Jan. 3, 1967 H. RAASCH ETAL 3,295,775
METHOD AND APPARATUS FOR READYING THE WINDING OPERATION OF YARN SUPPLY COILS ON COIL WINDING MACHINES
Filed April 6, 1964 3 Sheets-Sheet 1

FIG. 1

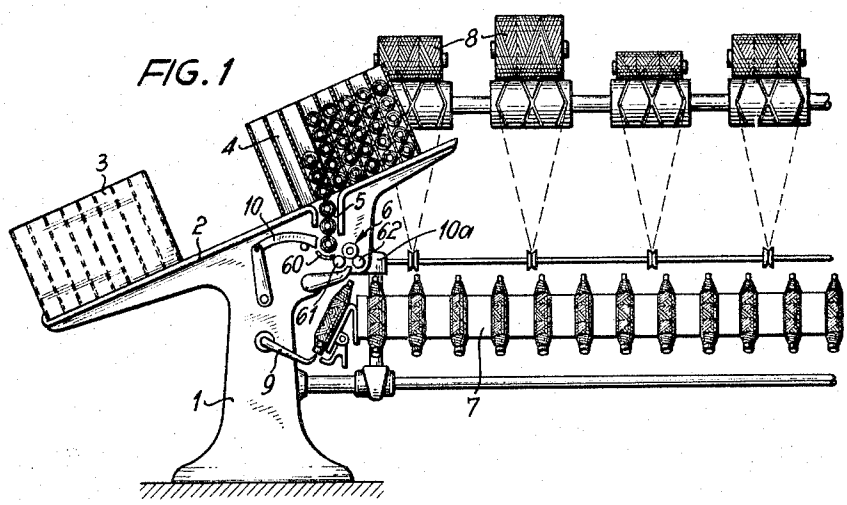

FIG. 2

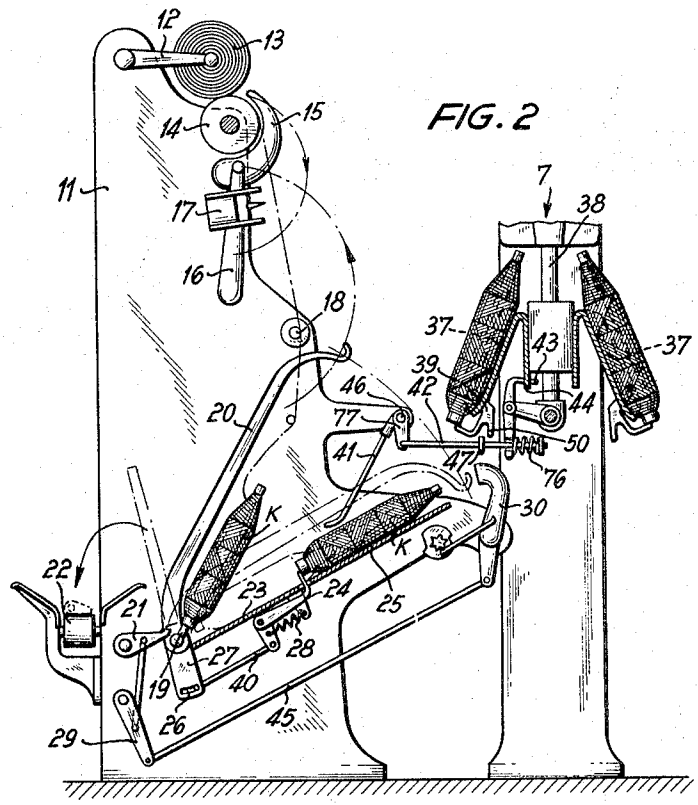

FIG. 3

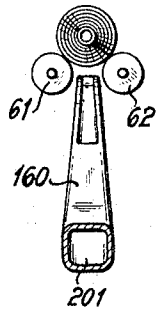

FIG. 4

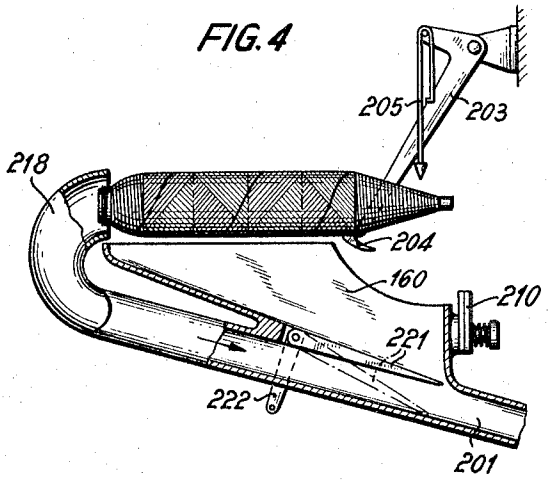

FIG. 5

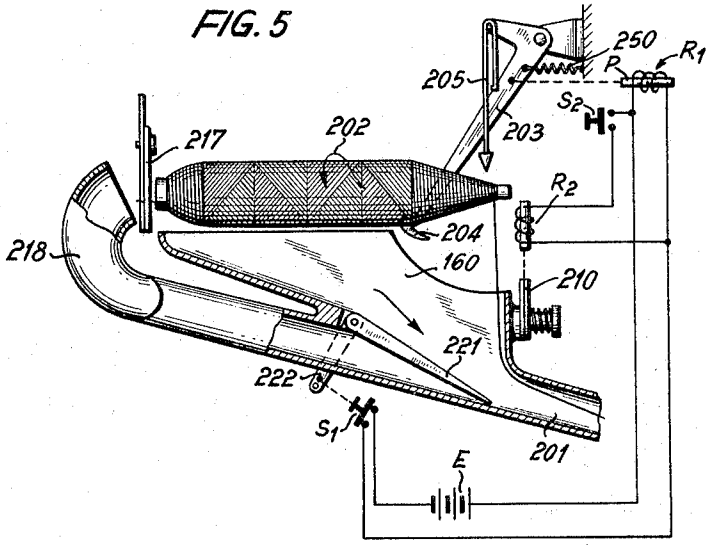

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FIG. 6

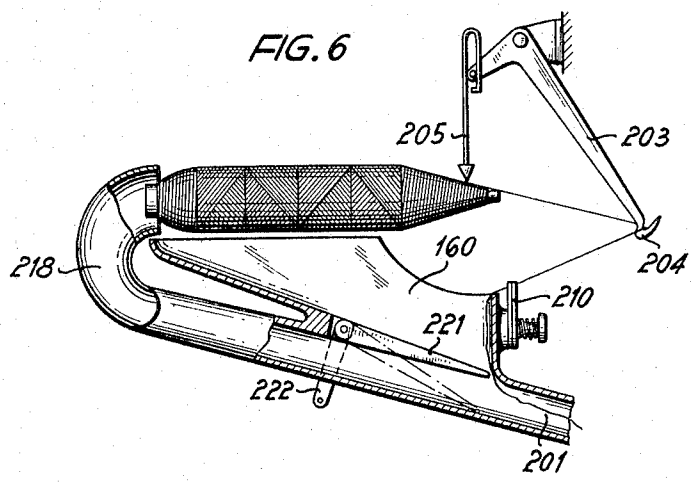
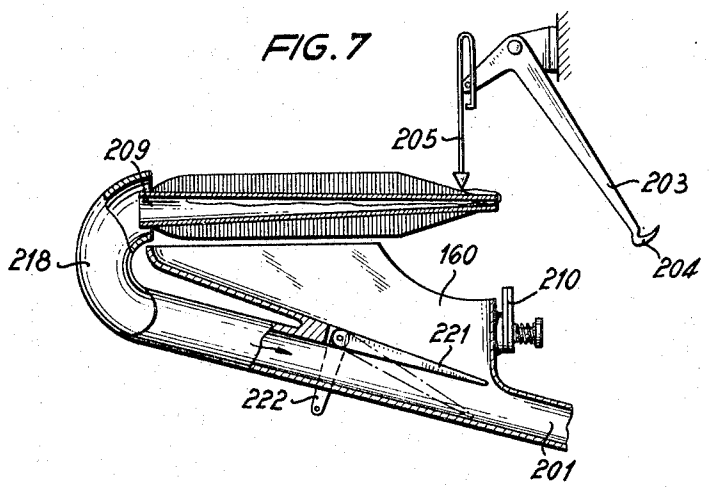


FIG. 7



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METHOD AND APPARATUS FOR READYING THE WINDING OPERATION OF YARN SUPPLY COILS ON COIL WINDING MACHINES

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9 Claims. (Cl. 242—35.5)

Our invention relates to yarn coil winding machines with automatic coil-exchanging and yarn-tying devices. Such machines are employed in textile manufacture for producing relatively large packages of yarn, such as cross-wound coils or "cheese" from a plurality of yarn supply coils such as spinning cops coming from spinning machines.

U.S. Patent No. 3,111,280 to Walter Reiners et al. may be referred to for better understanding of the state of the art and for further description of various elements of the machine described herein.

