combined with the operation of increasing the circumferential speed of the first godet roller and the second godet roller to the winding speed. Thus, the procedure is simplified for the operator.

**[0019]** According to the fourth aspect of the present invention, the threading speed is not higher than 2300 m/min. Thus, in the take-up apparatus, the friction between each of the godet rollers and the yarns can be made low, and thus the static electricity is less likely to be produced. Accordingly, the filaments forming the yarns can be prevented from being wound around the godet rollers.

**[0020]** According to the fifth aspect of the present invention, the threading speed is not lower than 50% of the winding speed. Thus, the circumferential speed of the godet rollers can promptly reach the winding speed after the threading on the godet rollers are completed. Thus, the amount of yarns sucked by the suction gun and wasted can be reduced.

#### [BRIEF DESCRIPTION OF THE DRAWINGS]

##### [0021]

[FIG. 1] FIG. 1 is a diagram showing an entire configuration of a take-up apparatus 100.

[FIG. 2] FIG. 2 is a diagram illustrating a threading in the take-up apparatus 100.

[FIG. 3] FIG. 3 is a diagram showing how a second godet roller 22 moves to a winding position W.

[FIG. 4] FIG. 4 is a graph illustrating how the circumferential speed of a first godet roller 21 and the second godet roller 22 changes over time and how the circumferential speed of a bobbins B changes over time.

[FIG. 5] FIG. 5 is a diagram illustrating a state where filaments F are wound around a godet roller G in a conventional technique.

#### [BEST MODE FOR CARRYING OUT THE INVENTION]

**[0022]** First, a take-up apparatus 100 according an em-

bodiment of the present invention will be described.

**[0023]** FIG. 1 is a diagram showing an entire configuration of a take-up apparatus 100. In general, a take-up apparatus is either a facility that produces fully drawn yarns (FDY) by fully drawing the yarns Y or a facility that produces partially oriented yarns (POY) by partially drawing the yarns Y. The take-up apparatus 100 according to the embodiment of the present invention is the facility that produces the partially oriented yarns (POY).

**[0024]** The take-up apparatus 100 combines spun filaments F into yarns Y and winds the yarns Y to form packages P. The take-up apparatus 100 mainly includes a melt spinning machine 10, a godet roller group 20, a take-up winder 30, and an elevator 40.

**[0025]** The melt spinning machine 10 can spin a plurality of filaments F. An extruder (not shown) melts a synthetic raw material (raw material of the filaments) put into the melt spinning machine 10 and forces the raw material with pressure to be spun through a plurality of spinnerets provided on a melt spinning head (not shown). The plurality of filaments F spun from the melt spinning machine 10 are guided toward the lower direction of the melt spinning machine 10.

**[0026]** The plurality of filaments F spun from the melt spinning machine 10 are combined into groups each including a predetermined number of filaments F to form a plurality of yarns Y. The yarns Y made by combining filaments F are guided by the godet roller group 20 via an oiling device 51. To be more specific, the yarns Y made by combining the filaments F are provided with oil from the oiling device 51 and then are guided by a first godet roller 21 forming the godet roller group 20.

**[0027]** The godet roller group 20 can feed the yarns made by combining the filaments F. To be more specific, the first godet roller 21 and a second godet roller 22 forming the godet roller group 20 rotate with the yarns Y wrapped around, and thus can feed the yarns Y.

**[0028]** The first godet roller 21 is a rotating member that draws out the filaments F from the melt spinning machine 10 and feeds the yarn Y made by combining the filaments F in a predetermined direction. The first godet roller 21 is formed to have an approximately cylindrical shape. The yarns Y guided via the oiling device 51 are wrapped around on the first godet roller 21. The first godet roller 21 rotates with the yarns Y wrapped around, and thus can feed the yarns Y to the second godet roller 22.

**[0029]** The second godet roller 22 is a rotating member that feeds the yarns Y fed by the first godet roller 21 in a predetermined direction. The second godet roller 22 is formed to have an approximately cylindrical shape. The yarns Y fed by the first godet roller 21 are wrapped around the second godet roller 22. The second godet roller 22 rotates with the yarns Y wrapped around, and thus can feed the yarns Y to the take-up winder 30.

