MECHANISM FOR WITHDRAWING AND WINDING YARN IN SPINNING UNITS

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ABSTRACT
An open end spinning machine including a yarn winding apparatus having a driven rotatable drum, a bobbin mounting frame movable toward and away from the drum so that the bobbin may be selectively driven and undriven. In accordance with the invention there is provided means, shown as hand operated, for raising the bobbin from the drum, and means for adjustably retaining the frame and bobbin in elevated position, preferably with the surface of the bobbin spaced only a small distance above the peripheral surface of the drum. Means, here shown as foot operated, is provided for releasing the frame, when desired, whereby it is lowered so that the bobbin again rest upon and is driven by the drum.

11 Claims, 7 Drawing Figures
MECHANISM FOR WITHDRAWING AND WINDING YARN IN SPINNING UNITS

The present invention relates to a device for controlling take-up bobbins in open end spinning machines. The control device of the invention is particularly useful with spinning machines of the pressure spinning chamber type, although it is obviously not limited thereto.

Spinning machines of the type mentioned above usually process slivers deposited in spinning cans, or manufacture fine yarns from a thin sliver or a thick roving. The final product, i.e., the yarn thus manufactured, is usually wound on to cylindrical or conical bobbins in a manner similar to that in winding machines. The dimensions of these bobbins depend on the construction of the take-up mechanism and, if said dimensions are satisfactory, the thus wound bobbins can be used directly during further processing. Modern winding machines, however, are also provided with yarn clearers which remove yarn slubs as well as other defects which are undesirable in the further processing of the yarn, e.g., by weaving or knitting. As far as cleanliness of yarn is concerned, yarns produced in open end spinning machines usually show good properties from that viewpoint; however, the occurrence of slubs such as knots due to the manual removing of yarn breakage is not eliminated.

In presently known machines the take-up bobbins may be mounted either in the upper or in the lower part of the machine. The bobbin is rotatably driven either by means of a continuous take-up cylinder and independent yarn distributors, or directly by a winding drum. Upon removing yarn breakage, the bobbin holder is swung by the attendant from the take-up cylinder or the winding drum into a fixed rest position and the yarn end from the wound bobbin is then introduced into the spinning unit. The attendant must react immediately, after the catching-up of the yarn end in the spinning unit, to drive the take-up bobbin by bringing it into contact with the take-up cylinder or the winding drum. The path along which the take-up bobbin has to be swung from its rest to its operative position is rather long, particularly when the diameter of the take-up bobbin is small, thus causing a yarn end which is too long to be introduced into the spinning chamber, and thereby subjecting such end to too long a spinning. The elements needed for this operation are also inconveniently positioned, so that the attendant's reaction is unduly delayed. This causes, in turn, a longer time than should be necessary for removing the yarn breakage, and results in a lower quality of the manufactured yarn.

The device according to the present invention has the purpose to mitigate the disadvantages mentioned above, particularly by accelerating the removal of yarn breakage and thus simultaneously improving the quality of the manufactured yarn.

The advantages of the device according to the present invention are of simple construction, is reliable in its operation, and substantially improves the performance of the attendant when removing yarn breakage. The last result is achieved by enabling the attendant to lift the wound bobbin at any winding diameter for only the minimum distance which is necessary to disengage the bobbin from the driving cylinder or the winding drum, and to drop said bobbin, upon removing yarn breakage, immediately into its working position in driving engagement with the cylinder or drum. In the device according to the present invention, the bobbin holder is connected by means of a connecting element with a control mechanism which selectively secures the bobbin holder in a swung-out position, the control mechanism being provided with a releasing lever for returning the bobbin holder with the winding into the working position.

Further features of the device according to the present invention and its various embodiments are specified in the following description and shown in the accompanying drawings, of which

FIG. 1 is a schematic view, partially in elevation and partially in vertical section of an arrangement of the device according to the present invention in a first embodiment of spinning machine;

FIG. 2 is a similar view of an arrangement of the device according to the present invention on a second embodiment of spinning machine;

FIG. 3 is a view of a first embodiment of the device according to the present invention partially in side elevation and partially in section;

FIG. 4 is a detailed view of a modification of the embodiment as shown in FIG. 3, the view being partially in side elevation and partially in section;

FIG. 5 is a schematic view of a third embodiment of the device according to the present invention, the view being partially in side elevation and partially in section;

FIG. 6 is a schematic view of the aforementioned embodiment of the device according to the present invention, the view being partially in side elevation and partially in section; and

FIG. 7 is a schematic view of a fifth embodiment of the device according to the present invention, the view being partially in side elevation and partially in section.

