Nov. 22, 1960 W. B. CHAMBLEY 2,961,178

PRODUCTION COUNTER FOR WINDING MACHINE

Filed Jan. 15, 1960 5 Sheets-Sheet 1

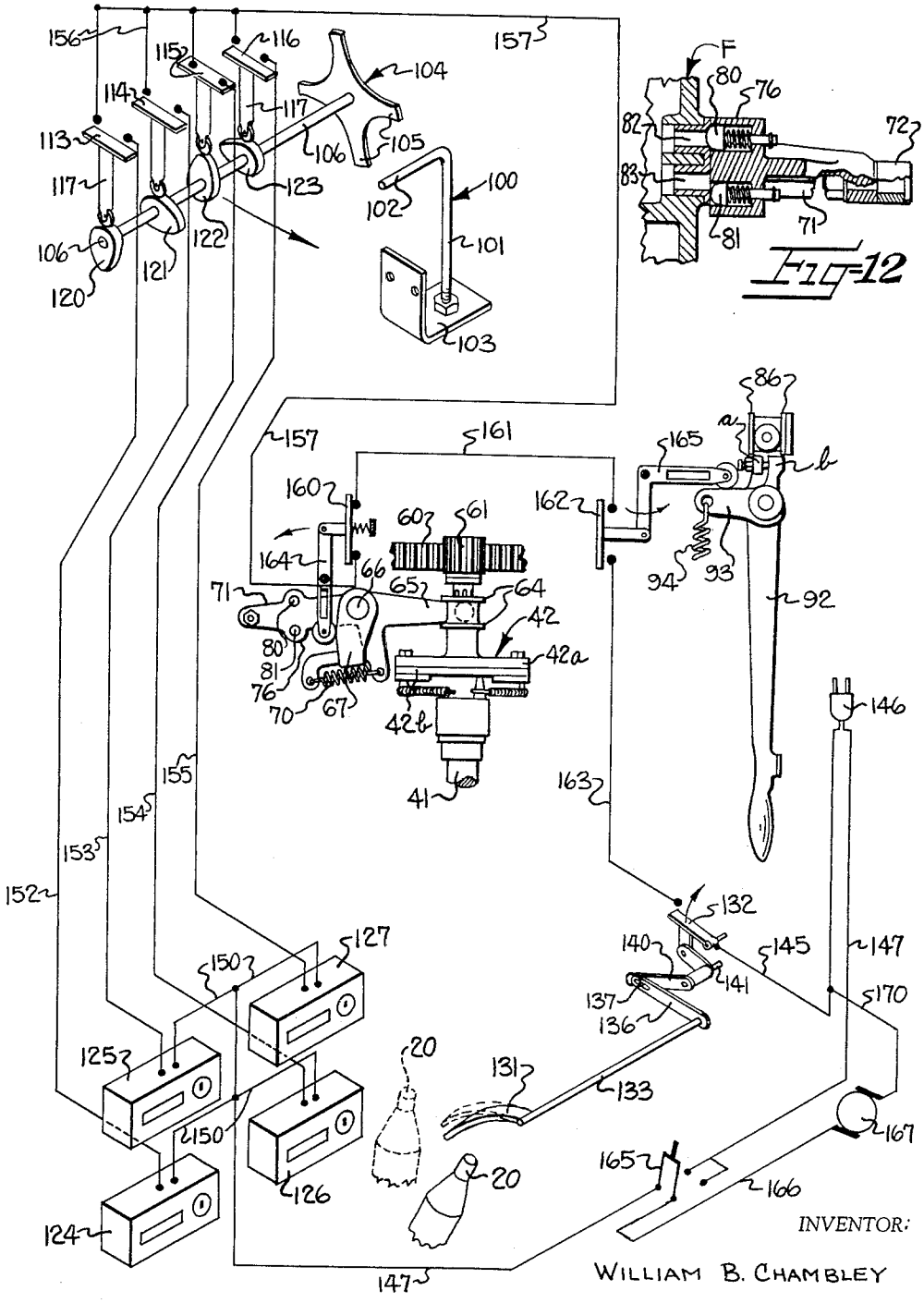


