This invention relates to production counting apparatus for cheese winding machines, and more especially, to apparatus for counting the number of bobbins moved into tying position on winders, spoolers, and the like, of the general type disclosed in Colman Patent No. 1,267,977, dated May 28, 1918, and commonly known as the Barber-Colman automatic spooler.

The Barber-Colman spooler winds yarn from bobbins onto cheese cores and comprises a series of winding units and a winding tending mechanism mounted on a carriage arranged to travel from unit to unit along the sides of the winder and which is operative to tie the ends of yarn on reserve bobbins in the case of inactive units, to the ends of the yarn on the corresponding cheese cores. The cores onto which the cheeses are wound are supported for movement from normal winding position; with the cheeses in rolling contact with a driving drum, to inactive or throw-out position at one side of the drum. Mechanism is provided for shifting the cheeses into inactive or throw-out positions when the bobbins being unwound become exhausted, preparatory to the tying of the ends of the yarn on the cheeses to the yarn on the reserve bobbins by a knotting device carried by the winder tending mechanism.

Two or four attendants are usually employed for operating equal sections of each winder; that is, each attendant is responsible for an equal number of spindles on the same machine. In order to determine the production of each attendant and, thus, the wages for each attendant for a given working period, it has been customary heretofore, for the superintendent to count the number of cheeses produced by each attendant at the end of each work shift.

However, the prior method of determining the production of each attendant has not been satisfactory because the superintendent could make errors in counting the number of cheeses, and he might "play favorites" and thus intentionally or inadvertently credit one attendant with greater production than another when such credit was not warranted.

Also, even if an attendant actually produced lesser cheeses than another attendant working on the same machine, the first attendant might be entitled to credit for greater production than the second attendant, because of the fact that the knotter on the winder tending mechanism may fail to tie the ends of the yarns on the cheeses to the yarn on the reserve bobbins in the first attendant's section of the machine, or on certain machines, while it might operate efficiently on other machines or other sections of machines, all of which is adverse to the morale of the attendants with a resultant adverse employee problem. The latter method of determining the wages to be paid to each attendant for a given work period has frequently resulted in the attendants being paid for more cheeses than were actually produced.

It is therefore an object of this invention to provide a novel apparatus for counting and recording the number of bobbins moved into tying position by the winder tending mechanism of winders of the character described, regardless of whether or not the knotter is effective in tying the ends of the yarn on all the cheeses to the yarn on the respective reserve bobbins.

It is another object of this invention to provide apparatus of the character described for registering the movement of each of a plurality of bobbins, from idle position in respective pockets to tying position, which comprises a plurality of registering counters carried by the winder tending mechanism, there being a counter for each section of the machine to which an attendant is assigned, with means rendering each counter operative as the winder tending mechanism moves past a respective section of winding units, means for actuating the respective counter as each bobbin in the respective section of winding units is moved into operative or tying position, and including means for rendering inactive all the counters at predetermined intervals, particularly at such times as the carriage of the winder tending mechanism is traversing the extreme end portions of the winder, so that the attendants cannot actuate the counters when the counter trigger is exposed from the bobbin pockets.

It is still another object of this invention to provide a production counter of the character described and including means for rendering inactive said counters whenever the winder tending mechanism is stopped, even though the winding units continue to function.

Some of the objects of the invention having been stated, other objects will appear as the description proceeds when taken in connection with the accompanying drawings, in which—

Figure 1 is an electrical diagram showing various mechanical elements of the invention in elevation and in perspective, and illustrating the relationship of such elements to various electrical elements of the invention;

Figure 2 is a fragmentary side elevation of a spooler or winder showing the winder tending mechanism mounted upon an endless track for traversing associated bobbin pockets;

Figure 3 is a somewhat schematic transverse vertical sectional view through the winder looking substantially along line 3—3 in Figure 2;

Figure 4 is an enlarged view of the upper central portion of Figure 2 with portions omitted, and showing switches for breaking the flow of current to the recording counters when the spooler is not operating and at such times as the spooler is moving around a bend in the track;

Figure 5 is an enlarged fragmentary plan view taken substantially along line 5—5 in Figure 3, and showing means for operating the counter selecting switches;

Figure 6 is a fragmentary elevation taken substantially along line 6—6 in Figure 5;

Figure 7 is an enlarged fragmentary vertical sectional view through one of the bobbin pockets, being similar to the right-hand lower portion of Figure 3, but being taken substantially along line 7—7 in Figure 2, showing, in broken lines, various positions occupied by a bobbin as it is moved from reserve or inactive position to tying or active position, and also showing the counter actuating or trigger switch mechanism in association therewith;

Figure 8 is a fragmentary elevation taken substantially along line 8—8 in Figure 7;

Figure 9 is a fragmentary plan view of the structure shown in Figure 8;

Figures 10 and 11 are schematic plan views of the endless track which supports the winder tending mechanism showing two different arrangements of the counter selecting actuators, and wherein the actuators of Figure 10 are arranged for four equal-length winding-unit sec-
tions of the winder and the actuators of Figure 11 are arranged for three equal-length winding-unit sections of the winder; and

Figure 12 (Sheet 1) is a fragmentary vertical sectional view taken substantially along line 12—12 in Figure 4.