Spinning cops have been provided with a reserve winding or tip bunch at the core tip of the cop or at the foot of the core or at both in order to facilitate the winding operation. These reserve windings can be unwound at the core winding machine so as to permit a yarn end of the cop to be seized without difficulty. Since the unwinding of a reserve winding located at the core foot of the coil would mean a rather considerable expenditure of work for the usual winding station of a yarn winding machine, the spinning machines are equipped to provide a reserve winding at the tip of the coil core at the end of the spinning process. It has also been previously suggested, to convey the coil coming from the spinning machine to a readying device in which the final steeply pitched turns on the peripheral surface of the coil and, where necessary, the reserve winding at the core foot of the coil is removed or unwound and a reserve winding or tip bunch is then formed at the tip of the coil core. Although the entire industry had been engaged for many years in attempting to provide solutions for the problem of automatically pulling off the reserve winding on the tip of the coil core at the individual winding stations of a yarn winding machine and to ready the yarn for the knotting operation, suitably constructed coil winding machines could not be carried out in practice since the devices for removing the tip bunch either were extremely expensive or relatively highly susceptible to derangement.

It is accordingly an object of our invention to provide a method and apparatus of readying the yarn end of a supply coil in a yarn winding machine in a manner that would avoid the disadvantages of the known machines.

It is a further object of our invention to provide a method and apparatus which will greatly reduce the expense of seizing the yarn end of a spinning cop at the winding station.

It is also an object of our invention to provide an apparatus in which only one device for readying the yarn ends of the coils (which device is necessarily complex and expensive) need be provided for a large number of winding stations, while the devices at the individual winding stations for seizing the yarn end and for readying the yarn end for the knotting operation can be of extremely simple and trouble-proof construction.

It is a further object of our invention to provide a device for readying supply coils which will greatly reduce the cost of the winding machine as a whole, notwithstanding the fact that a special readying device must be provided for readying the yarn end within the bore of the coil core, which constitutes an expense not incurred for

the devices employed until now for supplying the spinning cops to the winding stations. This over-all cost reduction for the winding machine is brought about by the fact that the devices at each individual winding station for seizing and readying the yarn end for the unwinding operation are extremely simplified. Consequently, only a single expensive device is necessary for a large number of winding stations while relatively simple devices are employed at the individual winding stations.

With the foregoing in view and in accordance with our invention, we do not ready the yarn end any longer in the heretofore usual manner of providing a reserve coil at the tip of the coil core, but rather we supply to the winding stations spinning cops within the hollow cores of which the yarn ends are readied.

In accordance with one aspect of our invention, we provide a method of readying the unwinding operation of a supply coil, such as a spinning cop by first removing the final turns of the yarn on the coil and inserting the yarn end into the hollow core of the coil. Thereafter the coil is automatically fed to the winding stations of a coil winding machine and the yarn end is removed at that station by vacuum from the bore of the coil core and readied for the knotting device.

In accordance with further aspects of our invention, we provide a supply coil readying machine for carrying out the method of our invention for several or all of the winding stations of one or more winding machines. The supply coil readying machine is provided with means for removing the final yarn turns on the coil and inserting the yarn end into the bore of the coil core, and with suction means located at the winding stations for seizing the yarn lying within the bore of the coil cores.

Other features which are considered as characteristic for the invention are set forth in the appended claims.

Although the invention has been illustrated and described as method and apparatus for readying the winding operation of yarn supply coils in coil winding machines it is nevertheless not intended to be limited to the details shown, since various modifications and structural changes may be made therein without departing from the spirit of the invention and within the scope and range of equivalents of the claims.

The construction and method of operation of the invention, however, together with additional objects and advantages thereof, will be best understood from the following description when read in connection with the accompanying drawings, in which:

FIG. 1 is a front elevational view of a multi-station winding machine provided on its front side with a supply coil readying apparatus according to the invention.

FIG. 2 is a side elevational view of a single winding station and of the supply-coil yarn readying apparatus.

FIG. 3 is an enlarged elevational view partly in section showing a detail of the readying device of FIG. 1 as viewed from the rear.

FIGS. 4 to 7 are elevational views partly in section of part of the readying device shown in FIGS. 1 and 2 in different stages of operation.

Referring now to the drawings and particularly to FIG. 1, there is shown a multi-station winding machine having a pedestal support 1 which carries an inclined table 2 upon which magazine containers 3 and 4 for dispensing a number of spinning cops K contained therein are located. The containers are subdivided into a number of vertically extending chambers, and the cops are piled up vertically in each chamber side to side. The upper portion of the inclined table is provided with the chute 5 through which the cops are guided successively from an opening in the bottom of the magazine chamber 4 onto a readying plate 60 from which they can drop into

the readying device designated by the reference numeral **6** as a whole in FIG. 1 and hereinafter described more fully with reference to FIGS. 4 to 7.

