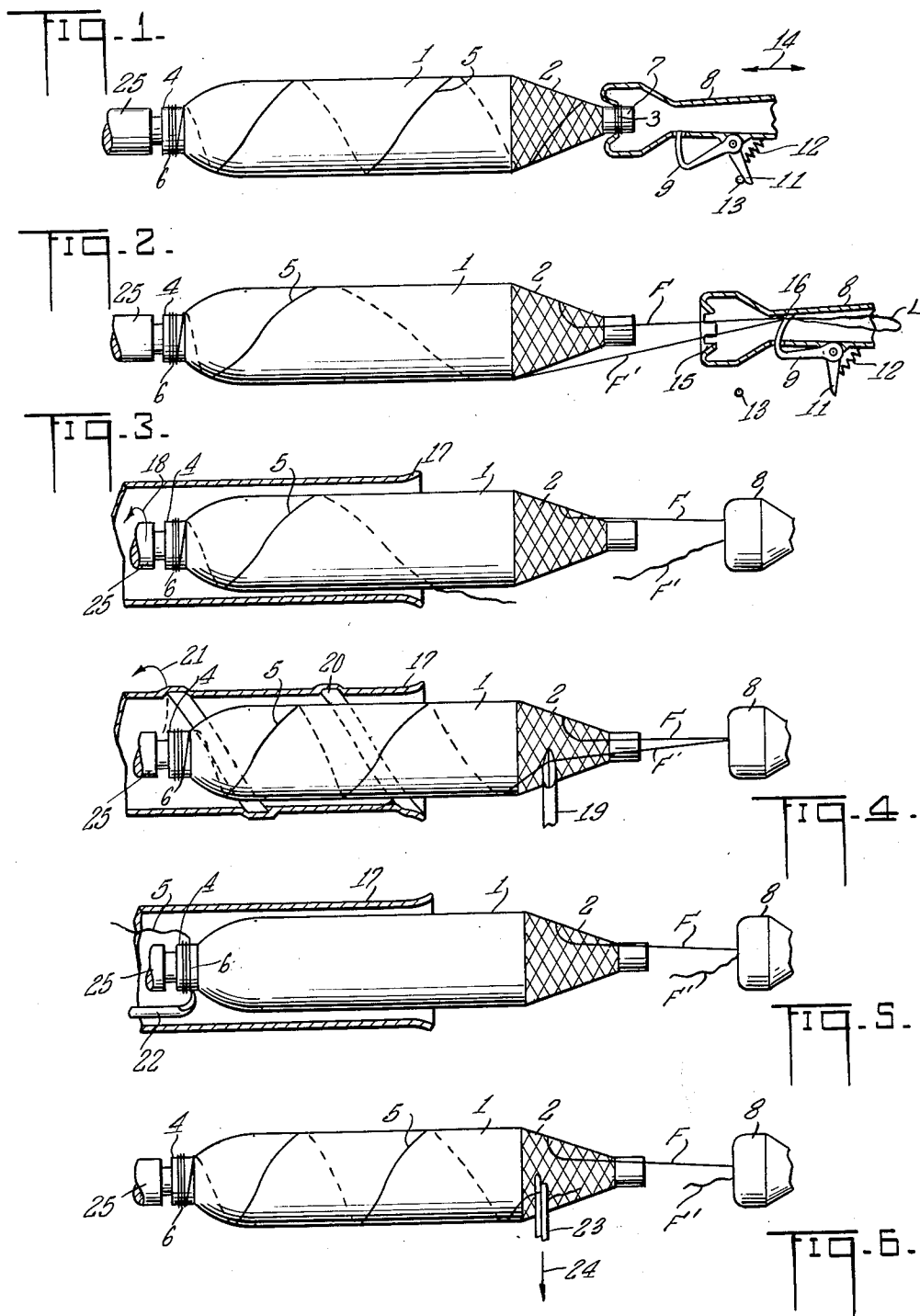


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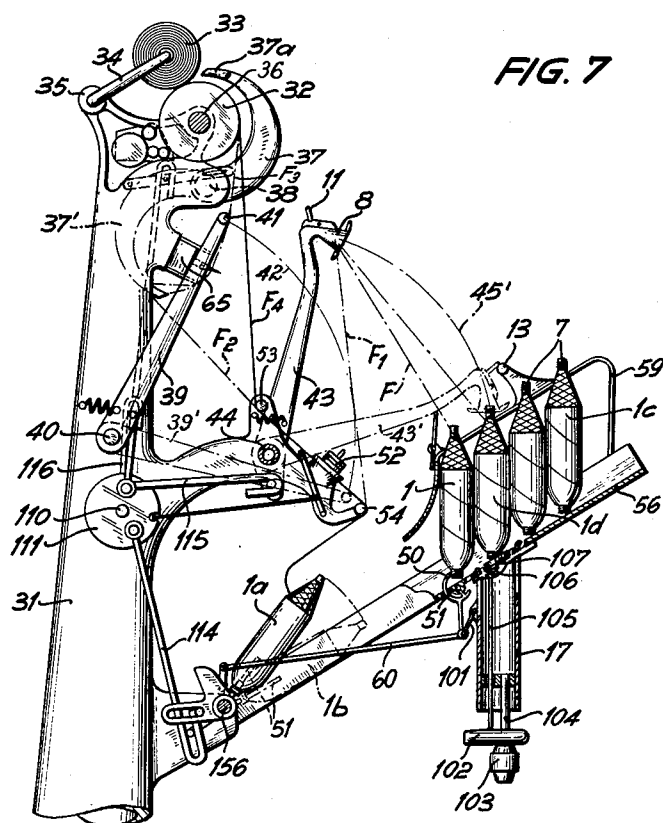