Description of conventional winder

Referring more specifically to the drawings, the present invention is shown in association with a spooler or winder of the character disclosed in said Colman Patent No. 1,267,977 and which is provided with bobbin pockets of substantially the type disclosed in a Brainerd et al. Patent No. 2,550,448 and a Peterson Patent No. 2,245,360.

Since the present invention is in the form of an attachment or attachments for use with a conventional winder or spooler of the character disclosed in said patent, only a general description of the conventional elements related to the present invention will be given and reference is made to said patents for a more complete disclosure. Additional details of various elements of the spooler disclosed herein may be found in United States Patents Nos. 1,622,607; 2,053,296; 2,130,498; 2,363,988 and 2,449,788, for example.

The winder comprises generally mechanism for unwinding yarn from bobbins or yarn carriers (Figure 3) onto other carriers to form cheeses, and a winder tending mechanism, broadly designated at 22, ties the ends of the yarn on reserve bobbins to the ends of the yarn on the cheeses and performs various other operations attendant to the production of the cheeses. The winder tending mechanism comprises a wheeled carriage or frame F arranged to travel on an endless track 23 mounted upon longitudinally spaced standards 24 which are interconnected by horizontal frame members 25 forming a winder framework designated at 26.

The winder comprises a series or plurality of winding units on each side thereof, each of which comprises a bobbin pocket 30 which is open at its upper end and is inclined so as to receive filled bobbins therein commonly known as reserve or hold down bobbins. The bottom of each pocket 30 is slotted to accommodate a bobbin support or spindle 31 which may bear against a lateral rod 32 at its medial portion, and whose lower end is pivotally connected to a crank 33 journaled in one side wall of pocket 30.

The lower portion of the winder tending mechanism 22 is provided with an elongated cam bar 34 which successively engages and moves downwardly a plurality of bobbin transfer arms 35. Each transfer arm 35 is normally biased upwardly by conventional means well known in the art, but not shown in the present drawings. As each transfer arm 35 moves downwardly, it imparts a revolution to crank 33 whereupon the respective spindle 31 moves from the broken line position shown in Figure 7 upwardly into the lower end of the bobbin, which is then in inactive position, and then the bobbin is swung upwardly in a somewhat arcuate path, as shown in broken lines in Figure 7 to move the same into operative position. As the winder tending mechanism 22 travels along track 23, and initiates downward movement of each successive transfer bar 35, a knotted K thereon also ties the ends of the yarn on the reserve bobbins 20 to the ends of the yarn on the cheeses 21, each cheese 21 normally resting upon and being rotated by a cylinder or drum 40.

The knotted K of winder tending mechanism 22, along with other related mechanisms in the lower portion of tending mechanism 22, are driven by a substantially vertical lower shaft 41 coupled, through a clutch 42, to an upper shaft 43 (Figures 2 and 4). Shaft 43 is journaled in a bearing 44, carried by the frame F of winder tending mechanism 22, and has a bevel gear 45 fixed on its upper end which engages a relatively small bevel gear 46 fixed on one end of a drive shaft 47. Shaft 47 is coupled, by means of a suitable clutch 50, to a constantly driven element in the form of a pulley 51 loosely mounted on shaft 47. Pulley 51 is engaged by an endless belt or belts 52 which also engage a pulley 53 driven by an electric motor 54.

It will be noted that the frame F of winder tending mechanism 22 is substantially L-shaped and its upper substantially horizontal portion 55 extends from one run of track 23 to the other and, thus, supports the motor 54 in fixed relation to pulley 51. The horizontal portion 55 of frame F is also provided with wheels or rollers 56, 57 thereon which ride upon opposed sections or runs of track 23.

