FIG. 3

FIG. 8

INVENTOR
APPARATUS FOR SORTING YARN-COIL CORES WITH AND WITHOUT YARN REMAINDERS

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My invention relates to apparatus for sorting coil cores with yarn remnants from those without such remnants.

In winding operations involving yarn or filament-shaped material, for example when winding cheeses or other yarn packages from spinning cops, when winding shuttle bobbins or beaming warp from conical yarn packages, or when performing weaving operations from shuttle bobbins, the cores of the yarn supplying cops, when depleted, are often doffed and ejected although the yarn is not fully removed therefrom so that smaller or larger quantities of yarn still remain wound about the cores. It is necessary to sort the cores with such yarn remnants from those bare of yarn. Such sorting has been done with the aid of devices in which the doffed cores pass on a conveyor belt along a feeler located above the travelling cores. If a core contains a residual winding of yarn, the feeler is mechanically lifted and closes an electrical contact. This activates a magnet which controls an ejector to throw the core off the conveyor into a collecting box.

It has been found, however, that such devices do not reliably secure the desired sorting operation. Since most coil cores employed in textile manufacture have a tubular and somewhat conical shape, the feeler device must be adapted to the largest diameter of the conical cores. For this reason, and because the cores involve certain tolerances, the known feeler devices cannot respond to small amounts of residual yarn windings. If residual windings of yarn are primarily located in the circumferential grooves of cores, they can likewise not be responded to by these feeler devices. It has been also observed that during unwinding of the yarn from the core, the last turns of yarn are often pulled toward the core tip where they cannot be detected by the known feeler device, due to the above-mentioned conical shape of the core.

It is an object of my invention to devise a core sorting apparatus which eliminates the above-mentioned shortcomings and secures a reliable sorting of bare cores from cores with yarn remnants, whether many or only few residual turns of yarn are located on a core and regardless of the location of such turns, even if they are situated in grooves of the core.

According to my invention, an apparatus for sorting coil cores with yarn remnants from those free of remnants is provided with selector means for issuing the respective cores to different locations, and with a checking device responsive to the presence of a yarn remainder on a core, this checking device being in controlling connection with the selector means. It is essential to the invention that the checking device comprises a feeler which has a hook-like front engageable with the cores to be sorted so as to hook behind any residual turns of yarn on the core. The feeler is preferably designed as a lever which is pivotally mounted so that, while a relative displacement in the axial direction of the core is imparted between core and feeler, the feeler will first hook into any turns of yarn and will then rotate about its pivot point, this angular displacement being utilized for controlling the above-mentioned selector means in the manner described.

The cores to be sorted may be moved past the feeler with the aid of a pusher. The pivoted feeler lever, according to another feature of my invention, may be given such a design that the turning movement of the feeler

causes lifting of the core into the action range of an ejection device such as a mechanical ejector or blowing current of air. During such operation, it may happen that parts of the yarn or fibers will adhere to the feeler lever thus gradually soiling or clogging the feeler lever or causing the core to remain stuck at the feeler lever. According to another feature of my invention, therefore, it is preferable to make the feeler lever rotatable about its pivot to such an extent that it reaches an angular position in which its hooking engagement with any residual turns of yarn on the core is fully releasable.

FIG. 1 shows schematically the complete apparatus.
FIG. 2 is a schematic sectional view along the line II—II in FIG. 1. FIG. 3 is a circuit diagram of the apparatus shown in FIGS. 1 and 2.

FIGS. 4 to 7 illustrate in section the checking device for the apparatus in four respectively different stages of operation, and FIG. 8 shows part of the checking device in section, seen from the right of FIG. 6.

The tubular cores of yarn supply coils, such as spinning cups derived from a winding machine are transferred, for example by means of a conveyor, into a magazine box 1 (FIG. 1), if desired, after eliminating those cores that still contain a body of yarn sufficient for re-insertion of these cores into the winding machine. The core 2 is shown to carry a residual winding of yarn. The core 3 is completely bare. The core 4 carries only a few residual turns of yarn which during the last stage of the unwinding operation were pulled toward the tip of the core. The lowermost core 2 lies in front of a pusher rod 5 which reciprocates horizontally. The rod 5 is driven by an arm 5 connected by a linking rod 7 with an eccentric pivot on a disc of the shaft of a drive motor 6. Whenever the pusher rod 5 moves from the illustrated position to the right, it shifts the lowermost core from the magazine 1 through a checking device 9 onto a support in a selector device 10.