In the readying device **6**, a yarn end is first unwound from the cop delivered to the readying device **6** and is then inserted in the hollow core of the cop as is explained hereinafter with regard to FIGS. 4 to 7. From the readying device, the readied cop proceeds onto an endless chain conveyor **7** provided with inclined holding troughs **37** (FIG. 2) for receiving the ready cops. The conveyor **7** passes along the individual winding stations to supply them with cops in accordance with the need and is entrained at one end about a shaft **38** carried by the pedestal **1**. The readying device **6** is controlled by a feeler **9**, which is switched on or off for example. The feeler **9** inspects the passing trough **37** of the chain conveyor **7** for the presence or absence of a cop at a location just beneath the readying station. If a cop is absent, the feeler **9** rotates in a counterclockwise direction about a pivot supported on the pedestal **1**, thereby releasing the drive mechanism of the readying station. A tappet **10** is then swung against the next cop that is to be readied which is located on the supporting surface **60**, moving this cop into the position in which it is located on a roller pair **61**, **62**, hereinafter described in greater detail with regard to FIG. 3, displacing the previously readied cop located on the roller pair which drops into a chute **10***a* leading to the unoccupied trough **37** of the chain conveyor **7**. If the conveyor trough **37** is occupied, the feeler **9** is prevented by the cop in the trough from turning counterclockwise as shown in FIG. 1 and the readying station accordingly remains inactive.

As shown in FIG. 2, each of the individual winding stations is mounted on a machine frame **11** and comprises a pivotable holder **12** rotatably supporting a take-up spool **13**. The yarn Y being unwound from the supply coil K passes through a tensioner **18**, thence over a guiding drum **14** onto the take-up spool **13**. The take-up spool **13** is frictionally entrained by the drum **14** to rotate at a constant peripheral speed while the yarn Y passing through a guiding groove of the drum **14** as shown in FIG. 1 is wound on the take-up spool so as to form a cross-wound yarn package. Two yarn seeking members **15** and **16** seek and seize the respective yarn ends of the take-up spool and of the supply coil in the event of yarn breakage or depletion of the preceding supply coil and deliver the two ends to a knotter **17** which ties them together. The yarn seeking member **15** is in the form of a suction tube pivoted on the frame **11** and has a nozzle opening which extends along the take-up spool **13**. When yarn breakage occurs or a supply coil is depleted, a non-illustrated yarn feeler which normally engages the yarn Y deflects causing the guiding drum **14** and the take-up spool **13** to be stopped or to be rotated only slightly in the opposite rotary direction in order to slightly unwind the spool **13**. The suction member **15** is connected to a non-illustrated source of suction and seizes the yarn end of the take-up spool **13**. Thereafter, the suction member **15** pivots in a clockwise direction shown by the arrow along the circular dot and dash arc associated therewith so that the one end from the take-up spool **13** is placed up against the knotting device **17**.

The yarn seeking member **16** similarly of suction-tube construction is pivoted on the machine frame **11** from a position in which it seizes the yarn end coming from the cop K, that is mounted on the mandrel **19**, when a yarn break occurs or a newly replaced supply coil has been substituted for a depleted coil, and then swings along the associated dot and dash arc in the counterclockwise direction of the arrow so that the yarn end from the supply coil intersects with the yarn end from the take-up coil at the knotting device **17** which thereafter ties both yarn ends together before the winding of the take-up spool is resumed.

The mandrel **19** which supports a supply coil is pivotably mounted so that it can be moved from the illustrated solid-line position to a dotted-line position to the right of FIG. 2 in which it can be donned with a fresh supply coil or it can be pivoted to the left to the dotted-line position in which the depleted supply coil is doffed therefrom by the pivotable doffing member **21**. The mandrel **19** is moved to the doffing position only after a sensing member (not shown) responds to the absence of yarn between the supply cop and the tensioner **18**, indicating that the supply coil is exhausted. When the mandrel **19** is in the doffing position, the doffing member **21** pivots counterclockwise and ejects the empty core of the exhausted supply coil from the mandrel. The coil then drops in the direction of the associated arrow onto a conveyor belt **22** which carries it away from the machine.