FIG. 7

INVENTOR

Stefan Fürst

June 9, 1964

S. FÜRST

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FIG. 8A

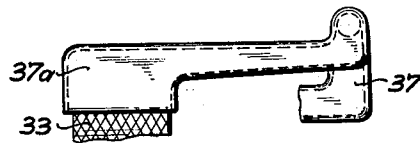
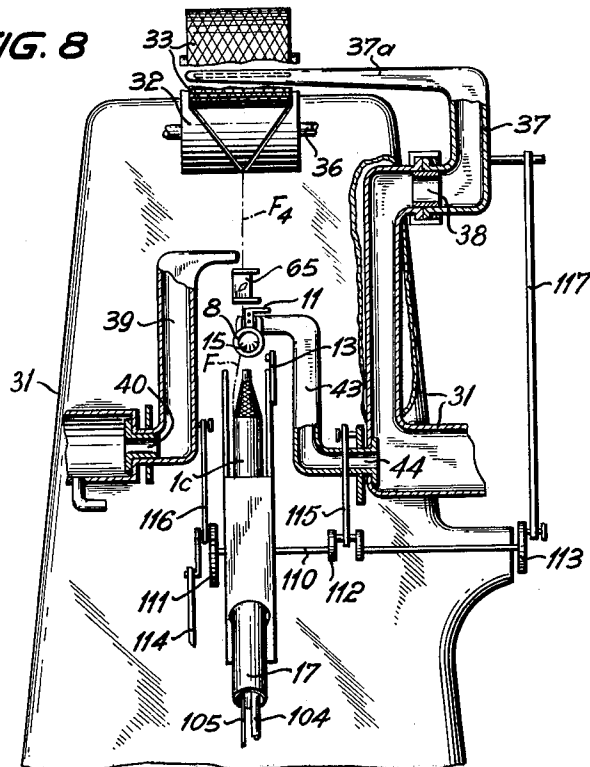