The design of the checking device 9 and its performance are apparent from FIGS. 4 to 7. This device comprises a feeler lever 11 whose front, directed against the travel direction of the core 2, is provided with a number of teeth or needle points 12 (FIG. 8). The top surface of the feeler 11 as shown in FIG. 4 is ground to a slightly hollow, concave shape so that the teeth or needle tips are directed toward the core 2 and bear on any residual amount of yarn as may still be wound upon the core. As the rear end of feeler 11 touches the core in the core-travel position reached in FIG. 5, this rear end urges the teeth or tips at the feeler front against the core body.

The feeler lever 11 is rotatable about a pivot pin 13 and is urged to the illustrated position (FIGS. 4, 5) by a spring 14 seated upon the pivot pin 13. The pivot pin 13 is mounted on a supporting lever 15 which is rotatable about a fixed pivot pin 16. Another spring 17, seated on pin 16, biases the lever 15 into engagement with a fixed stop 18. The lever 15 has an extension 19 beneath which the push button 20 of a switch 21 is located. Thus the switch 21 is actuated when the supporting lever 15 rotates clockwise about its pivot axis in opposition to the force of the spring 17. The above-described levers 11, 15 and their pivots and springs are protected by a housing 22.

In the position of the feeler lever 11 shown in FIG. 5, the needle tips 12 at the feeler front just enter beneath the residual turns of yarn on the core 2.

As the core continues its travel to the right, the feeler lever, now hooked to the yarn, turns clockwise about its pivot as shown in FIG. 6. The torque imposed by the biasing spring 17 upon the supporting lever 15 is lower than the torque acting upon the lever 15, so that the lever 15 also turns clockwise and its extension 19 depresses the push button 20 of the switch 21.

As the travel of the core 2 continues, the feeler lever reaches the ultimate, reversed position shown in FIG. 7. The rear side 11' of the feeler lever 11 is so designed that in the position the side 11' is approximately parallel to the adjacent generatrix line of the core 2. As a result, the residual turns of yarn now sliding over the rear side of the needle points 12, strip from these points any fibers or yarn fragments as may have adhered thereon.

After the core 2 has passed fully beyond the checking device 9, the feeler lever 11 returns to the position shown in FIGS. 1 and 4, due to the action of the springs 14 and 17. It will be recognized that if a completely empty core 3 passes through the checking device 9, the feeler lever 11 cannot hook into any obstacle and for that reason cannot turn clockwise. Consequently, the supporting lever 15 remains in its position of rest determined by the engagement with the stop 18 (FIGS. 4, 5) so that the switch 21 is not actuated.

Each time the pusher rod 5 (FIG. 1) reaches its right limit position, it actuates a wiper switch 23 (FIGS. 1, 3), which then temporarily closes a circuit between current-supply lead 34 and 25 (FIG. 3). When the checking device 9 does not respond to the presence of a yarn remainder on the core, the switch 21, as explained, remains open. Under these conditions, the switch 33, when closing, energizes a magnet 26 of the selector device through a selector contact 30 of a relay 27. On the other hand, when the checking device 9 detects the presence of a yarn remainder on the core, the switch 21 is closed as described above with reference to FIGS. 4 to 7 and then energizes the relay 27. As indicated by a broken line 28 in FIG. 3, the relay 27 has a normally open self-holding contact 29 in addition to the above-mentioned selector contact 30. Consequently, when switch 21 energizes the relay 27, this relay seals itself in at contact 29 and simultaneously switches the selector contact 30 from fixed contact 31 to contact 32, thus connecting the switch 23 with a second magnet 34 of the selector device 10.

Consequently, one or the other of the selector magnets 26 and 34 is energized, depending upon whether the checking device has detected the absence or presence of a yarn remainder on the core being checked at a time. The relay 27 remains picked up until the drive lever 8 (FIG. 1) returns to its left limit position where it actuates a switch 33 (FIGS. 1, 3) which then interrupts the self-holding circuit of relay 27.

Before this occurs, the lever 8 again actuates the wiper switch 23 and thus closes the circuit between current-supply leads 24 and 25 through contacts 30, 32 and magnet 34. Now the magnet 34 of the selector device 10 is energized.

The operation of the selector device 10 will now be further described with reference to FIGS. 1 and 2. As mentioned, the magnet 26 is energized when the checking device 9 detects absence of yarn on a core. A lever 35 connected with the armature 26 of magnet 26 then rotates a lever 37 on a pivot shaft 36 to which a supporting sheet member 38 of sheet metal is fastened. When the magnet 26 is energized, the supporting sheet 38 is thus rotated clockwise. As a result, the core, denoted by H in FIGS. 1 and 2, previously displaced by the pusher 5 into the selector device 10, can now glide along an inclined guiding sheet 39 into a collecting box 40.