In the donning position of the mandrel **19**, the mandrel is located on a trough-shaped slide **23** having an upwardly extending trough-shaped slideway **25** upon which a new supply cop discharged from the trough **37** in a manner hereinafter described, lies in readiness. A latch **24** keeps the new supply cop supported on the slideway **25** from sliding down into the slide **23**. During the coil replacement operation, the latch **24** is moved downwardly so as to permit the cop to slide from its position on the slideway **25** downwardly to its position shown by the dot and dash lines on the slide **23** onto the mandrel **19** which is thereafter turned upwardly to place the cop in the unwinding position shown by the solid lines. The latch **24** is actuated by a linking rod **40** which engages an elongated slot **26** that is firmly secured to the shaft on which the mandrel **19** pivots. When the mandrel **19** is turned toward the left in FIG. 2 to eject an empty core in the aforedescribed manner, the release of the latch **24** is not desired. During this ejection operation, therefore, the end of the linking rod **40** slides inactively in the slot **26**. However, when the mandrel moves clockwise to the donning position, the rod **40** is entrained by the arm **27** to release the latch **24** so that the replacement cop can slide from the slideway **25** onto the mandrel **19** in the slide **23**. When the mandrel and the newly donned supply coil are moved to the solid-line unwinding position shown in FIG. 2, the latch **24** is returned to its closing position illustrated in FIG. 2, suitably biased by a spring **28** which assists in raising it and urging it into cop restraining position. A rocker arm **29** pivotable on frame **11** is linked to the doffing member **21** and is connected through a linking rod **45** located beneath the linking rod **40** to a driving arm of a rotatable suction tube **30**, in a manner such as is shown in Patent No. 3,111,280 which causes entrainment of the suction tube **30** only when a yarn seeking operation is to be performed in which case the rocker arm **29** that is continuously reciprocated moves the suction tube **30** in front of the tip of the cop K lying on the slideway **25** so as to suck in the yarn which has already been readied within the bore of the cop core in a manner hereinafter described.

A feeler arm **41** pivoted at **46** to the frame structure **11** of the machine and actuated by the individual chain members of the conveyor **7** is located above the readying slideway **25**. Each trough **37** is provided with a nose **44** that presses upon a nose engaging feeler lever **43** as the trough **37** passes a winding station. The consequent motion of the feeler lever **43** is then transferred by a spring **76** onto a rod **42** connected by an arm **77** with the feeler **41**. When a cop is located in the readying slideway **25**, the feeler **41** is prevented from following the swinging movement of the nose engaging feeler lever **43** so that the spring **76** becomes compressed by the movement of the lever **43**. However, when no cop is located in the slideway **25**, the motion of the feeler lever **43** causes the rod **42** to displace a stop collar **47** toward the right which engages the nose **50** of the closure member **39** thereby opening the closure member and releasing a new cop from the trough **37** on the chain conveyor. The cop then slides into the position shown on the slideway **25**.

The rod 42 and the stop collar 47 attached thereto tend to reciprocate horizontally under the action of the lever 43. During this reciprocation, the stop 47 abuts the nose 50 of the closure member 39 and turns the latter counterclockwise so that the cop can drop down from its position on the trough 37 to the position in the slideway 25 if no cop is already present in the slideway 25. When there is a cop present in the slideway 25 as shown in FIG. 2, then the feeler arm 41 prevents the rod 42 from reciprocating. Stop collar 47 therefore cannot abut the closure member 39 and the swinging action of the feeler 43 is taken up by the spring 76 without moving the rod 42. The swinging motion of the lever 43 is performed by inclined planes against which the lower end of the nose 44 strikes and is more fully described in Patent No. 3,111,280.

As described above with reference to FIG. 1, the individual spinning cops drop from the magazine container 4 through a chute 5 into the readying station 6 of the winding machine where they are supported by a readying plate 60. When the cop is located on the plate 60, it lies opposite the tappet 10 that is controlled through suitable linkages by a cam disc driven by a motor, both not shown but of the type of mechanism described in Patent No. 3,111,280, which shifts the cop from its position on the plate 60 to a position on top of the pair of rollers 61, 62 (FIG. 1, FIG. 3). As shown in FIG. 3, there is located between rollers 61 and 62 an elongated nozzle 160 with a slot like opening at its upper end. The length of the slot at the top of the nozzle 160 as shown in FIG. 4 for example is approximately equal to the length of the cop up to the conical portion at the tip of the cop. The roller pairs 61, 62 are located at the foot of the coil core opposite a displaceable tubular nozzle member 218 which can be moved as shown in FIG. 4 toward and over the foot of the cop that is located on the rollers 61, 62. The tubular member 218 and the elongated slot nozzle 160 communicate with a suction conduit 201. A hinged valve or flap 221 actuated by an arm 222 selectively connects either the tubular member 218 or the slot nozzle 160 with a source of negative pressure (not shown). The movement of the hinged valve 221 takes place simultaneously with the tilting movement of the tubular member 218 in a manner described and shown in detail in Patent No. 3,111,280.