FIG. 8



INVENTOR

Stefan Fürst

June 9, 1964

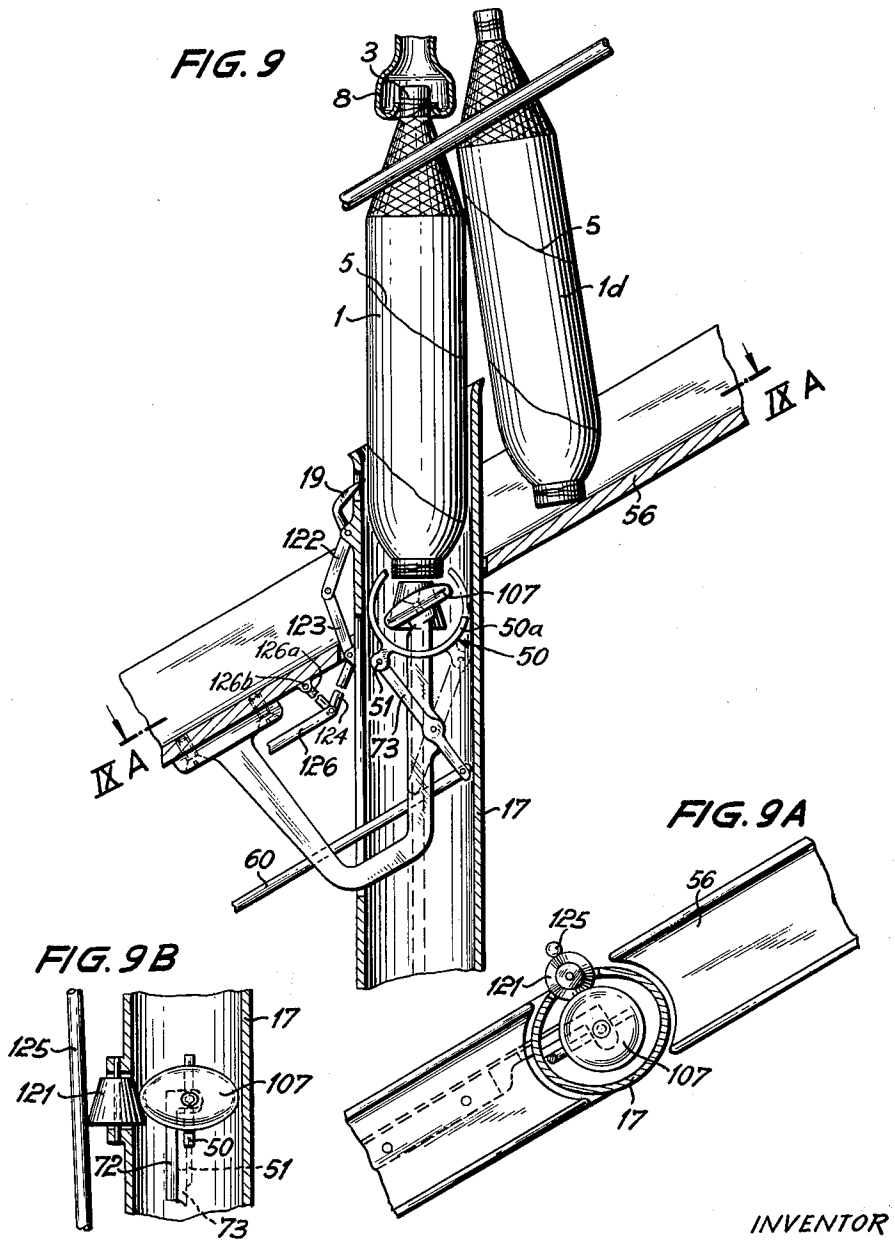
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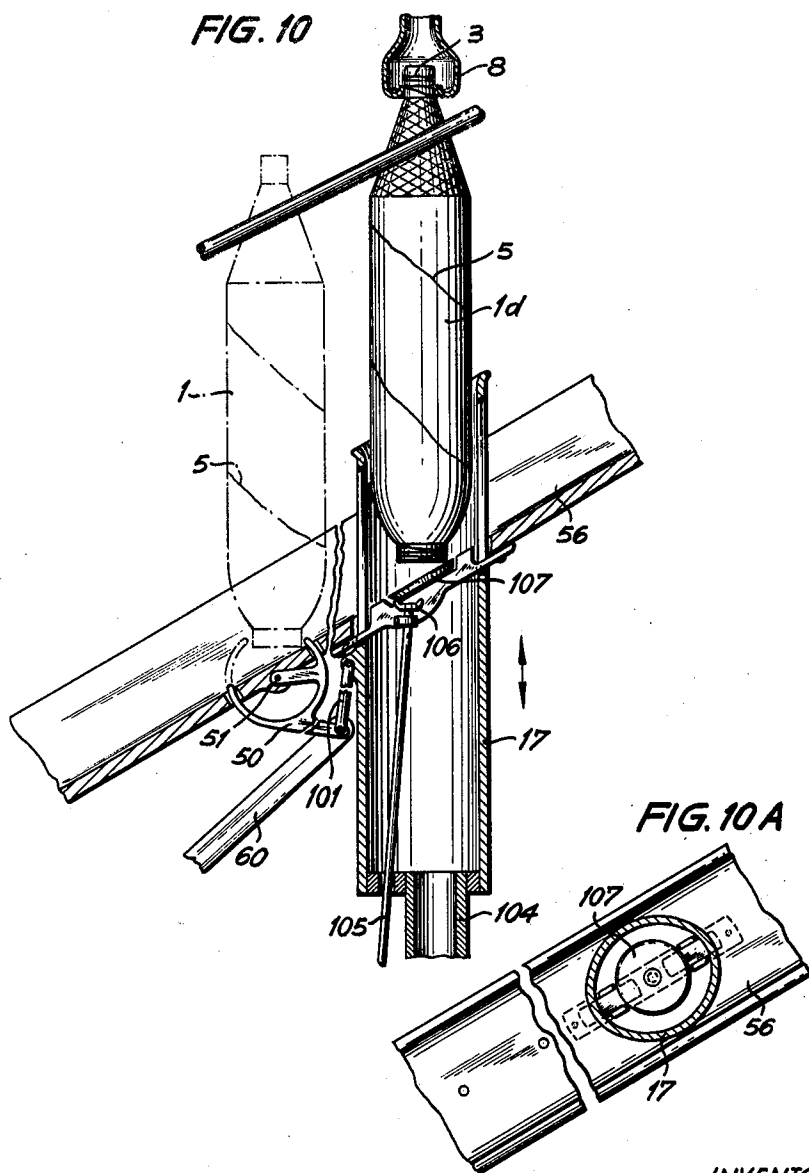
S. FÜRST

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Stefan Fürst

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METHOD AND MEANS FOR PREPARING SPINNING COPS FOR REWINDING

Stefan Fürst, Monchen-Gladbach, Germany, assignor to
Walter Reiners, Monchen-Gladbach, Germany
Filed Feb. 2, 1961, Ser. No. 87,485
Claims priority, application Germany Oct. 18, 1956
18 Claims. (Cl. 242—35.6)

My invention relates to a method and means for preparing spinning cops for rewinding.

This application is a continuation-in-part of my copending application Serial No. 690,674, filed October 17, 1957, now abandoned, and assigned to the assignee of the present application.

The invention will be described with reference to the drawings in which:

FIG. 1 shows an example of a spinning cop, as it comes from the spinning machine, inserted into a device for commencing the unwinding of the yarn from the cop for the purpose of rewinding the yarn to produce a yarn package of the type needed for further fabrication;

FIGS. 2 and 3 show two subsequent stages of operation relation to the same cop and the same device;

FIGS. 4, 5 and 6 show three respective modifications of the device of FIGS. 1-3 for performing the method according to the invention;

FIG. 7 illustrates an example of a winding machine equipped with a device according to the invention;

FIG. 8 is in the nature of a front view of FIG. 7, but modified to schematically represent the spacial relationships of the suction arms with each other, and partially cut away to show the air flow passage;

FIG. 8A is a bottom view of a detail of FIG. 8;

FIG. 9 is an enlarged view of a modification of the detail of FIGS. 7, 8 and 10;

FIG. 9A is a plan view taken along line IXA—IXA of FIG. 9;

FIG. 9B is a vertical cross section through the center of the tube of FIG. 9A; and

FIGS. 10 and 10A illustrate in elevation and plan an enlarged view of a portion of the lower right hand part of FIG. 7.

