APPARATUS FOR WINDING SLIVER AROUND BOBBIN

Shozo Noda, Nishi-ku, Nagoya-shi, Japan, assignor to Howa Kogyo Kabushiki-Kaisha Nishi-Kusagai-gun, Aichi-ken, Japan

Application May 15, 1957, Serial No. 659,274

Claims priority, application Japan May 30, 1956

4 Claims. (Cl. 57—54)

This invention relates generally to yarn spinning and more particularly to an improved sliver twisting apparatus.

In general, a drawing frame is used in conventional cotton type spinning systems for obtaining a sliver composed of substantially parallel fibers which is obtained by feeding the individual slivers, after collecting the ends of said slivers, to a draft assembly and then drafting said slivers to convert them to a uniform sliver.

The uniform sliver obtained as described above is passed through a trumpet, pressed by calendar rollers and then packed in cans through a tubular gear.

When it is desired to spin the above-mentioned sliver directly by use of a ring spinning frame to obtain a yarn, it is necessary to obtain a sliver which is substantially lighter than the sliver of conventional weight. However, when the delivery sliver having conventional grain is made light, the sliver will be irregularly drafted during its drafting process from cans or packing process into cans. In order to minimize the above-mentioned irregular draft and for drafting the sliver the most favourable condition possible, it is necessary to give a slight twist to the delivery sliver, as for example, 0.5 to 1.0 turns per inch.

The above-mentioned requirement may be effectively satisfied by an apparatus capable of winding the drawn sliver around a bobbin while twisting the sliver. In practice, however, when such an apparatus is used, the replacement of a filled bobbin by another one is made very difficult, because the removal and the insertion of the bobbins are impeded by the sliver twisting device.

A principal object of this invention is to provide a mechanism which makes the exchange of any empty bobbin for a filled bobbin very easy without being disturbed by any other device.

The construction and operations, together with other objects and advantages of this invention may best be understood by reference to the following description, taken in conjunction with the accompanying drawings, in which the same parts are indicated by the same numerals and in which:

Fig. 1 is a schematic side elevation view of a winding system to which an apparatus according to the invention is applied.

Fig. 2 is a fragmentary sectional side view of a portion of the apparatus in Fig. 1.

Figs. 3, 4 and 5 are respectively, schematic side views of three different positions of the bobbin portion of the apparatus in Fig. 1.

Fig. 6 is a sectional side view of a mechanism of this invention for effecting the exchange of the bobbins.

Fig. 7 is an enlarged fragmentary view of a pivotal portion of the mechanism in Fig. 6.

Fig. 8 is an enlarged perspective view of the leg and guide of the flyer in Fig. 1.

Referring to Figs. 1 and 2, a string of sliver 2 is drawn out from each of several cans 1 which are arranged at the back of a drawing frame A. The slivers drawn out of the cans are collected and then passed through a draft assembly 3 so as to be drafted to obtain slivers having required grains. The drafted slivers are passed through a trumpet 4 and then condensed in a pair of calender rollers 5 to form a uniform sliver 6, as in the case of conventional cotton type drawing frames.

In the drawing frame, the sliver 6 drawn out from the calender rollers 5 is passed through the center hole 11a of a flyer top 11, the hole of a hollow leg 12 of a flyer 10, and over a member 13 and then wound on a driven bobbin 14 which is arranged concentric with the flyer 10 so as to be rotated at a suitable speed. The top 11 is journaled on the top of the flyer 10 and is driven by a flyer driving shaft 7 through helical gears 8 and 9.

The details of hollow leg 12 and guide member 13 are clearly shown in Fig. 8.

The relative position and relative rotation between the bobbin 14 and the flyer 10 are entirely the same as those of the flyer frames in which conventional cone drums are used, but in the conventional case, there is a spindle which is positioned so as to pass through the center hole of the bobbin, and which supports and rotates the flyer. In the drawing frame according to the invention, however, the flyer 10 is supported by the bearings 15 and 15a arranged at the top of the flyer and the flyer driving shaft 10a is not elongated to extend into the center hole of the bobbin 14. The bobbin 14 is so arranged that it may be transferred up and down by a bobbin rail 23 while being rotated by a bobbin driving shaft 16 supported on said rail 23. This rail 23 is supported by a device 36 which in turn is engaged with a guide slot 35 so as to be slidably up and down along the slot 35 by a chain 34 driven by a pulley 34. The pulley 34 is driven by a cone drum 33 through a suitable coupling device such as belt or link mechanism not shown in the drawing.

The drum 33 is driven, through a belt 33b by another cone drum 33a which in turn is driven by a suitable driving means not shown in the drawing. The full mechanism including the drums 33, 33a and the pulley 34 for driving the device 36 and the shaft 16 is omitted in order to simplify the drawing, because any suitable conventional drive mechanism which has been used on conventional flyer frames may be used as said drive mechanism. In the drawing, a member B is the beam composing the main body of the machine at a position between both side frames.