Fig-12

Fig-1

INVENTOR:
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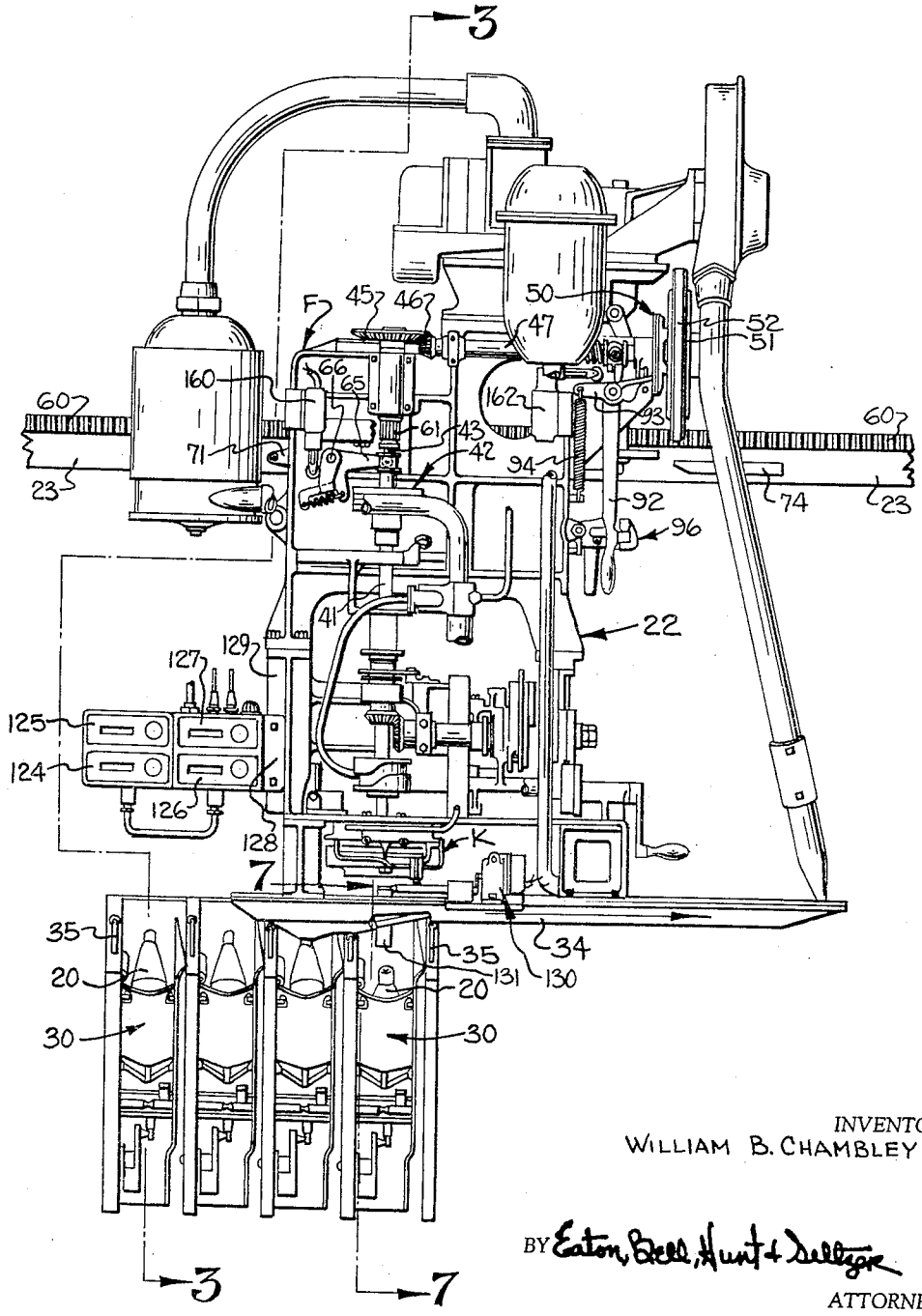
BY Eaton, Bell, Hunt & Deltzer
ATTORNEYS