With the mechanism shown in Patent No. 3,111,280, as soon as a new coil is placed by the tappet 10 onto the drive rollers 61, 62, the coil is driven in a direction opposite to that of its yarn turns. At the same time, the suction nozzle 218 is moved in the direction of the coil axis so that it is placed over the coil foot as shown in FIG. 4 and simultaneously connects the same with the source of suction air 201 by suitably moving the hinged valve to the position shown in FIG. 4. Under the effect of the suction current, the yarn originally contained in the form of a reserve winding on the foot of the cop core is pulled off axially, and a portion of the nearly adjacent steeply pitched final turns on the peripheral surface of the cop is also unwound and pulled off into the suction member 218. Thereafter, as shown in FIG. 5, the suction member 218 is again displaced from the foot of the coil core and a scissors 217 is introduced in a manner shown in Patent No. 3,111,280 between the foot of the coil and the displaced suction member 218 and severs the excess yarn end which is removed by the suction current. The cop as shown in FIG. 5 is further rotated in the direction of the arrow 202 by the roller pair 61, 62 in a reverse direction as described in Patent No. 3,111,280 so as to unwind the remaining final winding entirely from the cop, the yarn end of which being sucked into the slot nozzle 160 and the suction conduit 201, as the valve flap or hinged valve 221 simultaneously connects the slot nozzle 160 with the suction source 201 and disconnects the tubular nozzle member 218 from the latter. Thus the yarn now extends from the forward tip of the conical portion of the cop into the slot nozzle 160. The roller pair 61, 62 performs only a given number of rotations so that only a specific yarn length is unwound. As is seen in FIG. 5, the end length of yarn then lies at the right-side edge of the suction nozzle 160 and is aligned with and opposite to the tip of the cop core. It is of course apparent that the very same mechanism can also be employed for a cop which does not have a reserve winding at the foot of the cop core and only has the final steeply pitched turns at the peripheral surface of the cop. In such a case the yarn ending of the final steeply pitched turns is seized and drawn off by the nozzle 160 as the cop is rotated.

In order to convey the yarn to a location in front of the bore opening at the tip of the cop core, a bell crank lever or arm member 203 provided with an end hook 204 is pivotably mounted above the tip of the cop core. After the arm member 203 reaches the position substantially as shown in FIG. 5, it is pivoted to the position shown in FIG. 6 by the hereinafter described mechanism shown diagrammatically in FIG. 5 in a counterclockwise direction and the hook 204 thereby engages and pulls the yarn end slightly out of the slotted suction tube 160 so that a portion of the yarn extends in front of the right-side bore opening at the tip of the coil core. The suction member 218 is simultaneously placed opposite the foot of the coil core so that a suction current is produced through the bore of the cop core. The yarn lying in front of the cop tip as shown in FIG. 6 is thereby seized by the suction current and is drawn into the bore of the coil core after a portion of the yarn end extending from the hook 204 into the slotted suction tube 160 is severed by a scissors 210 located on the side of the suction tube 160. The severed portion of the yarn end is then sucked away through the suction channel 201. The yarn end now extending from the cop as shown in FIG. 7 is then sucked into the bore 209 of the cop core. In order to prevent an undesirably long length of yarn to be unwound from the cop by the suction current of the nozzle 160 in the position of FIG. 6, a gravity-operated pin 205 is slidingly connected to the arm member 203, on a component arm extending from said arm member 203. The pin 205 has a rear portion bent back on itself so as to provide a slideway for sliding on a peg carried by the component arm that extends from the arm member 203. A point is provided at the free end of the pin 205. As the arm member swings to the right side as shown in FIGS. 4 to 7, the component arm of the arm member 203 moves counterclockwise so that the point of the pin 205 engages the conical surface of the cop thereby creating a barrier against unwinding of the yarn as shown in FIG. 6 beyond the point at which the pin 205 engages the cop. The completely readied cop is shown in FIG. 7, the yarn end being inserted already in the bore 209 of the cop core. After the suction tube 218 is again displaced as shown in FIG. 5 and the gravity-operated pin 205 is raised due to the return motion of the arm member 203, the completely readied cop is then able to be delivered to the conveyor chain 7 in a manner such as is described hereinabove with regard to FIG. 1 and also in Patent No. 3,111,280.

An example of a mechanism for pivoting the arm member 203 and actuating the scissors 210 is illustrated diagrammatically in FIG. 5. A normally open switch S_1, is closed by the counterclockwise movement of the arm 222 when it actuates the flap 221 to connect the suction conduit 201 with the tubular member 218, which has simultaneously been placed over the foot of the cop by the mechanism described in Patent No. 3,111,280. The solenoid R_1 is consequently energized by the power source E to move the plunger P pivotably connected to the arm member 203, against the restoring bias of the compression spring 250 toward the right side of FIG. 5 so as to place the arm member 203 in the position shown in FIG. 6 in which the yarn end is entrained by the hook 204. Upon reaching the latter position, the arm member closes a normally open switch S_2 energizing the solenoid R_2 whose

plunger actuates the scissors 210 which severs the yarn end that is sucked away in the suction conduit 201.