As the carriage F of winder tending mechanism 22 reaches the end of the machine, it rides about the respective bead or loop L in the endless track 23 (Figure 10) so that those elements of the winder tending mechanism 22 in the right-hand portion of Figure 3 are transposed with respect to those elements of the winder tending mechanism 22 shown in the upper left-hand portion of Figure 3. In order to impart movement to the winder tending mechanism 22 along track 23, it will be noted that track 23 is provided with an endless rack 69 which is engaged by a pinion or gear 61 fixed on shaft 43. Thus, while clutch 59 is engaged, rotation is imparted to shaft 43 to impart movement to winder tending mechanism 22 from left to right in Figure 2 and 4 or in a counter-clockwise direction in Figure 10.

In order to render the lying mechanism or knoter inoperative as the winder tending mechanism 22 passes around a bend L in the track 23 at each end of the winder (Figure 10), clutch 42, which comprises a movable clutch element 42a and a fixed clutch element 42b is disengaged by raising clutch element 42a relative to clutch element 42b. Element 42b is fixed on the lower shaft 41 and element 42a is keyed on upper shaft 43. In order to disengage upper clutch element 42a relative to lower clutch element 42b (Figure 4), the upper clutch element 42a has a pair of spaced flanges 64 integral therewith which is positioned one end of a crank or shifting arm 65. Shifting arm 65 is pivotally mounted on a shaft 66 journaled in the frame F of winder tending mechanism 22, and is urged toward an intermediate arm 67 by a tension spring 70.

Intermediate arm 67 is fixed on the outer end of shaft 66. The other end of shaft 66 has a follower arm or crank 71 fixed thereon, on the free end of which a follower 72 is provided. A medial portion of follower arm 71 has a suitable yieldable locking means of conventional construction connecting the same with the frame F of the winder tending mechanism 22 so as to maintain lever 71 in either of two positions until the follower 72 is moved from one position to the other by either of a pair of strip cams or cam blocks 74, 75 provided adjacent diametrically opposed portions of each end in the track 23 (Figure 10).

Although the yieldable locking means is conventional, a detail thereof is shown in Figure 12 (Sheet 1) wherein it will be observed that a medial portion of follower arm 71 is enlarged, as at 76, and is provided with a pair of spring loaded detents 80, 81 therein which are adapted to alternate in engaging respective apertures 82, 83 provided in an adjacent portion of the frame F of winder tending mechanism 22.

Referring to the right-hand central portion of Figure 4, a portion of strip cam 74 is shown attached to the outer surface of track 23. It will be noted that the strip cam 74 is provided with an inclined lower surface so arranged as to be engaged by follower 72 to thus move follower arm 71 downwardly and to thereby impart counterclockwise movement to intermediate arm 67. In so doing, arm 67 engages the lower arm of shifting lever 65 to raise clutch element 42a out of engagement with clutch element 42b. Thus, clutch 42 is rendered inoperative and the elements in the lower portion of the winder tending mechanism 22, including the knoter K, will then remain inoperative or idle while the upper shaft 43 may continue.
to rotate, thus continuing to impart movement to the winder tending mechanism 22 along track 23.

It is apparent that strip cam 75 is arranged in the opposite manner to cam 74 so as to engage and raise cam follower 72 after the winder tending mechanism 22 has passed around the corresponding bend L in track 23. In so doing, arm 67 moves in a clockwise direction to return to the position of Figure 4. Therupon, spring 70 moves arm 65 so that clutch element 422 moves into engagement with clutch element 420 to again impart movement to the knooter K and other elements in the lower portion of the winder tending mechanism 22.

As heretofore stated, the horizontal drive shaft 47 is connected to pulley 51 by means of clutch 50. Clutch 50 includes a fixed clutch element 50a which is attached to, and rotates with, pulley 51. Clutch 50 also includes a movable element 50b which is keyed for movement along shaft 47 and is normally urged into engagement with fixed element 50a by a compression spring 85. Movable clutch element 50b is provided with a pair of spaced flanges 86 which are engaged by one end of a clutch shifting arm 90 pivotally mounted on a relatively short shaft 91 journaled in a portion of the frame F of the winder tending mechanism 22.

Shifting arm 90 has an abutment a thereon which engages a relatively short arm b integral with a spindle lever 92. Spindle lever 92 also has a relatively short radially projecting portion or arm 93 integral therewith to which the upper end of a tension spring 94 is connected. The lower end of tension spring 94 is connected to a spring anchor 95 suitably secured to and projecting forwardly or outwardly from the frame of the winder tending mechanism 22.

The clutch lever 92 is shown in "off" position in which it may be maintained by a conventional latch mechanism generally designated at 96. The latch mechanism 96 functions at times, to release the spindle lever 92 so that it is moved to the inoperative or "off" position shown by tension spring 94 during certain faulty operations of the winder tending mechanism, as is well known. The latch mechanism 96 also serves to latch the spindle lever 92 in operative position to which it is manually moved, during normal operation of the winder. Since the latch mechanism 96 forms no part of the present invention and is well known to those familiar with the art, a description thereof is deemed unnecessary.