Nov. 22, 1960 W. B. CHAMBLEY 2,961,178

PRODUCTION COUNTER FOR WINDING MACHINE

Filed Jan. 15, 1960 5 Sheets-Sheet 2

Fig-2



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Nov. 22, 1960 W. B. CHAMBLEY 2,961,178

PRODUCTION COUNTER FOR WINDING MACHINE

Filed Jan. 15, 1960 5 Sheets-Sheet 3

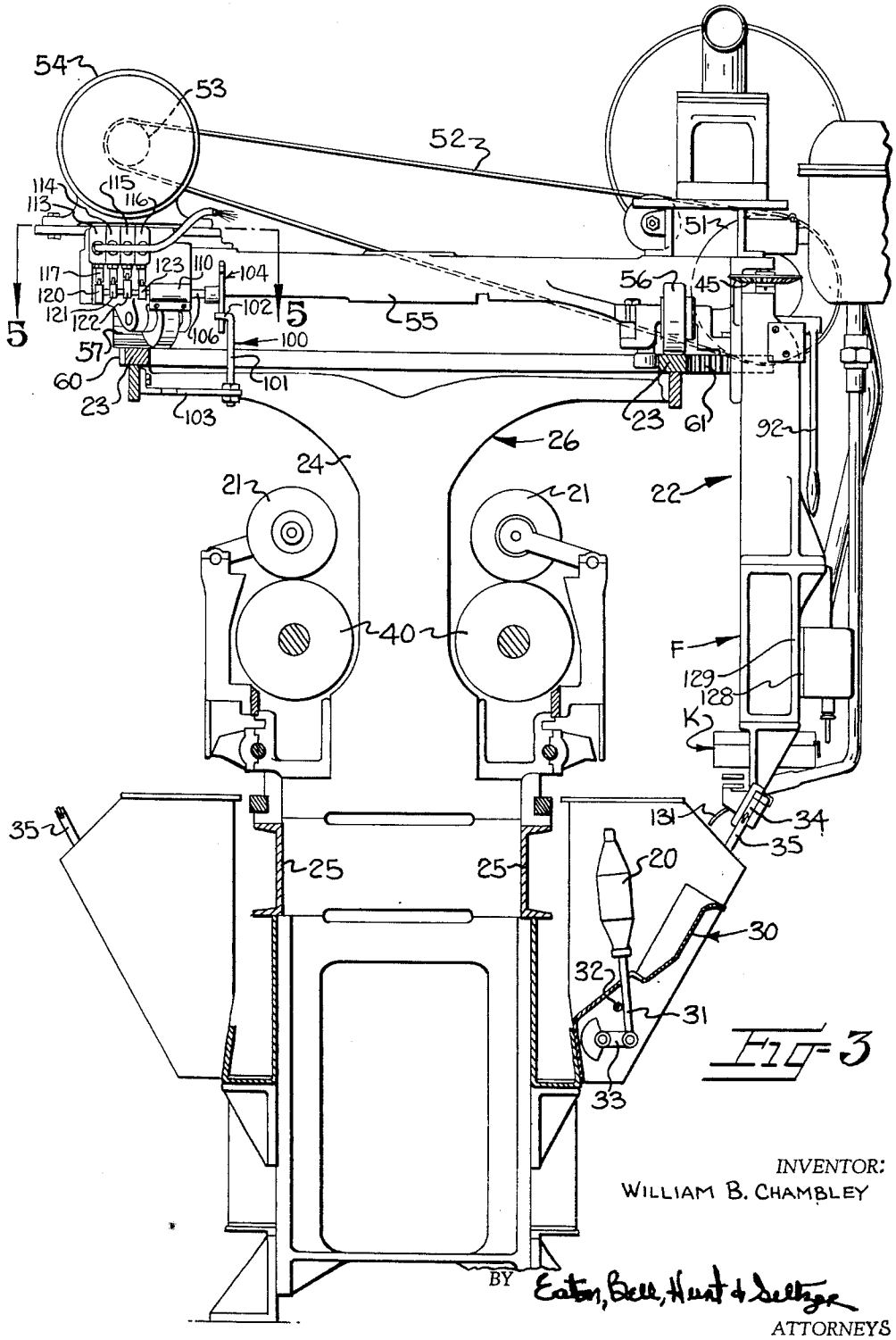


Fig. 3

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Nov. 22, 1960 W. B. CHAMBLEY 2,961,178