It is, of course, understood that a mechanism for pivoting the arm member 203 and actuating the scissors 210 can also be mechanically or hydraulically operated and can furthermore take an entirely different form from that shown schematically in FIG. 5 just as long as the desired movement of the arm member 203 and scissors 210 is effected.

Although the embodiment shown and described is that of a spinning cop which is provided with a reserve winding at the foot of the cop 4, as has been mentioned before, the invention also has within its scope a means of readying the cop which has only a final number of steep turns or windings but has more reserve windings at the foot of the coil core. Consequently, in a manner similar to that described herein it is also possible to unwind a reserve coil or tip bunch located at the tip of the cop core and to insert these yarn ends into the bore of the cop core by suction in accordance with our apparatus and method. Individual devices for carrying out separate operations have already been suggested in many different forms, so that a separate description thereof is necessary since they do not anticipate the invention of this application. It is of importance in the case of our invention that there is provided for several or all winding stations of one or more yarn winding machines a supply coil readying machine which has means for removing the final steeply pitched turns on the peripheral surface of the coil and if necessary also the additional or reserve windings and for inserting the yarn end into the bore of the coil core, this supply coil readying machine being for example in the form illustrated in FIGS. 3 to 7. Furthermore, it is also an important part of our invention that the coils are fed automatically to the winding stations of the yarn winding machine at which suction means are provided which seize the yarn lying ready in the bore of the cop core. The apparatus shown in FIG. 2 is employed for such a purpose.

We claim:

1. In the art of readying hollow-core spinning cops having a final length of yarn forming steeply wound final turns extending from tip to foot on the peripheral surface thereof, for an unwinding operation in a multi-station yarn winding machine having means at each station for knotting a yarn end of a spinning cop with a yarn end of a take-up package being wound at the station, the method which comprises removing a yarn end portion of the final length from the cops, inserting at least part of said end portion into the hollow core of the respective cop, conveying the cops to the respective winding stations, removing the yarn end portion from the hollow core of each cop at the respective station, and readying the yarn end for knotting with the yarn end of the take-up package by the knotting means at the station.

2. In the art of readying hollow-core spinning cops having a final length of yarn forming steeply wound final turns extending from tip to foot on the peripheral surface thereof, for an unwinding operation in a multi-station yarn winding machine having means at each station for knotting a yarn end of a spinning cop with a yarn end of a take-up package being wound at the station, the method which comprises removing a yarn end portion of the final length from the cops, drawing at least part of said end portion into the hollow core of the respective cop by suction, conveying the cops to the respective winding stations, withdrawing the yarn end portion by suction from the hollow core of each cop at the respective station, and readying the yarn end for knotting with the yarn end of the take-up package by the knotting means at the station.

3. In the art of readying hollow-core spinning cops of the type having a reserve winding on the core foot and having a final length of yarn forming steeply wound final turns extending from tip to foot on the peripheral surface thereof, for an unwinding operation in a multi-station yarn winding machine having means at each station for knotting a yarn end of a spinning cop with a yarn end of a take-up package being wound at the station, the method which comprises removing the reserve winding from the core foot and severing the same from the cop, unwinding a yarn end portion of the final length from the cop and inserting the same into the hollow core of the respective cop, conveying the cops to the respective winding stations, removing the yarn end portion from the hollow core of each cop at the respective station, and readying the yarn end for knotting with the yarn end of the take-up package by the knotting means at the station.

4. In the art of readying hollow-core spinning cops of the type having an open core tip and foot and having a final length of yarn forming steeply wound final turns extending from tip to foot on the peripheral surface of the cop for an unwinding operation in a multi-station yarn winding machine having means at each station for knotting a yarn end of a spinning cop with a yarn end of a take-up package being wound at the station, the method which comprises unwinding the final turns of the cops, extending the unwound turns adjacent the open core tip, severing a portion of the unwound turns so as to leave a predetermined length of unwound yarn at the yarn end of the cop, applying suction at the open foot of the hollow-core spinning cops so as to suck the predetermined length of unwound yarn into the hollow core of the respective cop, conveying the cops to the respective winding stations, removing the yarn end from the hollow core of each cop at the respective station, and readying the yarn end for knotting with the yarn end of the take-up package by the knotting means at the station.