As a rule, spinning cops coming from the spinning machine must be rewound into a yarn package, usually a cross-wound coil (cheese), of the particular shape and yarn length required for the further fabrication. In such spinning cops, the portion of the yarn last wound onto the tubular core of the cop 1 (FIG. 1) is located near the tip 7 of the cop, but the last end 5 of the yarn is carried back over the surface of the yarn mass so as to extend from the tip 7 to the foot 4 of the core. The pitch of this surface winding, comprising only a few turns, is very large compared with the normal winding pitch of the cop. In general, a reserve winding 6 is additionally formed on the foot 4 of the core. It has also become known to form such a reserve winding of the yarn end at the tip 7 of the core so that the yarn terminates in the tip winding which, when rewinding the yarn in an automatic winding machine, is pulled off by a gripper. Such tip-wound reserve windings, however, cause difficulty because in the spinning machine the yarn must be carried back toward and onto the foot of the cop. This is necessary because when a completely wound cop is discharged from the spinning machine and is substituted by an empty core, the yarn end should be so located that it can be conveniently placed about the winder mandril in order to facilitate the starting of the next cop winding and for reducing the time needed for the exchanging operation.

When commencing the rewinding of a spinning cop

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in a winding machine, the conventional practice is to first remove the yarn winding 6 from the foot 4 of the cop core and to manually unwind and withdraw the yarn sufficiently to have this end come directly from the uppermost layer of yarn. Such manual preparation is done before placing the cop onto the mandril or cop holder of the rewinding machine. The unwound end of yarn is then tied together with the yarn end coming from the take-up spool in the winding machine.

When performing the rewinding operation in a winding machine of the automatic type, the automatic machinery comprises means which seek and tie the yarn end without manual activity. However, it is then desirable to also perform the above-mentioned pulling-off and preliminary unwinding operation either automatically or in such a manner that the required time of manual activity is reduced to a fraction of that heretofore necessary, thus affording not only a manual insertion of the cop to be rewound but, if desired, also a fully automatic performance from the very start of all operations commencing with the spinning cop as it comes from the spinning machine.

It is an object of my invention to devise a method and means capable of the improved performance just mentioned.

According to my invention, relating to spinning cops that have a reserve winding at the core tip, the seizing and initial unwinding of the yarn end is effected by first applying a gripper device to the reserve winding on the core tip, then pulling the yarn end off the cop whereby a loop is formed by the yarn portion (F in FIG. 2) extending from the gripper to the yarn package of the cop, and by the yarn portion (F' in FIG. 2) extending from the same gripper to the residual end of the yarn 5 located about the periphery of the yarn package. The next step of the method, therefore, is to sever the residual yarn end, preferably near the point of seizure or at a predetermined location.

According to another feature of my invention, the just-mentioned severing is effected by firmly holding and simultaneously pulling both yarn portions (F and F') off the cop because then, due to the much larger pitch of the yarn portion located about the periphery of the cop, this yarn portion will tear, particularly if the yarn is guided over a sharp edge which severs the yarn by rubbing or cutting.

According to a modified feature, however, the yarn may be severed by a cutter or shearing device. It is further possible to sever the yarn by singeing it at a hot piece of wire.

After the severing operation, the yarn end (F) coming directly from the mass of yarn is free for starting the rewinding operation. At this stage, there remains a residual amount of yarn on the foot of the cop core forming a larger or smaller reserve winding.

According to another feature of my invention, this residual amount of yarn is eliminated by suction. Such elimination is facilitated if the residual yarn end is wound onto the core foot only a few number of turns.

If the cop is readily rotatable, for instance placed upon a mandril journaled in anti-friction bearings, then the draft produced by the suction current of air, or the pull imposed upon the yarn end by the above-mentioned seizing device, will cause the freely rotatable cop to turn sufficiently for having the residual yarn end wind itself off the foot while a suction tube is being moved over the cop.

However, the mandril or the cop itself may be driven mechanically to cause unwinding of the residual yarn end from the core foot.

According to another feature, the residual winding on

the core foot may be pulled off axially or may be cut off so that it will fall apart. Particularly suitable for this method are core bodies that are provided with longitudinal or peripheral grooves.

The suction current of air can be given a helical twist. For this purpose, according to another feature of the invention, a suction cylinder surrounding the cop or its foot portion is provided with interior helical channels extending in the direction of the core foot.

It is further possible to impart to the air current a turbulence, eddy-like motion by providing a suitably shaped nozzle at the entrance of the suction tube. The eddy direction in this case is such as to unwind the residual yarn end from the foot of the cop so that the yarn end can unwind itself automatically during the re-winding operation proper. If desired, the suction tube surrounding the cop body may be driven so that during rotation of the tube, the helical flow of air is distributed over the entire surface area of the cop near its foot portion.