It might be stated, however, that when spindle lever 92 is moved in a clockwise direction in Figure 4, from the "off" position to the "on" position, abutment b moves away from abutment a so that spring 85 may move clutch element b into engagement with clutch element 50a, whereby pulley 51 imparts rotation to shaft 47 to drive the winder tending mechanism 22. Conversely, when spindle lever 92 is moved in a counterclockwise direction in Figure 4, abutment b engages abutment a and, since spring 94 is stronger than spring 85, abutment b causes arm 90 to move clutch element 50b away from clutch element 50a to stop rotation of shaft 47.

As heretofore stated, each bobbin pocket 30 and the support for the respective cheese 21 thereabove constitutes a winding unit, and from two to four attendants usually operate each winder or spooler. Among other duties, the attendants must perform is that of placing filled bobbins in the bobbin pockets 30 so that a reserve bobbin is always available each time the yarn on an active bobbin is exhausted or, at least, each time the winder tending mechanism passes above the respective pocket 30. Accordingly, each attendant attends a section of the winding units, and each section generally includes a equal number of winding units on which a single attendant attends the entire winder. However, the present production counter serves the same purpose regardless of the number of attendants per winder.

In Figure 10, it will be noted that the track 23 of the particular winder is divided into four sections, each of equal length, exclusive of the bends at opposite ends of the winder. These sections are indicated at A–D in the order in which they are traversed by the knooter K of the winder tending mechanism 22.

Production counter (counter selector)

In order to count and record the number of bobbins which are moved from the inactive position shown in solid lines in Figure 7 to the tying position indicated by the left-hand broken line representation of the bobbin 20 in Figure 7, and to provide a separate record of the number of such bobbins moved to tying position for each of the sections A–D of winding units, I have provided a separate counter selector actuator 100 at each juncture of the adjacent sections A–D. Of course, the counter selector actuators 100 at each end of the spooler or winder may be disposed at either end of the respective curved portion or bend L of the track 23, or at any point along the respective curved portion of the track.

As shown in the upper left-hand portion of Figure 3 and in Figures 5 and 6, each counter selector actuator 100 may be in the form of a post pin 101 having an interrupted upper portion 102 and whose lower portion is suitably secured to a bracket 103 which projects inwardly and is suitably secured to the lower portion of track 23, as by screws 105a. The inwardly projecting portion 102 of pin 101 is disposed in the path of travel of a star wheel 104 which, in this instance, is provided with four substantially radially extending arms 105 thereon. The number of arms 105 may vary according to the number of work sections into which the machine may be provided. Since there are four sections A–D shown in Figure 10, the star wheel 104 is shown provided with four of the radially projecting arms 105, and these arms are preferably spaced equal distances apart from each other.

Star wheel 104 is removably secured on one end of a counter selecting shaft 106, as by a set screw 107 (Figure 5). Shaft 106 is journaled in a bearing 110 suitably secured to an upper portion 111 of the frame F of winder tending mechanism 22. Attached to, or formed integral with, bearing 110 is a bracket or housing 112 to which a plurality of normally closed electrical switches are suitably secured. The number of switches carried by bracket 112 should be equal to the number of work sections into which the spooler is divided. Accordingly, bracket 112 carries four switches 113–116 which are preferably arranged in a row so that their plungers 117 bear against respective cams 120–123 fixed on shaft 106. The lobes or high points of cams 113–116 are positioned in staggered relationship approximately ninety degrees apart. In other words, the lobe of cam 113 corresponds to one arm 105 of star wheel 104; the lobe of cam 121 corresponds to the next succeeding arm or another arm 105 of star wheel 104; the lobe of cam 122 corresponds to still another arm 105 of star wheel 104; and the lobe of cam 123 corresponds to the remaining arm 105 of star wheel 104 so that a separate one of the switches 113–116 is closed each time a step in rotation is imparted to star wheel 104 by engagement of one of its arms with the portion 102 of counter selecting post 101.

The switches 113–116, respective cams 120–123 and star wheel 104 are located as described so they are out of reach of the attendants. Since such attendants are kept occupied tending their winding-unit sections and cannot reach the switches 113–116 without standing on some object other than the floor of the mill, the switches 113–116 cannot be tampered with and, thus, a false counter selection cannot be effected by the attendants.