Spinning machines of the type mentioned above consist of a plurality of identical spinning units, of which each is provided with the device according to the present invention. It is thus necessary to describe only one spinning unit in each of its modifications shown herein.

In FIG. 1 the control mechanism of the present invention is shown applied to a system wherein yarns 4 are produced from a plurality of slivers 26. Such slivers are withdrawn from a plurality of spinning cans 27 and introduced into spinning units 5 which are of the type having a spinning chamber which operates under pressure. Yarns 4 are delivered from spinning units through tubes shown at the upper ends thereof are pulled upwardly by feeding rolls 9' and are then delivered to a drum or cylinder 3 which drives a bobbin 1 being wound; the drum or cylinder 3 is provided with means (not shown) whereby the yarn is laid upon the bobbin as by being cross-wound thereon. The bobbin 1 is rotatably mounted upon a frame which is shown pivotally mounted at 2a whereby the frame and bobbin may rise as the diameter of the bobbin progressively increases. The bobbin shown at the left rests upon and is driven by the drum 3; the bobbin 1a at the right is shown as having been lifted by its supporting frame from driving engagement with its cylinder 3, as during the removal of a yarn breakage.

The bobbin-supporting frames are provided with levers or arms 2 at their outer ends whereby the bobbins and frames may be lifted into the position shown at the right. The control device 6, (which is shown more particularly in FIGS. 3 and 4) includes a rod 7 which is pivotally mounted to the bobbin-supporting frame and which maintains the frame and bobbin in their elevated position as shown at the right in FIG. 1. The control device 6 is also provided with a foot operated pedal 8 whereby the rod 7 may be released when desired so that the frame and bobbin may be lowered into operative position.

In FIG. 2 the control mechanism 6 is shown applied to a system wherein yarns 4 are produced from rovings supplied by bobbins 29 positioned above the spinning units 5. As shown, the rovings 28 travel downwardly from their supply bobbins into the spinning units 5, yarns 4 produced therefrom then travelling downwardly and finally upwardly to a bobbin-supporting and driving drum or cylinder 3, as in FIG. 1. The control mechanisms 6 in FIG. 2 have the same relationship with respect to the bobbin-supporting frames and the driving cylinders 3 as in FIG. 1.

In the embodiment of control mechanism 6 shown in FIG. 3, there is employed a stationary yoke 12, mounted on the machine frame and provided with a horizontal pivot pin 11 on which an arm 10 is swingably mounted. The arm 10 has a flange on its upper end, such flange having an opening therethrough receiving the rod 7 which, as we have seen, is pivotally connected to its upper end to the frame which supports bobbin 1. Hanging upon the pivot pin 11 is a generally inverted V-shaped leaf spring 13, one leg of the leaf spring bearing against the stationary yoke 12 and the other bearing against the lower end of the rod 7. The spring 13 constantly urges the part into the position thereof shown in FIG. 3, in
which the rod 7 has a secure clamping engagement with the hole in the flange at the top of member 10. When, however, the member 6 is swung counterclockwise from its position in FIG.3, as by a pedal 8, the rod 7 may be moved freely with respect to the member 10 so that the frame and the bobbin supported thereby may be lowered into its operative position. In FIG.3 the pedal 8 is shown as being about to be moved in the downward position direction S, and the member 10 is shown as about to be swung in the counterclockwise direction S.

The apparatus shown in FIGS. 1, 2 and 3 and above-described functions as follows:

The sliver 26 from the spinning cans 27 (FIG.1) or the roving 28 from bobbins 29 (FIG.2) is fed into the spinning unit 5, which manufactures yarn in a known manner. Yarn discharged from the spinning units 5 is fed upwardly by the cooperating withdrawing rollers 9, 9', the yarn then travelling to the winding cylinder or drum 3 which both support the bobbin and the bobbin-supporting frame and drives the bobbin to take the yarn up thereon. When the bobbin is being driven the control mechanism 6 is in its inoperative position, the weight of the bobbin and frame being sustained, as above explained, by the winding drum 3.

In the case of yarn breakage, the feeding of yarn 4 to the bobbin 1 is interrupted. It is now necessary to remove the yarn breakage. The attendant swings the bobbin-supporting frame with the bobbin thereon upwardly from the winding cylinder or drum 3 for only that distance which is necessary to remove to the periphery of the bobbin from driving contact with the periphery of the drum 3. He does this by grasping the outer ends of the lever or levers 2 of the frame and lifting them upwardly. The control mechanism 3, as we have seen, is an infinitely adjustable gripping means which permits the rod 7 to be freely drawn upwardly against the opposition of spring 13 but prevents the downward travel of the rod unless the control mechanism is released by the pedal 8. After the yarn breakage has been removed and the yarn 4 is again presented to the winding cylinder or drum 3, the attendant steps upon the pedal 8 thereby releasing the control mechanism 6 and permitting the bobbin-supporting frame and the bobbin supported thereon to descend, whereby the bobbin 1 is again driven by the cylinder 3. Normal winding operations then go forward.