PRODUCTION COUNTER FOR WINDING MACHINE

Filed Jan. 15, 1960

5 Sheets-Sheet 4

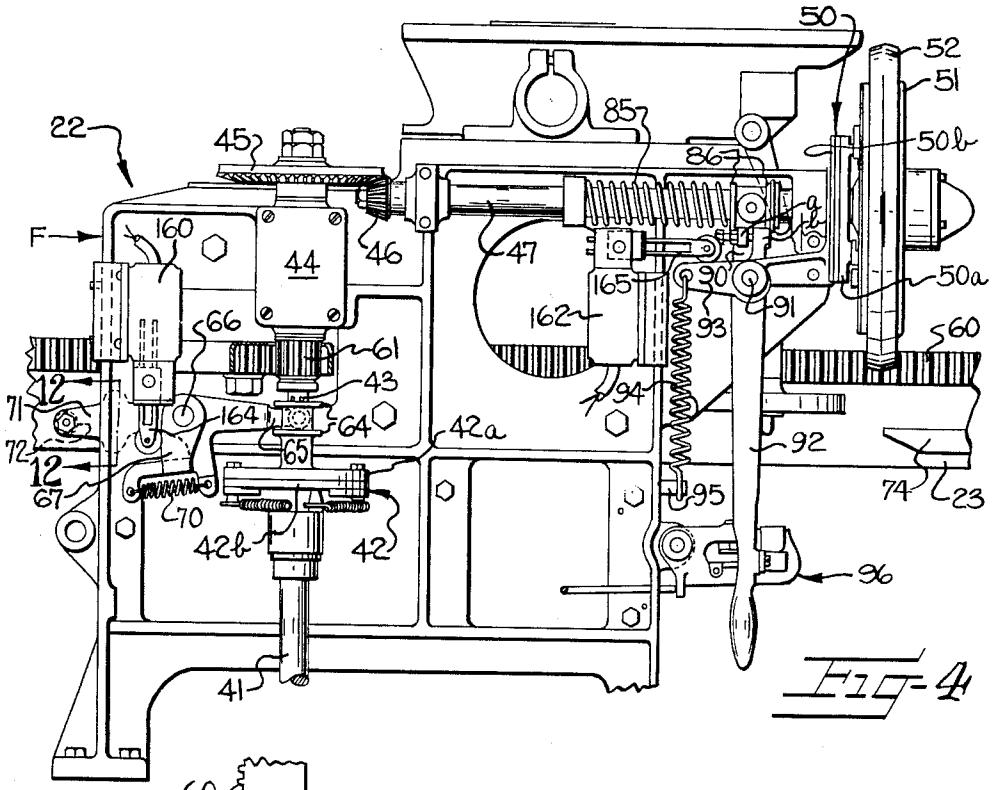


Fig-4

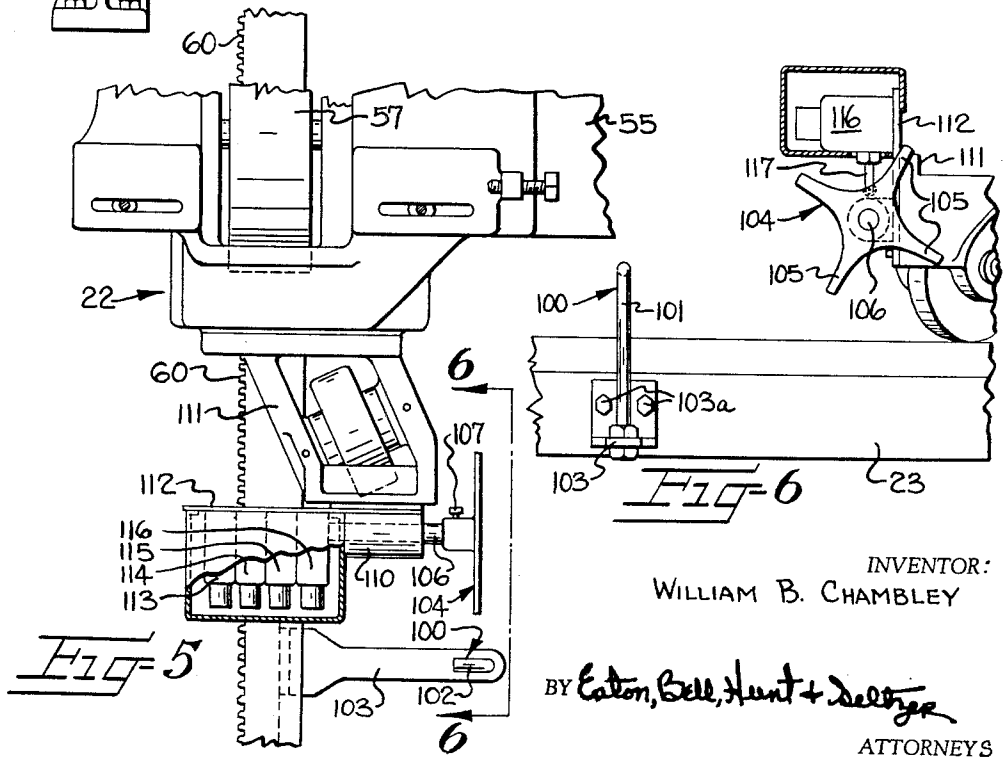


Fig-5

Fig-6

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Nov. 