The above-mentioned features of the invention will be more fully understood from the embodiments illustrated on the drawing and described presently.

As mentioned above, the spinning cop shown in FIG. 1 has a reserve winding 3 on the core tip 7 in front of the conical portion 2 of the yarn package; and the yarn end 5 extends from the front reserve winding or tip bunch 3 along the surface of the yarn package to the foot 4 of the core in a few turns of much larger pitch than the cop winding proper. The yarn end 5 forms another reserve winding 6 on the foot of the core. The core of the cop is tubular and is mounted on the holder spindle or mandril 25 of a coil-winding machine, this mandril being freely rotatable and preferably journaled in ball or roller bearings (not illustrated).

A tubular nozzle member 8 operating as a gripper and suction device is placed over the core tip 7 and the front reserve winding 3 in coaxial relation to the mandril. The member 8 is provided with a yarn clamp 9 pivotally mounted at 10 to the nozzle member 8 and rigidly joined with an arm 11. A spring 12 biases the arm 11 toward a stationary stop 13. The nozzle member 8 is horizontally displaceable toward and away from the cop as is indicated by a double-headed arrow 14. When the nozzle member 8 is shifted into active position shown in FIG. 1, the arm 11 abuts against the stop 13 so that the stop 13 opens the clamp 9. Suction is then applied through nozzle member 8.

Thereafter the nozzle member 8 is displaced toward the right into the position shown in FIG. 2. In the initial stage of this motion, several claw or barb members 15 of the suction nozzle pull or strip the reserve winding 3 off the core tip 7, and the loop L (FIG. 2) of yarn thus formed is sucked into the nozzle. Simultaneously, the arm 11 moves away from stop 13 so that the spring 12 turns the clamp 9 clockwise about pivot 10. As a result, the yarn portion F coming from the conical portion 2 of the cop winding proper and the yarn F' formed by the surface turns 5, are firmly clamped to the nozzle member.

In the next stage, shown in FIG. 3, the nozzle member 8 has moved farther to the right. The yarn portion F is still kept clamped in the clamping device. However, the yarn end F' is torn due to the overstress resulting from the fact that the steeply pitched return winding 5 resists being pulled off. In this stage, a suction tube 17 is placed over the foot portion of the cop in order to suck off the residual yarn end 5. To facilitate the unwinding of the yarn portion 5, the cop, or the mandril on which it is mounted, is driven in the direction indicated by an arrow 18 in FIG. 3, thus imparting a rotary motion to yarn end 5 about the axis of the cop.

The embodiments illustrated in FIGS. 4 to 5 perform substantially the same method as described above with

reference to FIGS. 1 to 3, with the exception of the modifications described presently.

In each of the embodiments, the above-described rotational motion is imparted to the yarn end 5 after the yarn loop end F' has been severed. In FIG. 4, the grooves 20 in suction tube 17' impart the necessary motion to yarn end 5 to unwind it from the surface of core 1 and from the cop foot 4 where it is present as winding 6.

In the embodiment according to FIG. 4, the severing of the yarn portion F' is effected or promoted by means of a cutter member 19 which acts simultaneously with the seizing operation of gripper 8. During the above-described displacement of the seizing and suction member 8 toward the right, the yarn portion F moves clockwise, whereas the yarn portion F' moves counter-clockwise viewed from the side of the core tip. This difference in motion is taken advantage of inasmuch as the yarn piece F', during displacement of member 8 away from the tip 7, will run automatically onto the edge of the cutter member 19 kept in ready position near the conical portion 2 of the cop. The severed piece 5 of yarn, in the embodiment of FIG. 4, is subjected to a current of suction air produced by means of the suction tube 17. The tube 17 is provided with spiral-shaped grooves 20 which place the air current in rotation in the direction required to unwind the yarn piece 5 from the cop and to then remove it by suction. The direction of air-flow rotation produced by the grooves 20 within the suction tube 17 is denoted in FIG. 4 by an arrow 21.

In the embodiment of FIG. 5, a hook-shaped knife member 22 of the type known, for example, from U.S. Patent 2,685,413 of W. Reiners, issued August 3, 1954, is provided for cutting and pulling the rear reserve winding 6 off the foot 4 of the cop 1. The reserve winding 6 as well as the yarn piece 5 are removed by an air current within the suction nozzle tube 17. The device 22 shown in FIG. 5 is applicable with any of the above-described methods and devices for severing the yarn portion F'.

According to the embodiment of FIG. 6, the yarn end F' is seized by a clamping member 23 and is severed between member 23 and the clamp 9 in the suction nozzle 8 (FIG. 1). Thereafter, the clamping device 23 is moved away from cop 1 in the direction indicated by an arrow 24 with the result that the clamped yarn piece 5 will roll off the surface of cop 1 as well as off the foot 4. After the yarn piece 5 and the reserve winding 6 are thus removed, they are eliminated by a suction tube as described above, while the clamping device 23 is being opened. In the embodiment of FIG. 6, the cop 1 is easily rotatable on a mandril-shaped cop holder 25 to permit the above-mentioned unwinding of yarn piece 5 during motion of clamping device 23 in the direction of arrow 24.

An example of applying the invention in a full-automatic winding machine will now be described with reference to FIG. 7.