In some instances it may be desired to prevent a sudden contact of the take-up bobbin 1 with the winding cylinder or drum 3, particularly when the distance between the periphery of the bobbin such as that shown at 1a at the right of FIG.1 and the surface of the driving drum 3 is appreciable. For this purpose the control mechanism 6 of FIG.3 may be modified to provide means for retarding the downward motion of the rod 7. One such means is shown in FIG.4 wherein the control mechanism is designated 6'. As there shown, a braking roller 14 is mounted on a horizontal pivot pin on the member 10, the roller 14 being in contact with the rear surface of the rod 7 upon the swinging of member 10 outwardly by the pedal 8. Upon such a release of the clamping means in mechanism 6' the roller 14 engages the rod 7 so as to exert a braking action thereon, thereby slowing the descent of the bobbin and its supporting frame.

In FIG.5 there is shown a control mechanism 6a having a toothed segment or bar 7a attached to one or more arms 2 of the bobbin-supporting frame. The radially outer surface of the segment 7a is coaxial of the pivot shaft 2a, and is provided with a plurality of ratchet teeth as shown. The control mechanism 6a is completed by a pawl in the form of a bell crank lever pivoted at its central zone on fixed structure (not shown). The pawl is constantly urged toward engagement with the gear teeth on the segment 7a by a coil compression spring 15. The pawl is lifted from operative engagement with the ratchet teeth by pressing downwardly in the direction S upon a pedal secured to the outer arm 7a of the pawl-carrying member.

In the control mechanism 6b of FIG.6 an arcuate arm 7b is secured to a lever arm 2 of the bobbin-supporting frame. The outer surface of arm 7b is part-circular cylindrical, and is coaxial of the pivot shaft 2a. A selectively movable control mechanism cooperating with the member 7b takes the form of an eccentric 8c which is pivotally mounted upon a pivot pin 17 affixed to fixed frame structure. The eccentric 8c has an arm 8b affixed thereto, the other end of the arm bearing a pedal. The arm is constantly urged in a clockwise direction (FIG.6) by a coil compression spring 16 interacting therewith. The configuration of the eccentric 8c is such that as it is rotated clockwise by the spring 16 a longer radius portion thereby is presented to the rear arcuate surface of member 7b, thereby to clamp it. Upon the depression of the arm 8b in the direction S, the eccentric 8c is released from the rear surface of the member 7b, thereby permitting the bobbin-supporting frame and its bobbin to descend into operative position. It will be seen that a partial release of eccentric 8c by pedal 8b will permit members 8c and 7b to function as a brake, thus permitting the frame and bobbin to be lowered gently.

In FIG.7 there is shown a fluid operated control mechanism 6d. The upper end of the piston rod 7d is pivotally connected to the bobbin-supporting frame, as shown. The lower end of rod 7d carries a piston 18 which reciprocates in a vertically disposed cylinder 19 affixed to fixed frame structure, as shown. The cylinder 19 is disposed within an other larger cylindrical tank 22 which serves as a sump for the system, the sump in this instance containing an hydraulic fluid. The lower end of cylinder 19 is provided with a selectively operated check valve 21 which permits liquid freely to rise from the sump into the cylinder 19 but prevents escape of such liquid from the cylinder unless the check valve 21 is opened. A liquid-throttling sieve or screen 20 is affixed positioned in the lower end of cylinder 19 beneath the piston 18. The check valve 21 is operated by a two-armed lever pivoted to fixed frame structure by a pivot pin 17d. The first of inner arm of such lever underlies the operating stem for the check valve 21, the second outer arm of the lever having a pedal 8d on its outer end. It will be apparent that the check valve 21 is opened when the pedal 8d is depressed, and that the check valve 21 is closed by the light coil spring shown when no pressure is exerted upon the pedal 8d. The depressing of the lever is limited by stop 23 which cooperates therewith in a valve-open position, and with a stop 24 which cooperates therewith in a valve-closed position.