**[0030]** The take-up winder 30 can wind the yarns Y fed from the godet roller group 20 around bobbins B. A plurality of the bobbins B are mounted in a bobbin holder 31 of the take-up winder 30 (see FIG. 2). As the bobbin hold-

er 31 rotate, the bobbins B integrally rotate with the bobbin holder 31. Thus, the take-up winder 30 can simultaneously wind the plurality of yarns Y, and thus can form the packages P on respective bobbins B.

**[0031]** The elevator 40 can move the second godet roller 22 from a threading position S to a winding position W (see FIG. 3). The elevator 40 includes a main body 41 having a rail attached on one side, a first godet unit 42 to which the first godet roller 21 and the like is attached, and a second godet unit 43 to which the second godet roller 22 and the like is attached. As the second godet unit 43 moves along the rail of the main body 41, the elevator 40 can move the second godet roller 22 from the threading position S to the winding position W.

**[0032]** The threading position S is right above the working surface (front surface) side of the take-up winder 30 and adjacent to the first godet roller 21 (see FIGs. 2 and 3). Accordingly, the second godet roller 22 is at the threading position S, and thus the threading by the operator is facilitated.

**[0033]** The winding position W is at an upper portion above the threading position S and is determined in such a manner that the bending angle  $\theta$  of the yarns on a traverse fulcrum guide 52 does not exceed an upper limit bending angle (e. g., 15°) (see FIGs. 1 and 3). Accordingly, when the second godet roller 22 is at the winding position W, the friction between the yarns Y and a traverse fulcrum guide 52 is reduced, and thus the deterioration of the quality of the yarns Y can be prevented.

**[0034]** Next, a preparation before the packages P are started to be formed will be described in detail.

**[0035]** FIG. 2 is a diagram illustrating the threading in the take-up apparatus 100. FIG. 3 is a diagram illustrating how the second godet roller 22 moves to the winding position W. Arrows in the diagram indicate the feeding direction of the filaments F and the yarns Y and the movement direction of the second godet roller 22. FIG. 4 is a graph illustrating how the circumferential speed of the first godet roller 21 and the second godet roller 22 changes over time and how the circumferential speed of the bobbins B changes over time. A solid line in the diagram indicates how the circumferential speed of the first godet roller 21 and the second godet roller 22 changes over time, and a dashed line in the diagram indicates how the circumferential speed of the bobbins B changes over time.

**[0036]** As described above, in the take-up apparatus 100, the threading needs to be carried out as the preparation before the packages P are started to be formed. To be more specific, in the take-up apparatus 100, an operator has to carry out the threading, as the preparation before the packages P are started to be formed, by operating a suction gun SG to so that the yarns Y are wrapped around the godet rollers 21, 22 and the traverse fulcrum guide 52. The suction gun SG is a yarn holding device that can be freely operated by the operator. The suction gun SG sucks the air and thus can suck and hold the yarns Y.

**[0037]** First, the operator operates the suction gun SG so that the yarns Y are wrapped around the first godet roller 21. At this time, the yarns Y are wrapped in such a manner that the feeding direction of the yarns Y complies with the rotational direction of the first godet roller 21.

**[0038]** Next, the operator operates the suction gun SG so that the yarns Y are wrapped around the second godet roller 22. At this time, the yarns Y are wrapped in such a manner that the feeding direction of the yarns Y complies with the rotational direction of the second godet roller 22. At this point, the second godet roller 22 is at the threading position S.

**[0039]** As illustrated in FIG. 4, the circumferential speed of the first godet roller 21 and the second godet roller 22 is limited to a threading speed Vs (see the solid line in the diagram) while the yarn threading operation is performed on the first godet roller 21 and the second godet roller 22 (threading period Rs of the first godet roller 21 and the second godet roller 22). This prevents the filaments F forming the yarns Y from being wound around the first godet roller 21 and the second godet roller 22 when the yarns Y are wrapped around the first godet roller 21 and the second godet roller 22 by the operator. This effect is considered to be obtained because, since the circumferential speed of the first godet roller 21 and the second godet roller 22 is limited to the threading speed Vs, the friction between each of the first godet roller 21 and the second godet roller 22 and the yarns Y sucked by the suction gun SG is reduced, and thus the static electricity is less likely to be produced.