The illustrated machine of FIGS. 7 and 8, otherwise similar to the one more fully disclosed in the copending application Serial No. 640,166, filed February 14, 1957, now Patent 2,936,130, is equipped with a device as shown in FIGS. 1 to 3.

The frame structure of the machine comprises a tubular standard 31 designed as a suction conduit. Mounted on standard 31 is a rotatable yarn-guiding drum 32, provided with the known guiding groove. A take-up spool 33 is journaled on a frame structure 34, which is pivoted at 35 to the standard 31. The yarn-guiding drum 32 is mounted on a revolvable shaft 36. When drum 32 is driven, it imparts rotation to the body of yarn wound up on spool 33 and at the same time the groove of the drum guides the oncoming yarn back and forth along the spool 33. A suction tube 37 of arcuate shape is pivoted about a hollow shaft 38 and communicates through the pivot with the interior of the tubular standard 31. The suction

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tube 37 has a suction opening 37a at its upper end and can be turned about shaft 38 to the position 37' illustrated by dot-and-dash lines.

An arm 39, designed as a suction tube and gripper, is pivoted at 40 to the standard 31 and is likewise in communication with the interior of the standard through the pivot. The upper end 41 of arm 39 is designed to receive the yarn. Arm 39, during operation, turns about pivot 40 along a circular path 42 into a position 39' illustrated by dot-and-dash lines. An arm 43, also of tubular design to operate as a suction tube, is pivoted to standard 31 at hollow pivot means 44. The upper end of arm 43 forms the nozzle member 8 described with reference to FIGS. 1 to 6. The arm 43, during operation, turns about pivot 44 along a circular path 45' into the position 43' illustrated by dot-and-dash lines.

The suction tube 37 and the arms 39 and 43, as mentioned above, are all in communication with the interior of the tubular standard 31. The tubular standard is connected to a vacuum conduit or pump, the air suction required for the operation of parts 37, 39, 43, and others described below, being applied through the hollow standard 31.

Also mounted on the standard 31 are a thread tensioner 52 and a thread-guiding pin 53. Another yarn-guiding pin 54 is mounted on the opposite side of the yarn tensioner 52. The yarn F coming from the supply cop 1a passes first over the pin 54, then around the thread tensioner 52, and then under the pin 53 toward the thread-guiding drum 32, whence it passes onto the take-up spool 33.

The yarn-supplying cop 1a is speared on a thorn 57 which is pivoted at 156 on standard 31. Consequently, the cop 1a, when in its uncoiling position on the thorn, can be pivoted or rotated about the axis of pivot pin 156, so that it can be turned into the position 1b shown by dot-and-dash lines. Secured to the machine standard 31 is a magazine 56 which accommodates a number of reserve cops such as those denoted by 1 and 1c. The tubular core of each cop projects out of the body of yarn and carries on its tip 7 a number of turns as described above. The magazine 56 is provided with two parallel guiding stirrups 59 which support the cops at their upper ends, whereas the bottom portion of the magazine slidably guides the lower ends of the cops so that they tend to travel by gravity toward a lowermost stop position. A lock 50 mounted on a horizontal pivot pin 51 retains the lowermost cop 1 in a magazine 56 in a predetermined ready position. The lock 50 is actuated by a control rod 60. The two guiding stirrups 59 located on the respective sides of the cops have their front ends 64 connected with each other to form a curved abutment so disposed that the top portion of the cop 1 cannot move downward further than to the position shown. Only the foot portion of the lowermost cop 1 in magazine 56, when released by the lock 50, can travel toward the left so that it will slide down into the position 1b. In this position, the lowermost cop is speared upon the thorn 57.

Operation of the machine according to FIGS. 7 and 8 is as follows:

Supply coils 1c are kept in reserve within the magazine 59. The coils have a reserve winding at the core tip 7. As soon as a coil is released, it passes to the position 1b and is then transferred by the control mechanism to the position 1a where it is unwound. When this takes place, a lock 50 is actuated through its limbs 50a. The winding is pulled off upwardly when the coil is in the penultimate position and before it passes to the position 1. The pulling operation is performed by means of an arm 43. The arm 43 carries at its front end a gripper member 8 which removes the reserve winding. In the penultimate position of the cop, the bottom side 56 of the magazine has an opening so that a suction tube 17 can be pushed up from below around the coil. The movement of the suction tube is effected by the same rod 60 which also actuates the lock 50. The movement of the arm 60 is transmitted by a

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pusher arm 101 to the tube 17. During this upward motion of the tube 17, it passes over the bottom portion of the cop 1d. Mounted on the bottom side of the tube 17 is a fan 102 actuated by an electric motor 103. Through the tube 104, the fan exhausts the air from the interior of the tube 17. The same motor 103 drives the shaft 105, if desired, through a transmission gearing (not illustrated). The upper end of shaft 105 carries a friction wheel 106 which enters into engagement with a rotatable disc 107 when the tube is in the upper position. However, it is also possible to make the tube 17 displaceable and to give the fan 102 with the suction tube 104 a fixed mounting. In this case, a continuous contact exists between the friction disc 106 and the wheel 107 so that the wheel 107 is driven continuously.