Analogously, when the checking device responds to the presence of a yarn remainder on a core, the magnet 34 actuates its armature 34' and causes the attached lever 41 to rotate a lever 42 on a pivot shaft 43 to which a supporting sheet member 44 is fastened. The supporting member 44 then rotates counterclockwise so that a core, if still containing the yarn remainder, will glide along an inclined guiding sheet 45 into a different collecting box 46.

To those skilled in the art, it will be obvious upon a study of this disclosure that my invention is amenable to a variety of modifications and may be given embodiments other than particularly illustrated and described herein, without departing from the essential features of my invention and within the scope of the claims annexed hereto.

I claim:

1. In apparatus for sorting coil cores with yarn remainders from those free of remainders, having core supporting means, selector means for issuing cores from said supporting means to respectively different locations and a checking device responsive to presence of a yarn remainder on a core and connected to said selector means for controlling said selector means, said checking device comprising a feeler, drive means for imparting movement to a
core in the axial direction of the core so as to move it past said feeler onto said supporting means, said feeler having a front engageable with the core during said movement to hook into any windings of yarn remaining on the core, said feeler being pivotally mounted and rotatable about its pivot axis, due to entrainment by a yarn remainder, from a position in which said pivot axis lags said feeler front to a position in which said feeler front lags said pivot axis and is released from the yarn remainder on the core, so as to control said selector means in response to feeler rotation.

2. An apparatus for sorting coil cores with yarn remainders from those free of remainders, having core supporting means, selector means for issuing cores from said supporting means to respectively different locations and a checking device responsive to presence of a yarn remainder on a core and connected to said selector means for controlling said selector means, said checking device comprising a feeler, drive means for imparting movement to a core in the axial direction of the core so as to move it past said feeler onto said supporting means, said feeler having a front engageable with the core during said movement to hook into any windings of yarn remaining on the core, a yieldably mounted carrier, said feeler being pivotally joined with said carrier and rotatable about the pivot point due to entrainment by a yarn remainder, so as to control said selector means in response to feeler rotation.

3. An apparatus for sorting coil cores with yarn remainders from those free of remainders, having core supporting means, selector means for issuing cores from said supporting means to respectively different locations and a checking device responsive to presence of a yarn remainder on a core and connected to said selector means for controlling said selector means, said checking device comprising a feeler, drive means for imparting movement to a core in the axial direction of the core so as to move it past said feeler onto said supporting means, said feeler having a front engageable with the core during said movement to hook into any windings of yarn remaining on the core, a yieldably mounted carrier member, said feeler being pivoted to said carrier member at a pivot point located near the path of said core motion and in lugging positional relation to said feeler front so that said feeler, when its front is entrained by a yarn remainder, is caused to rotate about said pivot point and to yieldingly displace said carrier member for controlling said selector means.

4. In core sorting apparatus according to claim 3, said feeler being rotatable about said pivot point from a normal position, in which said pivot point is in said lugging relation, to a reversed position in which said feeler front is lugging and thereby released from said yarn remainder on the core.

5. In core sorting apparatus according to claim 3, said feeler front having an arcuate, concave shape generally similar to the peripheral contour of the cores to be sorted.

6. In core sorting apparatus according to claim 4, said feeler front and the rear end of said feeler having an arcuate shape generally similar to the circumferential contour of the cores to be sorted.

7. In core sorting apparatus according to claim 3, said feeler front having a number of pointed tips adapted to hook into any yarn remainder on a core to be sorted.

8. Core sorting apparatus according to claim 4, comprising spring means mounted between said feeler and said carrier member and tending to hold said feeler in said normal position, whereby said feeler upon entrainment by said yarn remainder on a core is returned by said spring means to said normal position when the core passes from said checking device onto said supporting means.

9. Core sorting apparatus according to claim 8, comprising elastic means connected with said carrier member and adapted to permit said feeler pivot point to yieldingly move when said feeler point is engaged by a core on said supporting means.

10. Core sorting apparatus according to claim 8, said supporting means defining a substantially horizontal position for the cores to be sorted, said feeler being located below said horizontal position, elastic means connected with said carrier member and adapted to permit said feeler pivot point to yieldingly move downwardly due to the weight of a core engaged by said feeler front.

11. In core sorting apparatus according to claim 4, said feeler having a top surface approximately parallel to the longitudinal direction of a core on said supporting means when said feeler is in said normal position, and said feeler having a rear side approximately parallel to said longitudinal direction when said feeler is in said reversed position.

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