**[0040]** Next, the operator has to operate the suction gun SG and a separator not shown so that the yarns Y are wrapped around the bobbins B. The operator moves the second godet roller 22 from the threading position S to the winding position W before the yarns Y are wrapped around the bobbins B. In the take-up apparatus 100, the second godet roller 22 moves from the threading position S to the winding position W when the operator presses an instruction switch (not shown).

**[0041]** Thus, while a yarn threading operation is performed on the second godet roller 22, the second godet roller 22 is at the threading position S close to the position of the first godet roller 21. The second godet roller 22 moves to the winding position W after the threading on the second godet roller 22 is completed and before the winding of the yarn Y through the threading on the bobbin B is started. Accordingly, in the take-up apparatus 100, while the yarn threading operation is performed on the second godet roller 22, the first godet roller 21 and the second godet roller 22 are close to each other, and thus the operator can readily carry out the threading on the first godet roller 21 and the second godet roller 22.

**[0042]** As illustrated in FIG. 4, the circumferential speed of the first godet roller 21 and the second godet roller 22 is set to a winding speed Vw (see the solid line in the diagram) while the packages P are formed (winding period Pw). Accordingly, in the take-up apparatus 100, the circumferential speed of the first godet roller 21 and

the second godet roller 22 increases along with the movement of the second godet roller 22.

**[0043]** Thus, the circumferential speed of the first godet roller 21 and the second godet roller 22 increases from the threading speed Vs to the winding speed Vw along with the movement of the second godet roller 22 from the threading position S to the winding position W. Thus, in the take-up apparatus 100, the operation of moving the second godet roller 22 to the winding position W is combined with the operation of increasing the circumferential speed of the first godet roller 21 and the second godet roller 22 to the winding speed Vw. Thus, the procedure is simplified for the operator.

**[0044]** As described above, while the yarn threading operation is performed on the first godet roller 21 and the second godet roller 22, the circumferential speed of the first godet roller 21 and the second godet roller 22 is set to the threading speed Vs lower than the circumferential speed in the winding period Pw, and is increased to the winding speed Vw after the threading on the first godet roller 21 and the second godet roller 22 is completed and before the winding of the yarns Y through the threading on the bobbins B is started. Accordingly, in the take-up apparatus 100, while the yarn threading operation is performed on the first godet roller 21 and the second godet roller 22, the friction between each of the first godet roller 21 and the second godet roller 22 and the yarns Y is reduced, and thus the static electricity is less likely to be produced. Thus, the filaments F forming the yarns Y can be prevented from being wound around the first godet roller 21 and the second godet roller 22.

**[0045]** As illustrated in FIG. 4, when the packages P are formed (winding period Pw), the circumferential speed of the bobbins B is also set to the winding speed Vw (see the solid line in the diagram). Accordingly, in the take-up apparatus 100, the circumferential speed of the bobbin holder 31 is increased.

**[0046]** In the take-up apparatus 100, during, before or after the threading on the first godet roller 21 and the second godet roller 22, and increasing of the circumferential speed of the first godet roller 21 and the second godet roller 22 to the winding speed Vw, the operator presses the instruction switch (not shown) to start the rotation of the bobbin holder 31 of the take-up winder 30, thereby increasing the circumferential speed of the bobbins B to the winding speed Vw.

**[0047]** Then, after the circumferential speed of the bobbins B reaches the winding speed Vw, the winding of the yarns Y through the threading on the bobbins B is started. Thus, the yarns Y having a desired property can be wound around the bobbins B immediately after the winding is started. That is, waste yarns are no longer wound around the bobbins B.

**[0048]** For simplifying the description, the same reference number (Vw) is used for the circumferential speed of the first godet roller 21 and the second godet roller 22 and the circumferential speed of the bobbins B. However, the circumferential speed of the bobbins B is preferably

slightly lower than the circumferential speed of the second godet roller 22 to reduce the stress of the yarns Y. In order to stabilize the tension of the yarns Y during the threading, the circumferential speed of the bobbins B can be slightly higher than the winding speed Vw as long as the yarns wound around the inner layer of the packages P are not disturbed.