According to the illustration in Figs. 1 and 2, a desired twist will be given to the sliver 6 at the portion thereof between the calender rollers 5 and the flyer top 11. The length of the sliver portion twisted is about 8" at the shortest in the conventional flyer frame. In the illustration in Figs. 1 and 2, however, the length of the twisted part of sliver 6 is but a fraction of the distance between the calender rollers 5 and the flyer top 11 and it is possible to make the length of the twisted part shorter than 4".

In general, the sliver 6 is in a relatively stable state after twisting thereof, but irregular drafting of the sliver is liable to occur during the twisting process due to oscillation of the sliver 6 caused by rotation of the flyer 10. Furthermore, when the length of the sliver 6 under twisting is too long, the twist concentrates at the light portion of the sliver 6, which results in a twisting that is not uniform. Therefore, when the sliver 6 is shortened as described above, all portions of the sliver can be uniformly and effectively twisted, whereby the quality of the twisted sliver 6 can be greatly improved. Such a characteristic cannot be obtained in the conventional drawing frame and flyer frame, but it is readily obtained by the illustration in Figs. 1 and 2.

According to such an arrangement of the bobbin and the flyer as illustrated in Figs. 1 and 2, detachment of the
flyer positioned just above the bobbin which should be moved up and down would normally be very difficult. Therefore, for taking out the bobbing, any space suitable for picking up the bobbin from the stationary spindle is necessarily formed between the top of the stationary spindle and the lower part of the flyer. For obtaining said space, downward shifting of the bobbin rail would be necessary. Such an arrangement would reduce the practical value of the device.

According to this invention, the above-mentioned disadvantage is avoided by constructing the mechanism for supporting the bobbin so as to make any sideward inclination of the bobbin possible without necessitating the shifting or removal of the bobbin driving device to replace the lifting distance with an empty bobbin. Such an illustrative mechanism is shown in Figs. 3, 7, in which the bobbin 14 is supported so as to be rotated by a bobbin wheel 19 which in turn is driven by a bobbin shaft 16 through helical gears 17 and 18. The bobbin wheel 19 is supported by a stationary collar 20 and centrally in the collar 20 is arranged a nonrotatable spindle 21. On the top of the spindle 21 is disposed a spindle cap 22. The bottom of the bobbin 14 is formed so that it may engage with an upper flange of the bobbin wheel 19.

According to the construction in Figs. 3, 7, it is possible to take out the bobbin from the spindle 21 without being impeded by the existence of the bobbin, so that in the bobbin operating, bobbin exchange can be performed by merely slanting or pivoting the bobbin and the stationary spindle 21 at an angle, for example, about 16°, without varying the position of the bobbin wheel 19. The slanting operation can be effectively carried out by the construction as will be described later in connection with Fig. 7. Accordingly, the bobbin 14 can be exchanged in all cases without particular lowering of the bobbin rail 23. According to the above-mentioned construction, besides the advantage of ease of exchange of the bobbin, it is possible to take out the bobbin more than sixteen inches without having the draft assembly positioned on a level higher than the floor. Accordingly, when the distance between the bottom of the flyer and the floor is, for example, forty inches, a bobbin having the length of 17½” can be used as the bobbin for the movement of sixteen inches. In the conventional flyer frame, however, even when the above-mentioned distance is forty-four inches and the bobbin for the movement of eleven inches is adopted, only a bobbin length of 12½” can be used. This invention has a further characteristic in that a large package suitable for the movement of sixteen inches has now become possible. Heretofore, it has not been possible to have such a large package in the conventional systems.

According to this invention, a particular construction for the inclination of the stationary spindle is proposed. Such a construction is shown in Figs. 6 and 7, in which a jaw 24 is provided at the top of the collar 20 and a slot 25 is cut out of a part of said jaw. The stationary spindle 21 is provided with an expanded, disc-shaped lower end 27 having a spherical periphery and an upper surface 28 of the end 27 abuts with an underside surface of said jaw 24. Furthermore, the stationary spindle 21 is provided with a pin 29 which can be engaged with the slot 25 when the spindle 21 is disposed vertically. The surfaces 26 and 28 are held in close contact by the spring force of a spring 32 through a pushing piece 31 which pushes an under surface 30 of the end 27, whereas the stationary spindle 21 is capable of being lowered by gravity. However, in the downward movement of said spindle, the pin 29 engages the slot 25, so that the spindle is moved toward the left. In this case, the bobbin 14 supported by the spindle 21 moves in the same direction. Accordingly, it is possible to remove the bobbin from the spindle 21 without being impeded by the existence of other devices as shown in Fig. 5.

Once the spindle 21 is in the position shown in Fig. 6 and the filled bobbin is removed an empty bobbin can be easily inserted on the spindle. After insertion of the empty bobbin, the spindle 21 the spring 32 is then compressed against rotation of the cam 37 to the position shown in Fig. 6, the spindle 21 and empty bobbin are raised to a vertical position and in their normal upright position suitable for winding the sliver.

While particular embodiments of this invention have been described and shown, it will, of course, be understood that the invention is not limited thereto, since many modifications may be made within the spirit and scope of this invention.