22, 1960 W. B. CHAMBLEY 2,961,178

PRODUCTION COUNTER FOR WINDING MACHINE

Filed Jan. 15, 1960 5 Sheets-Sheet 5

Fig-7

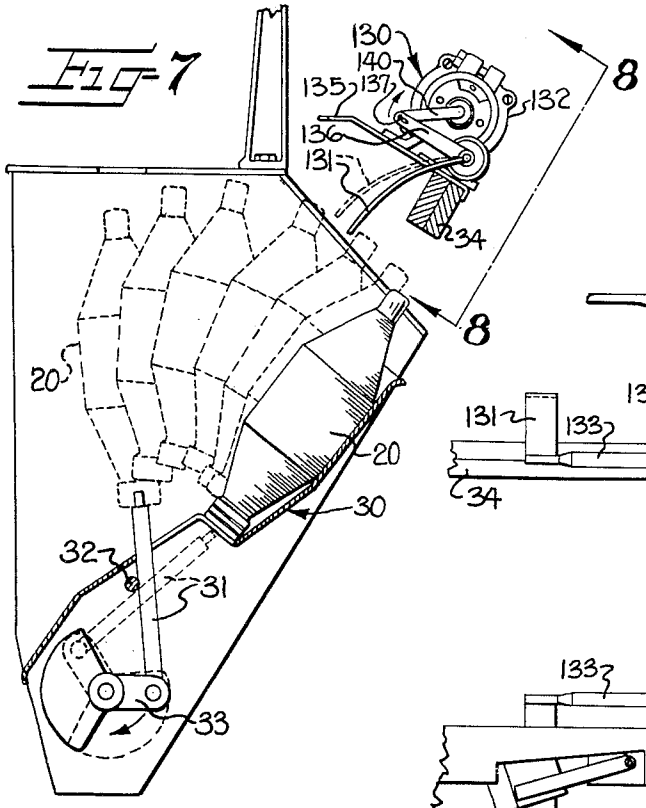
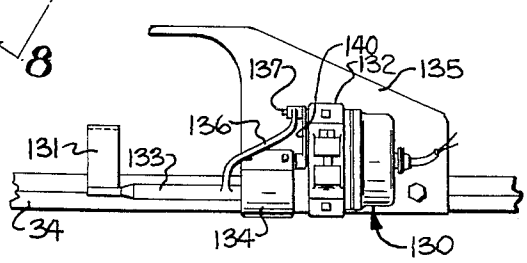