As the counter selecting switches 113–116 are selectively closed, in the manner described, they normally electrically condition respective electrical counters 124–127 (Figures 1 and 2) which may be suitably supported at any desired location on the winder tending mechanism 22. "Conditioning" the recording counters indicates that, upon each bobbin tripping a
counter-control switch, a circuit is completed to the selected or conditioned counter; i.e., a "conditioned" counter is one rendered susceptible of actuation by a single control switch common to all the counters.

In this instance, it will be observed in Figure 2 that the recording counters 124–127 are suitably supported in a bracket 205 which is, in turn, suitably secured to an upper portion 126 of the frame F of the winder tendering mechanism 22. In order to prevent fraudulent actuation of the recording counters 124–127, they are preferably of a lock-and-key reset magnetic type such as is disclosed on page 495–90 of Catalogue No. 599, copyrighted 1955 by Veedu-Rooit, Incorporated, and entitled "Counting Devices." Since counters of this type are generally well known, a detailed description thereof is deemed unnecessary.

Counter tripping device

In order to energize and thereby actuate a respective recording counter each time a reserved bobbin is moved from the inactive position shown in solid lines in Figure 7, to the tying position indicated as the extreme left-hand broken line representation of the bobbin 206 in Figure 7, I have provided a bobbin-actuated counter-tripping device 130 (Figures 7, 8 and 9) comprising a trip arm or lever 131 which is shown in the form of an elongated relatively narrow and curved strip, preferably made from metal, plastic or the like. The trip arm 131 is carried by the winder tendering mechanism 22, and its lower edge moves longitudinally of the machine along a path inwardly of inactive bobbins 20 placed in pockets 30. Also, the lower edge of the trip arm 131 is so arranged as to be disposed in the path of travel of the upper end portions of successive bobbins 20 as they are moved from inactive position to tying position, as shown in Figure 7.

Thus, as each reserved bobbin is moved from inactive position to tying position, it engages the lower portion of the trip arm 131 and imparts inward movement thereon. This movement of trip arm 131 closes a counter switch 132 which is interposed in a circuit to all the recording counters, but which circuit is completed only to a respective selected counter. Such counter thus registers the particular movement of the corresponding bobbin from inactive position to tying position.

In this instance, the trip arm 131 curves upwardly and outwardsly above the elongated cam bar 34 which, as herebefore stated, is carried by the frame F of the winder tendering mechanism 22. The upper end or edge of trip arm 131 is suitably secured to a shaft 133 journaled in a bearing block 134 fixed on a shiel member 135 attached to the elongated cam bar 34. Shaft 133 has an inwardly curved crank portion 136 therein whose free end portion is pivotally connected, by a slot-and-pin connection 137, to a crank 140 fixed on a shaft 141 of the switch 132.

Although various types of switches may be employed for the present purpose, the switch 132 is shown in the form of a cylindrical electrical contactor of a type disclosed on pages 459–75 of said catalogue.

The housing of switch 132 is also fixed upon shiel member 135. Switch 132 is normally open and, when trip arm 131 is moved inwardly from the solid line to the broken line position in Figure 7, crank 136 moves therewith and, since there is a slot-and-pin connection between crank 136 and arm 140, crank 136 imparts movement to arm 140 to close switch 132.

As soon as the upper end of a bobbin moves inwardly beyond and out of engagement with trip arm 131, the trip arm returns to the solid line position of Figures 1 and 7, either by gravity or suitable spring means in switch 132.

Electrical diagram

It will be observed in Figure 1 that one side of normally open trip switch 132 has a lead conductor 145 connected thereto which leads to one side of a suitable source of electrical energy 146. The other side of the source of electrical energy 146 has a lead conductor 147 leading therefrom, which has branch conductors 150 leading therefrom, whose other ends are each connected to a respective one of the registering counters 124–127; that is, each registering counter 124–127 has a conductor 150 leading therefrom and all the conductors 150 are connected to lead conductor 147.

The other sides of the registering counters 124–127 have respective conductors 152–155 leading therefrom which are connected to corresponding sides of respective selector switches 113–116. The other side of selector switch 113–116 has a conductor 156 leading therefrom and all the conductors 156 are connected to a common conductor 157. Conductor 157 leads to one side of a normally open switch 160 which may be termed as a track bend safety switch, the purpose and location of which will be presently described.

The other side of track bend safety switch 160 has a conductor 161 leading therefrom to one side of a normally open knock-off safety switch 162. The purpose and location of switch 162 will also be presently described. The other side of knock-off safety switch 162 has a conductor 163 leading therefrom to the side of tripping switch 132 opposite the side to which lead conductor 145 is connected.