Prior to lifting of the tube 17, the arm 43 has already become lowered and the seizing member 8 has seized the tip winding and has taken it along in the upward direction. During this operation, the yarn has been torn at a predetermined location so that the yarn end extending to the winding is free at the lower or foot end of the coil and thus is entrained and unwound by the current of air. The coil remains in this position until the lock 50, whose limbs 50a are pivoted at 51, is again closed. In this stage, the tube 17 is lowered and the prepared coil glides with its lower portion toward the left. It strikes against the lower, upwardly moving limb 50a of the lock 50 and remains at this location until a coil exchange becomes necessary due to depletion of the coil 1a. During this waiting period, the preparation of a second coil in the penultimate reserve position is not necessary. When a coil exchange takes place, the cycle of operations commences anew. The next following coil is prepared by pulling the yarn winding off the tip, by unwinding and removing the residual yarn end by suction at the foot; and the prepared coil is then kept in readiness until the coil exchange takes place.

The individual operating members are driven from a rotating shaft 110. Several control cams 111, 112, 113 are mounted on shaft 110. Cam 111 cooperates through a control rod 114 with the thorn for holding the yarn supply coil, and also cooperates through a rod 115 with the arm 43. The cam 112 cooperates with the arm 39 through the rod 116. Cam 113 cooperates through the rod 117 with the arm 37.

Assume that during the operation of the winding machine, the cop 1, then in unwinding position, has run empty. This actuates a sensing device such as a yarn feeler (not shown). The empty core is then automatically eliminated as the thorn 57 turns downwardly on its pivot 56. Simultaneously, the arm 43 moves its nozzle member 8 along the circular path 45'. When the arm 43 is in its lowermost position 43', the nozzle member 8 enters over windings on the tip of cop 1. Upon the subsequent return movement of member 8 in the upward direction, the starting end of the yarn is pulled off the cop as explained above with reference to FIGS. 1 to 3. The removed yarn is in the position F (FIG. 7) at the end of the return movement.

During that movement, the yarn-guiding drum 32 is temporarily rotated at slow speed in the reverse direction so that the yarn end is laid free. This yarn end is sucked into the suction tube 37. As this is being done, the lowermost cop 1 is released from the magazine 56 by actuation of the lock 50 due to operation of the rod 60 and drops into the position 1b where it is speared upon the thorn 57 which is now in lowered position. Shortly thereafter, the thorn 57 is lifted and transfers the cop into the position 1a.

The starting end of the cop, when in position 1, was previously pulled off by the suction member 8 of arm 43 and occupied the position F prior to the release of cop 1 and its subsequent transfer into the position of cop 1b. Consequently, the transfer of the cop into the position 1b shifts the starting end of the yarn from the

position F to the position F₁. Before or during the movement of the cop into the position 1b in the manner just described, the suction arm 39 moves downward to its lowermost position. After the cop is in position 1b and the starting end of the yarn has shifted from position F to position F₁, the arm 39 moves upwardly back to its original position. On its way back, the suction end 41 of lever 39 seizes the yarn end F₁ and moves it in the direction toward the tying device 65. At about the same time, the suction tube 37 turns from its full-line position to the dotted-line position 37' together with the yarn end coming from the take-up spool 33, this yarn end being located in the interior of the suction tube 37. Thus, the yarn end F₃ of the take-up spool is likewise supplied to the tying device 65. The starting end coming from the supplying cop 1a, and held by suction end 41, is diverted by the suction tube 37, now in position 37', in such a manner that it occupies the position F₂. Tube 37 sucks the starting end and also pushes it from device 11. As a result, the two yarn ends F₂ and F₃ coming from the yarn-supplying cop 1a and the take-up spool 33 respectively are now arranged side by side in the tying device 65 so that they can be knotted together in known manner. In the meantime, the yarn-guiding drum 32 has stopped and the tying device 65 now operates while the guiding drum 33 and the spool 32 remain temporarily at rest.

During the last part of the automatic coil-exchanging operation, the suction arm 43 turns into the position 43'. Since, in the meantime, the next following cop in magazine 56 has advanced into the position 1, the nozzle member 8 of suction arm 43 again seizes the yarn on the tip of the next following cop, now in ready position, and can move the starting end of the yarn into the illustrated ready position F. Near the end of the coil-exchanging interval, the thread-guiding drum 2 is again caused to run in the forward direction, and the winding operation commences with the yarn now in position F₄.

In FIGS. 9, 9A and 9B, the device and above-described operation of the machine of FIGS. 7 and 8 is illustrated on a larger scale and illustrate the means for rotating the mandrel to unwind the residual yarn portion. Of these, FIG. 9 is an enlarged view of a portion of the lower right hand part of FIG. 7, FIG. 9A is a plan view taken along line IXA—IXA of FIG. 9, and FIG. 9B is a vertical cross section through tube 17.