Fig-9



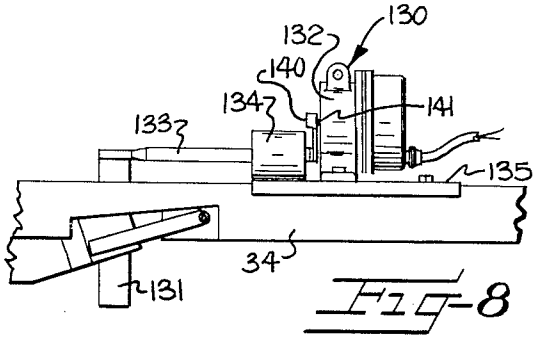


Fig-8

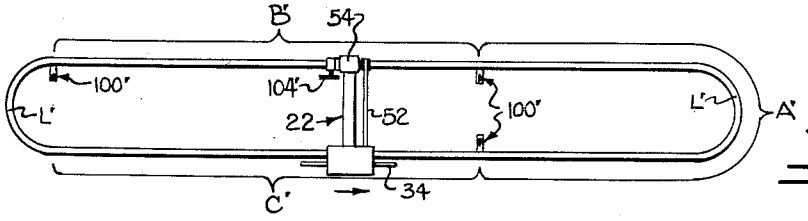


Fig-11

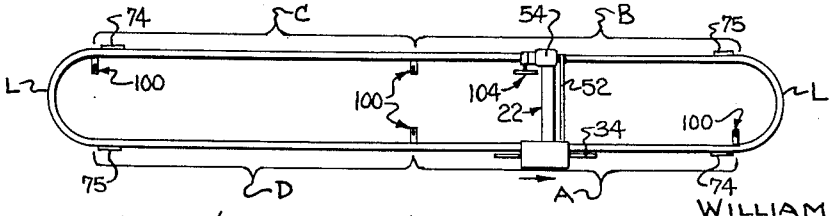


Fig-10

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United States Patent Office 2,961,178
Patented Nov. 22, 1960

2,961,178

PRODUCTION COUNTER FOR WINDING MACHINE

William B. Chambley, Fieldale, Va., assignor to Mitchell H. Creighton, Charlotte, N.C., and Julius Ralph Richie, Raleigh, N.C.

Filed Jan. 15, 1960, Ser. No. 2,727

11 Claims. (Cl. 242—35.6)

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 a 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 thrown-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 to four attendants are usually employed for operating equal sections of each winder; that is, each attendant is responsible for an equal number of spind es 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 away 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; 2,210,498; 2,363,988 and 2,449,788, for example.

The winder comprises generally mechanism for unwinding yarn from bobbins or yarn carriers **20** (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 attending 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 frame broadly 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 inactive 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 knotter 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 knotter 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 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 bend 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 **60** which is engaged by a pinion or gear **61** fixed on shaft **43**. Thus, while clutch **50** is engaged, rotation is imparted to shaft **43** to impart movement to winder tending mechanism **22** from left to right in Figures 2 and 4 or in a counterclockwise direction in Figure 10.

In order to render the tying mechanism or knotter 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 **42***a* and a fixed clutch element **42***b* is disengaged by raising clutch element **42***a* relative to clutch element **42***b*. Element **42***b* is fixed on the lower shaft **41** and element **42***a* is keyed on upper shaft **43**. In order to disengage upper clutch element **42***a* relative to lower clutch element **42***b* (Figure 4), the upper clutch element **42***a* has a pair of spaced flanges **64** integral therewith between 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 bend 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 **42***a* out of engagement with clutch element **42***b*. Thus, clutch **42** is rendered inoperative and the elements in the lower portion of the winder tending mechanism **22**, including the knotter 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 of 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. Thereupon, spring **70** moves arm **65** so that clutch element **42***a* moves into engagement with clutch element **42***b* to again impart movement to the knotter 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 **50***a* which is attached to, and rotates with, pulley **51**. Clutch **50** also includes a movable element **50***b* which is keyed for movement along shaft **47** and is normally urged into engagement with fixed element **50***a* by a compression spring **85**. Movable clutch element **50***b* 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 shipper lever **92**. Shipper 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 shipper 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 shipper 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 shipper 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 detailed description thereof is deemed unnecessary.