Referring to Figure 4, in particular, it will be observed that switches 160, 162 are suitably secured, to the frame F of winder tendering mechanism 22, adjacent the clutches 42, 50 so that the respective operating levers 164, 165 thereof are disposed adjacent to or bear against the crank arm 67 associated with clutch 42 and the radial projection 93 on shipper lever 92, respectively. Thus, during normal operation of the winder tendering mechanism 22, while moving past the winding units, both safety switches 160, 162 are held closed by arm 67 and projection 93.

As heretofore stated, movable element 42a of clutch 42 normally engages fixed element 42b during intervals in which the winder tendering mechanism is moving past the winding units; that is, at all times except the intervals during which the winder tendering mechanism is moving around the bends L at opposite end portions of the track 23. At such times as the winder tendering mechanism is moving around said bends, the movable clutch element 42a of clutch 42 is raised out of engagement with clutch element 42b. Since track-bend safety switch 160 is normally open, it is apparent that counterclockwise movement of intermediate arm 67 (Figures 1 and 4) will permit safety switch 160 to open.

Referring to Figure 1, when switch 162 is open, this prevents current from flowing to any of the counters even though an attendant might close switch 132 by manual operation of trip arm 131. This also applies to knock-off safety switch 160.

By referring to the right-hand portions of Figures 1 and 4, it is apparent that, since knock-off safety switch 162 is normally open, when the shipper handle or lever 92 occupies the "off" position shown, the switch 162 is then open. On the other hand, when shipper lever 92 is moved in a clockwise direction to "on" position, the arm 93 raises the switch lever 165 to thus close switch 162. Here again, it will be noted that, since switch 162 is open whenever the knock-off or shipper lever 92 occupies "off" or "inoperative" position, manual operation of trip switch 132 will not affect the corresponding registering counter.

Since the trip switch 132 must be rendered ineffective whenever the entire winder is stopped, lead conductor 147 has a manually controlled double-pole switch 165 interposed therein which is also interposed in a conductor 166 leading from a portion of lead conductor between switch 165 and source of electrical energy 146. The other end of conductor 166 may be connected to one side of a main drive motor 167. A conductor 170
extends from the other side of motor 167 to lead conductor 145.

**Method of operation**

In operation, assuming that counter selecting switches 113–116 and registering counters 124–127 correspond to the respective work sections A–D in Figure 10, as the winder tending mechanism passes the selector switch actuator 160 at the juncture of work sections D, A with movement thereof in a counterclockwise direction in Figure 10, it is apparent that selector cam 120 moves into engagement with the plunger 117 of switch 113 to close the same. Thus, each time the trip element or arm 131 moves past the respective 30 in the work section A, trip element 131 will be moved inwards by each successive bobbin 20 as it is moved from inactive position to tycing position.

In so doing, counter-actuating or tripping switch 132 is closed momentarily. This causes current to flow from the operator's electrical energy 146 through lead conductor 145, switch 132, conductor 163, safety switch 162, conductor 161, safety switch 160, conductor 157, and the conductor 156 corresponding to switch 113, through switch 113. Current then flows from switch 113 through conductor 125, switch 124, its conductor 150 and lead conductor 141 on the other side of the source of electrical energy 146. In so doing, it is apparent that this momentarily energizes recording counter 124 to register the movement of each respective bobbin from inactive to tycing position.

As the star wheel 104 (Figure 6) subsequently engages the next succeeding selector switch actuator 100 adjacent the bend L in the right-hand portion of Figure 10, and causes the selector cam 121 to close counter selecting switch 114, switch 113 is opened, clutch 142 is rendered inoperative, and switch 160 is then opened in the manner heretofore described. Thus, an attendant cannot falsely record the movement of bobbins from inactive to tycing position as the winder tending mechanism 22 moves about a corresponding bend in the track 23.

Upon completion of its movement around the corresponding bend in the track 23, the movable clutch element 42z moves into engagement with clutch element 42b in the manner heretofore described. The operation of the counting apparatus with respect to the succeeding work sections B, C, D is the same as that described with movement of the winder tending mechanism 22 past the work section A, with the exception that the respective switches 114, 115, 116 are closed independently and in succession as the winder tending mechanism 22 moves past the respective work sections B, C, D.

It also follows that, as the remaining counter selecting switches 114, 115, 116 are closed successively, the respective counters 125, 126, 127 are conditioned so as to be operated by the tripping switch 132 in that order. Since the method in which the knock-off safety switch 162 has already been described, a further description thereof is deemed unnecessary.