1. In a drawing flyer frame comprising a draft assembly, a trumpet, calendar rollers, a flyer device having a driven top portion, a bobbin drive mechanism arranged under the flyer, inclined means operably associated with said bobbin drive mechanism and inclined independently thereof for releasably supporting a bobbin so that it may be inclined independently of said drive mechanism thereby making it possible to replace a filled bobbin with an empty bobbin without necessitating the shifting or removal of the bobbin drive mechanism and without interference with the flyer device, said inclined means comprising a bobbin supporting spindle movable between an upstanding position and a position inclined relative to the upstanding position, means to selectively position the spindle in both positions.

2. In a drawing flyer frame comprising a draft assembly, a trumpet, calendar rollers, a flyer device having a driven top portion, a bobbin drive mechanism arranged under the flyer, inclined means operably associated with said bobbin driven mechanism and inclined independently thereof for releasably supporting a bobbin so that it may be inclined laterally independently of said driven mechanism thereby making it possible to replace a filled bobbin thereon with an empty bobbin without necessitating the shifting or removal of the bobbin driven mechanism and without interference with the flyer device, said inclined means comprising a bobbin wheel, a jaw portion provided on the upper part of said support collar, a spindle disposed centrally in said collar and extending axially thereof for insertion of a bobbin thereon having an expanded disc-shaped lower end provided with a spherical periphery, the spindle being movable between an upstanding position and an inclined position, a spring in said bobbin wheel movable to a position for lowering the spindle and to a raised position for biasing said lower end upwardly so as to cause an upper face of said disc-shaped lower end to engage an under surface of said jaw thereby holding the spindle in said upstanding position, the spindle having a radial pin projecting from a lower portion thereof, said collar having a slot on the upper end thereof for releasably receiving said pin when the spindle is lowered, and a device for selectively raising and compressing said spring to apply pressure to said lower end of the spindle and for lowering said spring to allow the spindle to move downwardly, whereby when the spindle moves downwardly, said projecting pin engages the slot in said collar and the spindle is deflected laterally to a predetermined angle thereby positioning a bobbin thereon at an angle clear of said flyer for easy removal of a filled bobbin and insertion of an empty bobbin thereon.

3. In a drawing flyer frame comprising a draft assembly, a trumpet, calendar rollers, a flyer device having a driven top portion, a bobbin drive mechanism arranged under the flyer, inclined means operably associated with said bobbin drive mechanism and inclined independently thereof for releasably supporting a bobbin.
so that it may be inclined laterally independently of said drive mechanism thereby making it possible to replace a filled bobbin thereon with an empty bobbin without necessitating the shifting or removal of the bobbin drive mechanism and without interference with the flyer device, said inclinable means comprising a bobbin wheel, a cylindrical collar for supporting said bobbin wheel, a jaw portion provided on the upper part of said support collar, a spindle disposed centrally in said collar and extending axially thereof for insertion of a bobbin thereon and having an expanded disc-shaped lower end provided with a spherical periphery, the spindle being movable between an upstanding position and an inclined position, a spring in said bobbin wheel movable to a position for inclinably lowering the spindle and to a raised position for biasing said lower end upwardly so as to cause an upper face of said disc-shaped lower end to engage an under surface of said jaw thereby holding the spindle in said upstanding position, the spindle having a radial pin projecting from a lower portion thereof, said collar having a slot on the upper end thereof for releasably receiving said pin when the spindle is lowered, means for selectively raising and compressing said spring to apply pressure to said lower end of the spindle and for lowering said spring to allow the spindle to move downwardly, whereby when the spindle moves downwardly, said projecting pin engages the slot in said collar and the spindle is deflected laterally to a predetermined angle thereby positioning a bobbin thereon at an angle and clear of said flyer for easy removal of a filled bobbin and insertion of an empty bobbin thereon, means for driving said bobbin drive mechanism at a selected speed relative to the speed at which said flyer top portion is driven, means for raising and lowering said inclinable means for winding the roving on a bobbin thereon in cooperation with said flyer device.

4. In a drawing flyer frame comprising a draft assembly, a trumpet, calender rollers, an apparatus comprising a flyer having a driven top portion, a bobbin cooperative with said flyer, a bobbin driving mechanism arranged under the flyer, a mechanism supporting the bobbin constructed to allow sideward inclination of said bobbin possible without necessitating the shifting or removal of the bobbin driving device to exchange the bobbin, said bobbin driving mechanism being arranged in position under the flyer to rotate it at a speed relative to that of the flyer, said bobbin driving mechanism including means to vary the speed of said mechanism positively in relation to layers of roving wound around the bobbin, and means on said mechanism to move it up and down so as to wind the roving on the bobbin.

References Cited in the file of this patent

UNITED STATES PATENTS

1,912,072 Fraser et al. ------------- May 30, 1933
2,068,815 Arano-Pratmarso ------- Jan. 26, 1937
2,232,490 Prince-Smith ------------ Feb. 18, 1941
2,710,428 Nutter et al. ----------- June 14, 1955

FOREIGN PATENTS

455,565 Germany -------------- Feb. 3, 1928