It might be stated, however, that when shipper 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 **50***a*, whereby pulley **51** imparts rotation to shaft **47** to drive the winder tending mechanism **22**. Conversely, when shipper 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 **50***b* away from clutch element **50***a* 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 an equal number of winding units. There are instances in 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 knotter 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 selecting actuator **100** may be in the form of a post or pin **101** having an inturned 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 **103***a*. 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 **120** 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. Thus, 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 electrically operable recording 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 **128** which is, in turn, suitably secured to an upstanding portion **129** of the frame F of the winder tending 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 G59–80 of Catalogue No. G59, copyrighted 1959 by Veeder-Root, 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 reserve 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 **20** 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 tending 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 reserve bobbin is moved from inactive position to tying position, it engages the lower portion of the trip arm **131** and imparts inward movement thereto. 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 outwardly and terminates above the elongated cam bar **34** which, as heretofore stated, is carried by the frame F of winder tending 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 shield member **135** attached to the elongated cam bar **34**. Shaft **133** has an inwardly curved crank portion **136** thereon 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 G59–75 of said catalogue.

The housing of switch **132** is also fixed upon shield 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 each 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 tending 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 tending 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 **42***a* of clutch **42** normally engages fixed element **42***b* during intervals in which the winder tending mechanism is moving past the winding units; that is, at all times except the intervals during which the winder tending mechanism is moving around the bends L at opposite end portions of the track **23**. At such times as the winder tending mechanism is moving around said bends, the movable clutch element **42***a* of clutch **42** is raised out of engagement with clutch element **42***b*. 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 **100** 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 above a pocket **30** in the work section A, trip element **131** will be moved inwardly by each successive bobbin **20** as it is moved from inactive position to tying position.

In so doing, counter-actuating or tripping switch **132** is closed momentarily. This causes current to flow from the source of 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 **152**, counter **124**, its conductor **150** and lead conductor **147** to 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 tying 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 typing 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 **42***a* moves into engagement with clutch element **42***b* 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** operates 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 length or, 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 **100′** which may be identical to selector actuators **100** 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 **100** (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 tying position, and the counters are rendered inoperative whenever the winder tending mechanism passes around either 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 attendants because of the close relationship of the knotter K, the cam bar **34**, the bobbins **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 tying 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 for momentarily closing a circuit to the respective recording counter to thus record the number of bobbins 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 adjacent to and overlying 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 operable 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 opposed runs thereof, a row of winding units comprising bobbin pockets on each side of the spooler, a winder tending mechanism having a knotter 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 therewith 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 inoperable 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 shipper 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 selecting 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 engageable 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 shipper 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 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 runs thereof, a row of winding units comprising bobbin pockets on each side of the spooler, a winder tending mechanism having a knotter 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 inoperable 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 succesively 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 knotter 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 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.

References Cited in the file of this patent

UNITED STATES PATENTS

1,267,977 Colman ---------- May 28, 1918
1,622,607 Peterson ---------- Mar. 29, 1927
1,686,102 Peterson ---------- Oct. 2, 1928
2,053,296 Marcellus ---------- Sept. 8, 1936
2,210,498 Peterson ---------- Aug. 6, 1940
2,245,360 Peterson ---------- June 10, 1941
2,329,825 Champion ---------- Sept. 21, 1943
2,449,788 Peterson ---------- Sept. 21, 1948
2,486,118 Clark ---------- Oct. 25, 1949
2,543,790 Maker et al. ---------- Mar. 6, 1951
2,815,914 Ingram ---------- Dec. 10, 1957