The track 23 is shown in Figure 11 for the purpose of illustrating how the present production counting apparatus may be used when the number of work sections per machine is changed. In this instance, the machine represented by track 23 is divided into three work sections A', B', C' of substantially equal lengths; at least, each work section A', B', C' may include substantially the same number of winding units. As in Figure 10, the junctures of adjacent work sections A', B', C' are determined or defined by respective counter selector actuators 160 which may be identical to selector actuators 160 of Figure 10.

Now, since only three work sections A', B', C' appear in Figure 11, the same apparatus may be mounted on the winder tending mechanism when used with each track 23, 23'. However, two of the selector actuators 100 may then be used at one of the three junctures between adjacent sections, and one of the switches 113–116 and a respective counter 124–127 may then be blocked out of the circuit (Figure 1) such as by removing conductor 155, for example.

Alternatively, the apparatus may be constructed to accommodate any number of work sections into which the work units of a machine or machines may be divided, by simply increasing or decreasing the number of selector actuators 160 (Figure 1) per machine, the number of arms 105 on star wheel 104 and the respective numbers of selector cams (120–123), selector switches (113–116) and recording counters (124–127), without departing from the spirit of the invention.

Regardless of the number of work sections per machines; i.e., a single work section or several work sections, a separate record is made for the number of bobbins of each work section which are moved into tycing position, and the counters are rendered inoperative whenever the winder tending mechanism passes around the end of the machine and/or whenever the winder tending mechanism 22 is stopped.

While the winder tending mechanism is moving past winding units, the trip arm 131 is practically inaccessible to the attendant because of the close relationship of the bobbin 20 and pockets 30. The latter elements, and other adjacent elements, are so close together that it is very nearly a certainty that an attendant would be injured if he attempted to operate the trip switch 132 at any time during which the winder tending mechanism is moving and safety switch 160 is closed.

It is thus seen that I have provided an improved apparatus for counting the number of reserve bobbins moved from inactive to tycing position regardless of the number of cheeses which may be wound therefrom, thus providing an accurate record from which the wages of each attendant may be determined. It is seen further that I have provided means for automatically rendering the counting and recording apparatus inoperative whenever the winder tending mechanism passes around bends in the track of the corresponding machine or whenever the machine or winder tending mechanism are stopped for any reason whatsoever.

In the drawings and specification there has been set forth a preferred embodiment of the invention and, although specific terms are employed, they are used in a generic and descriptive sense only and not for purposes of limitation, the scope of the invention being defined in the claims.

I claim:

1. In an automatic winder having a frame providing a track, a winder tending mechanism mounted to travel along said track, a series of pockets for receiving bobbins in inactive position therein, and means responsive to the movement of said mechanism past each successive pocket for moving said bobbins from inactive position to an active position; the combination of at least one electrically operable recording counter, means engageable by each successive bobbin moved into active position, and means in the path of travel of said mechanism for breaking the circuit between said engageable means and said recording counter.

2. A structure according to claim 1 wherein said engageable means comprises a movable trip arm movable with said mechanism along a path closely following each of said pockets, a normally open trip switch on said mechanism and interposed in an electrical circuit to said counter, and means operatively connecting said trip arm to said switch, said trip arm being movable by each successive bobbin moved into active position to momentarily close said switch.

3. In an automatic winder having a frame providing an endless track having curved end portions thereon, a
winder tending mechanism mounted to travel along said track, a series of pockets on at least one side of said winder for receiving bobbins therein, and means responsive to the movement of said mechanism past each successive pocket for moving said bobbins from an inactive position to an active position; the combination of at least one recording counter, movable means engageable by each successive bobbin moved into active position for actuating the respective recording counter to thus record the number of bobbins moved into active position, and means automatically operative to render said movable means inoperative during movement of said mechanism along said curved end portions of the track.

4. In an automatic spooler having a frame providing an endless track with bends connecting opposite ends thereof, a row of winding units comprising bobbin pockets on each side of the spooler, a winder tending mechanism having a knotted thereon and being movable along the track for traversing said pockets, normally engaged clutch means interposed in a drive for said knotter, means disengaging said clutch means during movement of said mechanism around said bends, and said mechanism including means to move a bobbin in each successive pocket traversed thereby from inactive to tying position; the combination thereof of, at least one recording counter, means responsive to the movement of each bobbin into tying position for actuating the counter, and means to render said responsive means inoperative while said clutch is disengaged.