**[0049]** Next, other features of the take-up apparatus 100 will be described.

**[0050]** In the take-up apparatus 100, the threading speed Vs is set to be not lower than 50% of the winding speed Vw and not larger than 2300 m/min, and thus is lower and more limited than the production speed of the partially oriented yarns (POY) whose winding speed Vw is within the range between about 2500 m/min to 3500 m/min. The advantage obtained by setting the threading speed Vs to be not lower than 50% of the winding speed Vw and not higher than 2300 m/min will be described later.

**[0051]** In the take-up apparatus 100, the threading speed Vs of the first godet roller 21 and the second godet roller 22 is not lower than 50% of the winding speed Vw, and thus time required for the circumferential speed is increased to reach the winding speed Vw can be shortened. In contrast, with the threading speed Vs of the first godet roller 21 and the second godet roller 22 being lower than 50% of the winding speed Vw, a time required for the circumferential speed of the first godet roller 21 and the second godet roller 22 to reach the winding speed Vw is long. Accordingly, the circumferential speed of the first godet roller 21 and the second godet roller 22 might fail to reach the winding speed Vw, even when the threading on the traverse fulcrum guide 52, yarn traverse guides (not shown) of the take-up winder 30, and the bobbins B has been completed. When this happens, formation of the packages P through the threading on the bobbins B cannot be started until the increase of the circumferential speed of the first godet roller 21 and the second godet roller 22 is completed. The yarns Y are sucked by the suction gun SG during this waiting time, and thus a large amount of the yarns Y is wasted. However, in the take-up apparatus 100, the circumferential speed of the first godet roller 21 and the second godet roller 22 can promptly reach the winding speed Vw after the threading on the first godet roller 21 and the second godet roller 22 is completed. Thus, the amount of yarns Y sucked by the suction gun SG and wasted can be reduced.

**[0052]** Furthermore, in the take-up apparatus 100, the threading speed Vs of the first godet roller 21 and the second godet roller 22 is not higher than 2300 m/min, and thus the friction between each of the first godet roller 21 and the second godet roller 22 and the yarns Y sucked by the suction gun SG can be reduced, and the production of the static electricity can be prevented. This advantageous effect cannot be obtained if the threading speed Vs is higher than 2300 m/min. Thus, in the take-up apparatus 100, while the yarn Y threading operation is performed on the first godet roller 21 and the second godet

roller 22, the friction between each of the first godet roller 21 and the second godet roller 22 and the yarns Y can be made low, and thus the static electricity is less likely to be produced. Accordingly, the filaments F forming the yarns Y can be prevented from being wound around the first godet roller 21 and the second godet roller 22.

[Description of the Reference Numeral]

**[0053]**

10	melt spinning machine
20	godet roller group
21	first godet roller (godet roller)
22	second godet roller (godet roller)
30	take-up winder
31	bobbin holder
40	elevator
41	main body
42	first godet unit
43	second godet unit
100	take-up apparatus
B	bobbin
F	filament
Y	yarn
P	package
SG	suction gun
S	threading position
W	winding position
Rs	threading period
Pw	winding period
Vs	threading speed
Vw	winding speed

### Claims

1. A take-up apparatus comprising:

a melt spinning machine configured to spin filaments;  
a godet roller group configured to feed yarns made by combining the filaments; and  
a take-up winder configured to wind the yarns fed from the godet roller group around bobbins, wherein, while a yarn threading operation is performed on godet rollers, a circumferential speed of the godet rollers forming the godet roller group is set to a threading speed lower than a circumferential speed in a winding period, and is increased to a winding speed after the threading on the godet rollers is completed and before winding of the yarns through a threading on the bobbins is started, and  
wherein a circumferential speed of the bobbins is increased to the winding speed before the winding of the yarns through the threading on the bobbins is started.