The embodiment of the mechanism 6d shown in FIG.7 operates as follows:

When the bobbin-supporting frame 2 and the bobbin 1 mounted thereon are lifted from operative cooperation with the winding cylinder 3, the piston rod 7d moves upwardly with the frame. Upon the rising of the piston 18, the greater height of liquid in the sump 22 causes the liquid to flow downwardly and then upwardly through the check valve 21, which is then open because the pressure difference overcomes the coil spring, into the cylinder 19. The cylinder 19 underneath the piston 18 is then filled with liquid, which is placed under compression when the attendant releases the arm 2 of the frame, thereby supporting the frame and bobbin above the cylinder 3 in the position shown in FIG.7. Upon the removal of the yarn breakage, the operator then steps upon pedal 8d after having again presented a yarn 4 to the drum 3. The depression of the pedal 8d opens the check valve 21, thereby allowing liquid to flow from the lower end of the cylinder 18 into the sump 22. The frame and bobbin are thus lowered into their operating positions. It will be seen that not only does the screen 20 prevent the intrusion of dirt thereabove into the portion of the cylinder 19 traversed by the piston, but that the screen throttles the downward flow of fluid under pressure from beneath the piston, thereby giving the mechanism 6d a dashpot effect, slowing the descent of the bobbin and the frame toward the cylinder 3.

The mechanism 6d may be modified, should it be desired to employ a gas such as air rather than a liquid therein. If at-
mospheric air is employed the sump 22 can be dispensed with. Upon the raising of the bobbin-supporting frame 2, air from the atmosphere is sucked into the lower end of cylinder 19 through the check valve 21. The check valve 21 closes the lower end of the cylinder after the upward motion of the piston 18 has stopped. The frame and bobbin continue to be supported by the air cylinder 19 until the check valve 21 is opened by the depressing of the pedal 8d. As with liquid, the screen 20 also acts as a metering means for the flow of air therethrough, so that the descent of the frame and bobbin is slowed upon the opening of the valve 21.

Although our invention has been illustrated and described with reference to the preferred embodiments thereof, we wish to have it understood that it is in no way limited to the details of such embodiments but is capable of numerous modifications within the scope of the appended claims.

What is claimed is:

1. In an open end spinning machine including a yarn winding apparatus having a driven rotatable drum, a frame movable toward and away from the drum, means on the frame rotatably mounting a bobbin being wound by surface engagement with the drum as the bobbin is thrust toward the drum, the improvement which comprises means for selectively moving the bobbin continuously and steplessly into a selected position away from the drum to stop the winding operation, means for retaining the frame with the peripheral surface of the bobbin in said selected position spaced from the drum, and means for releasing the last named means so that the frame approaches the drum and carries the bobbin into driving engagement with the drum.

2. Apparatus according to claim 1, wherein the means for selectively moving the bobbin away from the drum is positioned to be operated by the hand of an operator in a normal position, and the means for releasing the frame retaining means is adapted to be operated by the foot of the operator in substantially the same normal position.

3. Apparatus according to claim 1, wherein at least a part of the frame and the bobbin mounted thereon are disposed above the drum, and the bobbin is held in its lowered position in driving engagement with the drum by gravity.

4. Apparatus according to claim 3, wherein the frame is pivotally mounted on a shaft disposed parallel to and substantially spaced from the axis of the drum.

5. Apparatus according to claim 4, wherein the means for retaining the frame with the peripheral surface of the bobbin elevated above the peripheral surface of the drum is so constructed and arranged that the axis of the bobbin may selectively be positioned at continuously varying distances from the axis of the drum.

6. Apparatus according to claim 5, wherein said means for retaining the frame and bobbin elevated comprises a first, fixed member having a first surface and a second member movable with the frame and having a second surface selectively clampingly engaging the first surface in adjusted position.

7. Apparatus according to claim 6, wherein the first and second surfaces engage each other in infinitely adjusted positions.

8. Apparatus according to claim 5, wherein the means for retaining the frame with the peripheral surface of the bobbin elevated above the peripheral surface of the drum comprises a fluid check device having a cylinder and a piston therein one of which is fixedly positioned and the other of which is connected to the frame mounting the bobbin.

9. Apparatus according to claim 8, wherein the fluid check device operates with liquid, and comprising a selectively operated valve to release liquid from between the piston and cylinder, and a sump from which liquid passes into the cylinder and into which it flows from the cylinder.

10. Apparatus according to claim 3, comprising means for selectively retarding the descent of the frame and bobbin into their lowered position wherein the bobbin drivingly engages the drum.

11. Apparatus according to claim 2, wherein the means for selectively moving the bobbin away from the drum and the means for releasing the frame retaining means are disposed generally in the same vertical plane, and one of said bobbin moving means and frame retaining releasing means is disposed substantially above the other.

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