5. In a winder having serially arranged sections of operating winding units, each winding unit including a pocket for receiving and holding an inactive reserve bobbin therein, a winder tending mechanism arranged to travel along the sections, means for moving each successive bobbin into tying position as the winder tending mechanism moves above each successive bobbin pocket, and a shudder lever movable between active and inactive positions for starting and stopping said winder tending mechanism while said winding units continue operating; the combination of, an electrically operable recording counter for each of said sections, a normally open counter selecting switch interposed in an electrical circuit to each recording counter, said counters and selecting switches being carried by said mechanism, a movable select actuator for closing said selecting switches in predetermined sequence independently of each other, means at spaced intervals in the course of travel of said winder tending mechanism for imparting movement to said selecting actuator, means engagingable with each bobbin as it is moved into tying position and being in series with said recording counters and said selecting switches for actuating that counter corresponding to a closed selecting switch, and means for breaking the circuit to said counters independent of said engageable means when said shudder lever occupies inactive position.

6. A structure according to claim 5 wherein said movable selecting actuator comprises a star wheel having a plurality of radially projecting arms thereon, a shaft journaled on said mechanism and on which said wheel is secured, a plurality of cams on said shaft, there being one of said cams for each counter selecting switch, each counter selecting switch having a plunger thereon engaging a respective cam, and each of said means at spaced intervals in the course of travel of said mechanism including an abutment engageable with a respective arm on said star wheel for imparting thereto a step in rotation, said cams being so arranged as to successively close each of said selecting switches while opening the others with successive movements of said star wheel.

7. In an automatic spooler having a frame providing an endless track with bends connecting opposed ends thereof, a row of winding units comprising bobbin pockets on each side of the spooler, a winder tending mechanism having a knotted thereon and being movable along the track for traversing said pockets, and said mechanism including means to move a bobbin in each successive pocket traversed thereby from inactive to tying position; the combination of, a plurality of recording counters, means for conditioning a separate counter at each of a plurality of places spaced along said track, means responsive to the movement of each bobbin into tying position for actuating the respective conditioned counter, and means automatically operable to render said responsive means inoperative during movement of said mechanism around said bends.

8. A structure according to claim 7 wherein said conditioning means comprises a star wheel having a plurality of radially projecting arms thereon, a shaft journaled on said mechanism and on which said wheel is secured, a separate normally open counter selecting switch carried by said mechanism and interposed in an electrical circuit to each counter, a plurality of cams on said shaft, there being one of said cams for each counter selecting switch, each counter selecting switch having a plunger thereon engaging a respective cam, a plurality of abutments spaced along the course of travel of said mechanism, each abutment being engageable with a respective arm on said star wheel, said cams being so arranged as to successively close said switches, one at a time, while opening the other switches with successive movements of said star wheel, said responsive means comprising a normally open trip switch carried by the mechanism and interposed in said circuit, and means engageable by each bobbin moving into tying position for momentarily closing said trip switch.

9. In an automatic spooler having a frame providing an endless track with bends connecting opposed runs thereof, a row of winding units comprising bobbin pockets on each side of the spooler, said winding units being divided into a plurality of work sections, a winder tending mechanism having a knotted thereon and being movable along the track for traversing said pockets, normally engaged clutch means interposed in a drive for said knobber, means disengaging said clutch means during movement of said mechanism around said bends, and said mechanism including means to move a bobbin in each successive pocket traversed thereby from inactive to tying position; the combination of, a plurality of recording counters, there being one of said counters for each of said work sections, means for selecting a separate counter at the beginning of the movement of said mechanism past each work section, means responsive to the movement of each bobbin into tying position for actuating the respective selected counter, and means to render said responsive means inoperative while said clutch is disengaged.

10. A structure according to claim 9 wherein said responsive means comprises a trip arm movable with said mechanism along a path closely adjacent to and overlying said pockets, a normally open trip switch carried by said mechanism and interposed in an electrical circuit to said counters, said selecting means including a separate normally open selecting switch for each counter and being interposed in said circuit, means at the beginning of each work section for closing a respective one of said selecting switches, and means operatively connecting said trip arm to said trip switch, said trip arm being movable by each successive bobbin moved into active position to momentarily close said trip switch.

11. A structure according to claim 9 in which said selecting means comprises a normally open selecting switch interposed in an electrical circuit to each of said recording counters, a rotatable shaft adjacent said selecting switches and being journaled on said mechanism, a plurality of cams fixed on said shaft, there being one of said cams for each selecting switch, each selecting switch having a plunger engaging a respective one of said cams, a star wheel fixed on said shaft and having a plurality of substantially radially projecting arms thereon, a plurality of spaced abutments carried by said track and disposed in the path of said star wheel so that successive arms
are successively engaged by said abutments for imparting step-by-step rotation to said star wheel, shaft and cams, said cams being so arranged as to close said switches in succession, one at a time, and said responsive means including a normally open trip switch carried by said mechanism, being momentarily closable by each successive bobbin moved into typing position, and being interposed in said circuit.

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