5. In a multi-station yarn winding machine having at each station means for knotting a yarn end of a hollow-core spinning cop having a final length of yarn forming steeply wound final turns extending from tip to foot on the peripheral surface thereof, with a yarn end of a take-up package being wound at the station and means for exchanging a depleted cop with a new cop at each station, a cop readying device for a plurality of the winding stations comprising means for removing an end portion of the final length of yarn from the cop and inserting at least part of said end portion into the hollow core of the respective cop, conveyor means extending from said cop readying device along the winding stations for replenishing the depleted cops at said winding stations with new cops readied by said readying device and conveyed to said stations by conveyor means, and means provided at each of said winding stations for seizing the yarn end inserted in the hollow core of the respective new cop and passing the yarn end to said knotting means for knotting the same with the yarn end of the respective take-up package.

6. In a multi-station yarn winding machine having at each station means for knotting a yarn end of a hollow-core spinning cop having a final length of yarn forming steeply wound final turns extending from tip to foot on the perihperal surface thereof, with a yarn end of a take-up package being wound at the station and means for exchanging a depleted cop with a new cop at each station, a cop readying device for a plurality of the winding stations comprising means for removing an end portion of the final length of yarn from the cop and suction means for drawing at least part of said end portion into the hollow core of the respective cop, conveyor means extending from said cop readying device along the winding stations for replenishing the depleted cops at said winding stations with new cops readied by said readying device and conveyed to said stations by said conveyor means, and suction means provided at each of said winding stations for withdrawing the yarn

end inserted in the hollow core of the respective new cop and passing the yarn end to said knotting means for knotting the same with the yarn end of the respective take-up package.

7. In a multi-station yarn winding machine having at each station means for knotting a yarn end of a hollow-core spinning cop of the type having a reserve winding on the core foot thereof and having a final length of yarn forming steeply wound final turns extending from tip to foot on the perpiheral surface thereof, with a yarn end of a take-up package being wound at the station, and means for exchanging a depleted cop with a new cop at each station, a cop readying device for a plurality of the winding stations comprising means for removing the reserve winding from the core foot of the cop, severing means for severing the reserve winding from the cop, means for unwinding a yarn end portion of the final length from the cop, means for inserting at least part of said end portion into the hollow core of the respective cop, conveyor means extending from said cop readying device along the winding stations for replenishing the depleted cops at said winding stations with new cops readied by said readying device and conveyed to said stations by said conveyor means, and means provided at each of said winding stations for seizing the yarn end inserted in the hollow core of the respective cop and passing the yarn end to said knotting means for knotting the same with the yarn end of the respective take-up package.

8. In a multi-station yarn winding machine having at each station means for knotting a yarn end of a hollow-core spinning cop having a final length of yarn forming steeply wound final turns extending from tip to foot on the peripheral surface thereof, with a yarn end of a take-up package being wound at the station, and means for exchanging a depleted cop with a new cop at each station, a cop readying device for a plurality of the winding stations comprising means for unwinding a yarn end portion of the final length from the cop, means for severing part of the yarn end portion therefrom so as to leave a predetermined unwound length of yarn at the yarn end of the cop and suction means for drawing said unwound length of yarn into the hollow core of the respective cop, conveyor means extending from said cop readying device along the winding stations for replenishing the depleted cops at said winding stations with new cops readied by said readying device and conveyed to said stations by said conveyor means, and means provided at each of said winding stations for withdrawing the yarn end inserted in the hollow core of the respective cop and passing the yarn end to said knotting means for knotting the same with the yarn end of the respective take-up package.

9. In a multi-station yarn winding machine having at each station means for knotting a yarn end of a hollow-core spinning cop with a yarn end of a take-up package being wound at the station, and means for exchanging a depleted cop with a new cop at each station, a cop readying device for a plurality of the winding stations comprising means for unwinding a yarn end portion from the cop, means for severing part of the yarn end portion therefrom so as to leave a predetermined unwound length of yarn at the yarn end of the cop and suction means for drawing said unwound length of yarn into the hollow core of the respective cop, conveyor means extending from said cop readying device along the winding stations for replenishing the depleted cops at said winding stations with new cops readied by said readying device and conveyed to said stations by said conveyor means, means provided at each of said winding stations for withdrawing the yarn end inserted in the hollow core of the respective cop and passing the yarn end to said knotting means for knotting the same with the yarn end of the respective take-up package, a pivotable arm member having means at one thereof for entraining said unwound yarn end portion when said arm is pivoted to a position axially away from the hollow-core cop whereby said yarn end portion extends over the tip of the cop and can be sucked into the hollow core, and pin means slidably suspended from said arm member so as to engage the cop in said position of said arm member at a predetermined point spaced from the core tip for limiting further unwinding of the yarn length.

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