2. The take-up apparatus according to claim 1, wherein the godet roller group comprises:

a first godet roller on which the yarns are first wrapped; and 5  
a second godet roller on which the yarns are wrapped after the yarns are wrapped around the first godet roller, and

wherein, while a yarn threading operation is performed on the second godet roller, the second godet roller is at a threading position close to a position of the first godet roller, and the second godet roller moves to a winding position after the threading on the second godet roller is completed and before the winding of the yarns through the threading on the bobbins is started. 10 15

3. The take-up apparatus according to claim 2, wherein circumferential speed of the first godet roller and the second godet roller is increased from the threading speed to the winding speed as the second godet roller moves from the threading position the winding position. 20

4. The take-up apparatus according to any one of claims 1 to 3, wherein the threading speed is not higher than 2300 m/min. 25

5. The take-up apparatus according to any one of claims 1 to 4, wherein the threading speed is not lower than 50% of the winding speed. 30

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Fig. 1

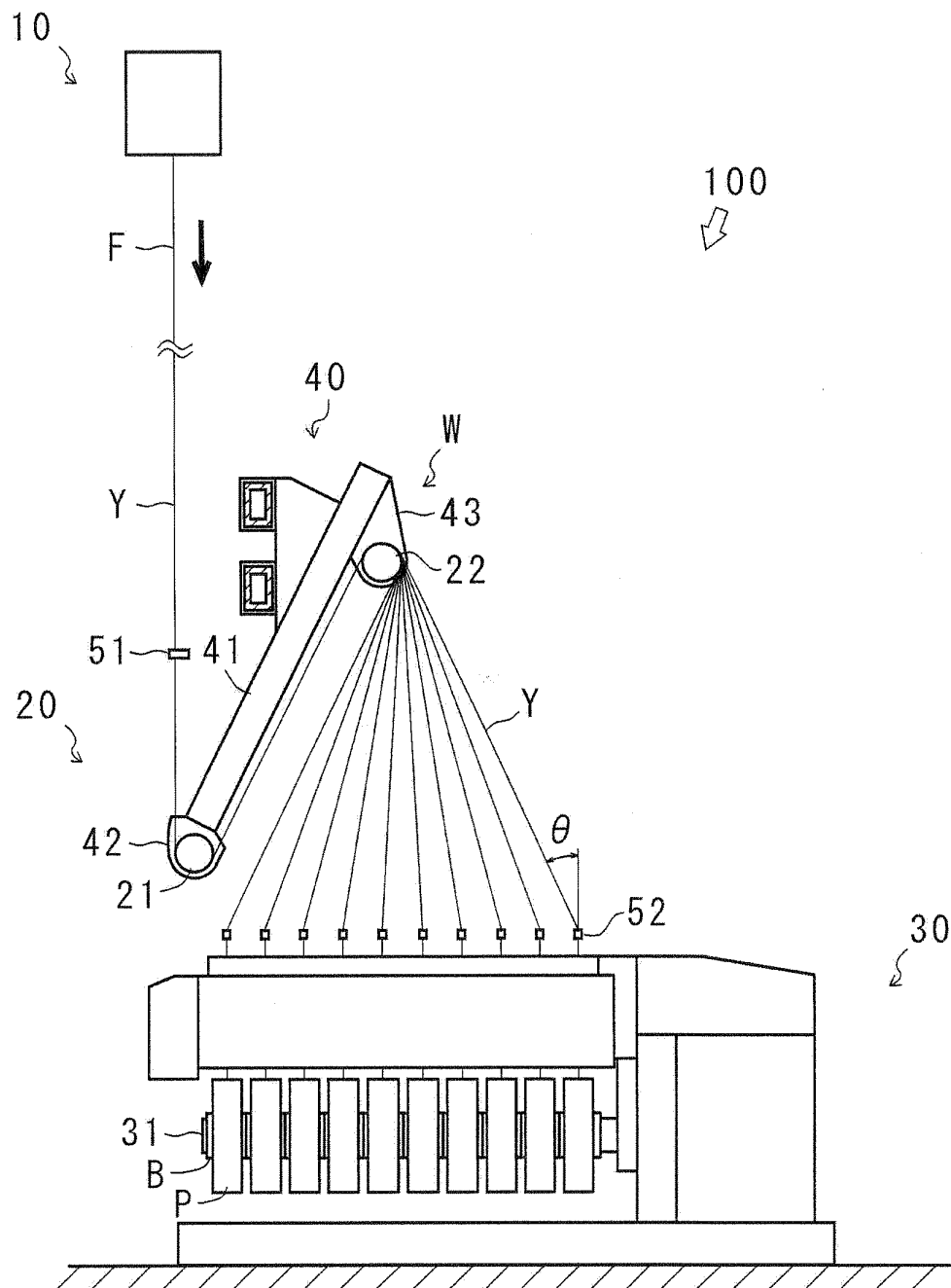




Fig. 2

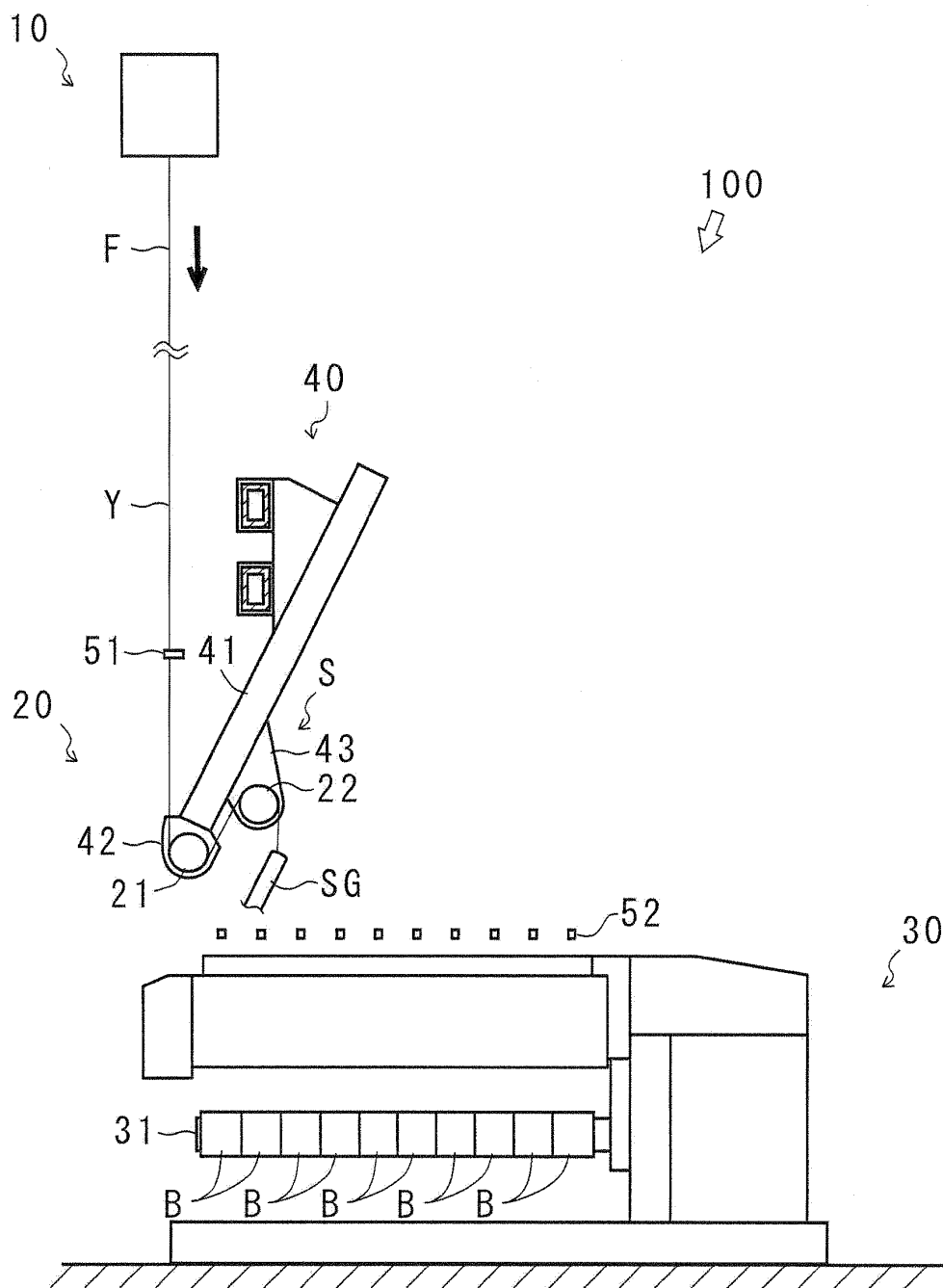


Fig. 3

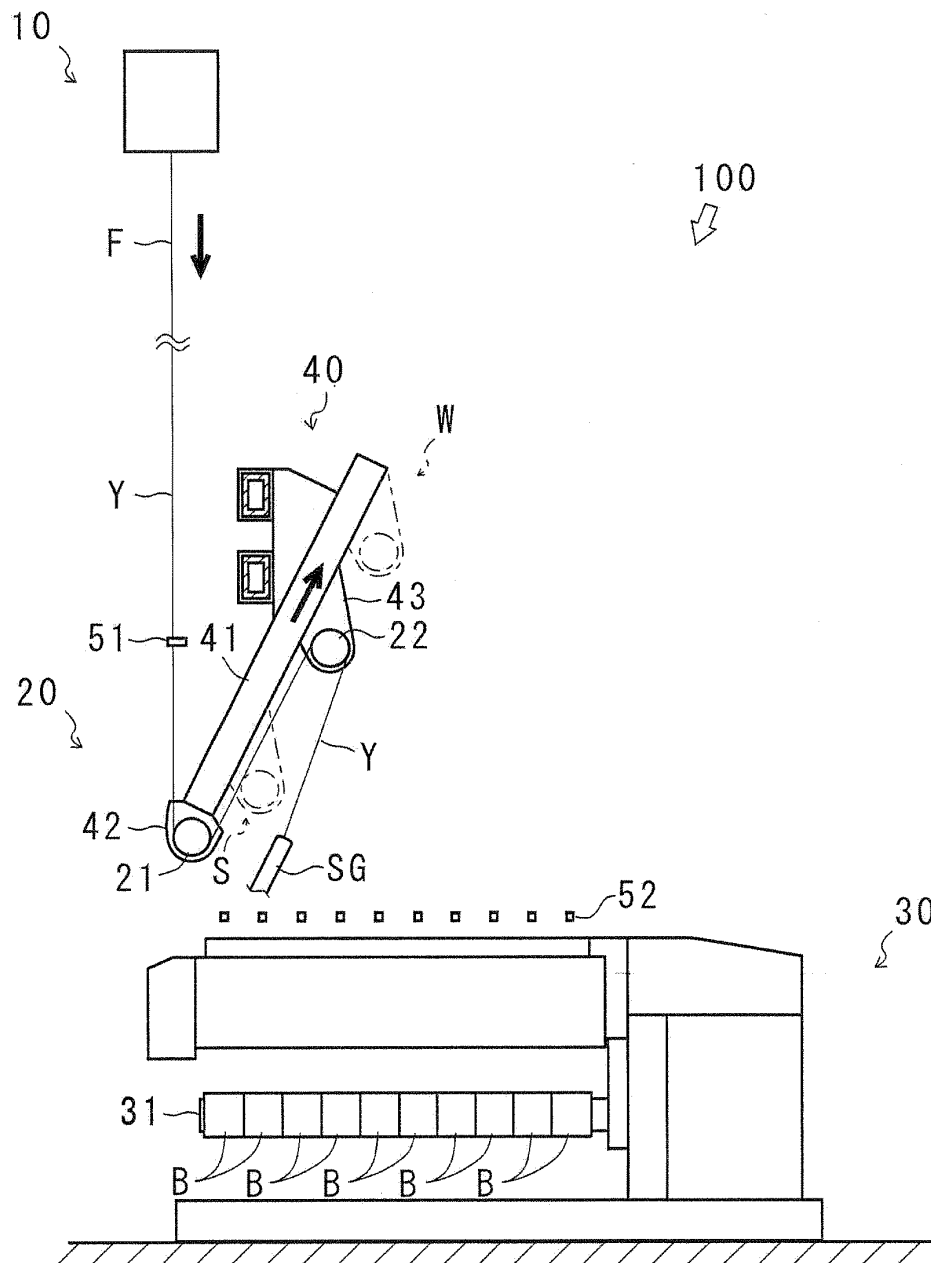


Fig. 4

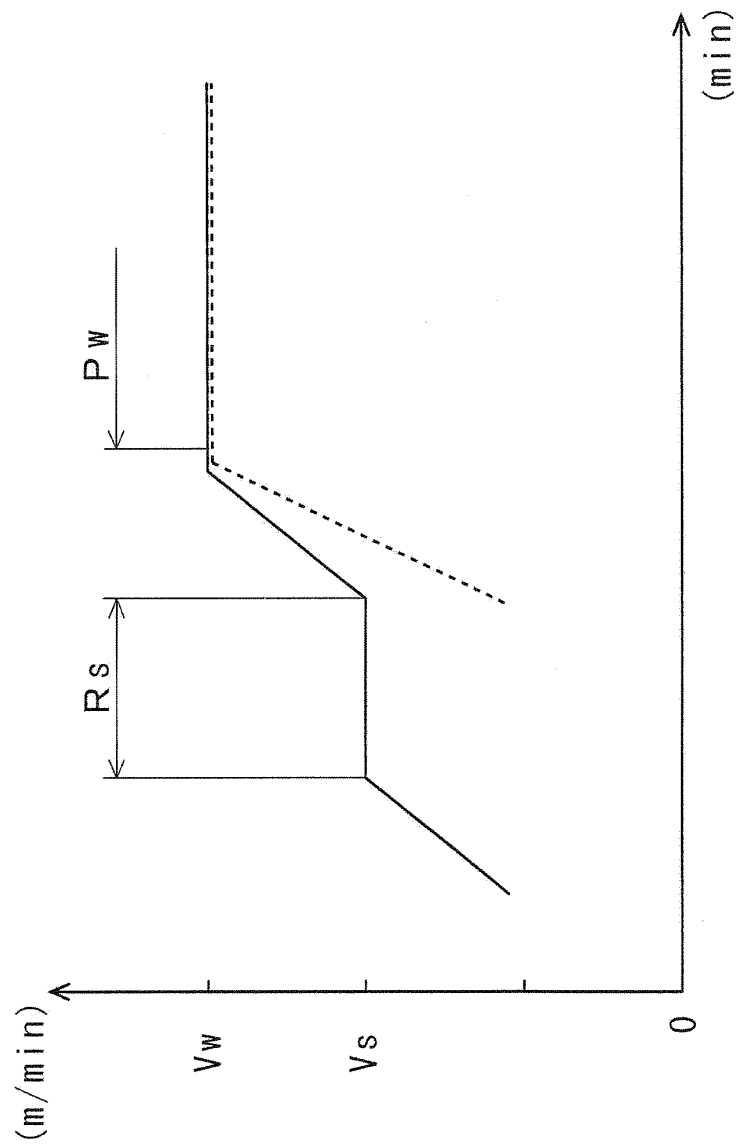
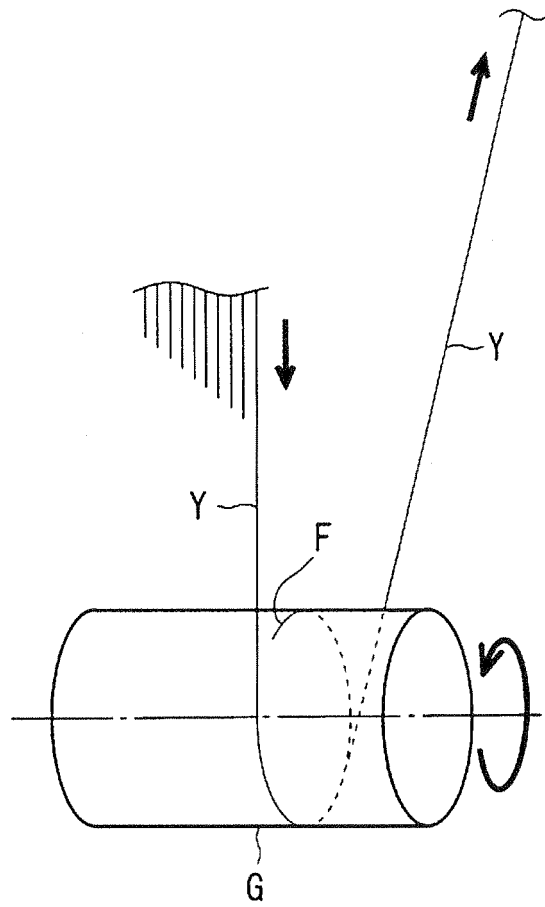


Fig. 5



( Prior Art )

**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.*

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- JP 47035929 A [0007]