The coil-holder disc 107 (FIG. 9) is driven by a friction cone 121 which is connected with the suction tube 17 and is in frictional engagement with a rotating shaft 125 during upward and downward motion of the suction tube 17. Only in the upper position of the tube 17 will a contact engagement occur between the disc 107 and the friction cone 121. Since the coil 1 stands upon the disc 107, the coil is taken along from below. The direction of rotation is so chosen that the yarn is wound off in each case. The suction air in suction tube 17 then removes the yarn residue in the downward direction past the lock components and the disc 107. Mounted on the suction tube 17 is a device for retaining the yarn. This device is actuated from the outside and causes a blade or a body with a sharp edge 19 (FIGS. 4, 9) to enter into engagement with the yarn. Consequently, the yarn F' (FIG. 4) which at the same time is pulled off from above must somehow touch this blade and becomes severed automatically at the edge when being subjected to pull. The movement of the blade 19 is effected through a system of levers 122, 123, 124 and a rod 126. Rod 126 is operated from shaft 156 (FIG. 7) in the same manner as rod 60. When rod 126 is pulled toward the left, link 124, pivoted to the end of rod 126 and to arm 126a which is swingable at 126b on the trough 56, is pulled. Since arm 124 is also linked to tube 17, this causes the tube 17 to move downwardly and swings lever 123 clockwise and lever 122 counterclockwise. As a result, knife 19, fixed to lever 122, moves counterclockwise.

In the embodiment of FIGS. 9, 9A and 9B, the operation of removing yarn winding 3 from the coil 1 by gripper 8 is performed when the coil is in its lowermost position in the magazine 56. In the embodiment illustrated in FIGS. 7, 19 and 10A, gripper 8 and tube 17 are positioned so that this operation is performed in the penultimate position of the coil 1. The control rod 60 is coupled to tube 17 by linkage 101 and also to escapement lock 5 so that tube 17 and lock 50 operate simultaneously.

Coordination of the motion and operation of the various elements in timed sequence may be carried out automatically by means of conventional cam driven mechanisms such as those more fully described in copending application Serial No. 640,166 of Walter Reiners and Stefan Fürst, filed February 14, 1957, now Patent 2,936,130, assigned to the assignee of the present application.

It will be obvious to those skilled in the art, upon studying this disclosure, that my invention permits of various modifications, including the use of yarn-gripper means other than those particularly illustrated and described herein, without departing from the essential features of my invention and within the scope of the claims annexed hereto.

I claim:

1. The method of preparing spinning cops for rewinding, said cops having a reserve winding on the tip of the cop and having the yarn end wound about the cop surface toward and onto the foot of the cop, comprising the steps of seizing the reserve winding and pulling it axially off the tip to form a closed loop having one end thereof leading from the vicinity of said core tip and the other end thereof forming said yarn end wound about the cop surface toward and onto the cop foot, clamping both said loop ends while simultaneously severing said other loop end at a predetermined location therealong away from said tip to part said one loop end from the residual yarn portion extending from the point of seizure to the cop surface, and then removing the residual yarn portion off the cop surface and cop foot.

2. The method of preparing spinning cops for rewinding, said cops having a reserve winding on the tip of the cop and having the yarn end wound about the cop surface toward and onto the foot of the cop, comprising the steps of seizing the reserve winding and pulling it axially off the tip to form a closed loop having one end thereof leading from the vicinity of said core tip and the other end thereof forming said yarn end wound about the cop surface toward and onto the cop foot, clamping both said loop ends while simultaneously passing said other loop end along a severing member at a predetermined location between the point of seizure and the cop surface, severing said other end at said member, and then removing the residual yarn portion off the cop surface and cop foot.

3. The method of preparing spinning cops for rewinding, said cops having a reserve winding on the tip of the cop and having the yarn end wound about the cop surface toward and onto the foot of the cop, comprising the steps of seizing the reserve winding and pulling it axially off the tip to form a closed loop having one end thereof leading from the vicinity of said core tip and the other end thereof forming said yarn end wound about the cop surface toward and onto the cop foot, clamping both said loop ends while simultaneously severing said other loop end along the yarn portion extending from the point of seizure to the cop surface, and removing the severed yarn portion off the cop surface and cop foot by suction.

4. The method of preparing spinning cops for rewinding, said cops having a reserve winding on the tip of the cop and having the yarn end wound about the cop surface toward and onto the foot of the cop, comprising the steps of seizing the reserve winding and pulling it axially off the tip to form a closed loop having one end

thereof leading from the vicinity of said core tip and the other end thereof forming said yarn end wound about the cop surface toward and onto the cop foot, clamping both said loop ends while simultaneously severing said other loop end along the yarn portion extending from the point of seizure to the cop surface, and subjecting the cop to an air current while maintaining a rotary relative movement between the air current and the cop, whereby the severed residual yarn portion is unwound and removed from the cop surface and cop foot.

5. The method of preparing spinning cops for rewinding, said cops having a reserve winding on the tip of the cop and having the yarn end wound about the cop surface and about the foot of the cop, comprising the steps of seizing the reserve winding and pulling it axially off the tip to form a closed loop having one end thereof leading from the vicinity of said core tip and the other end thereof forming said yarn end wound about the cop surface toward and onto the cop foot, clamping both said loop ends while simultaneously severing said other loop end along the yarn portion extending from the point of seizure to the cop surface, and unwinding the severed yarn portion from the cop surface and from the cop foot.

6. The method of preparing spinning cops for rewinding, said cops having a reserve winding on the tip of the cop and having the yarn end wound about the cop surface and about the foot of the cop, comprising the steps of seizing the reserve winding and pulling it axially off the tip to form a closed loop having one end thereof leading from the vicinity of said core tip and the other end thereof forming said yarn end wound about the cop surface toward and onto the cop foot, clamping both said loop ends while simultaneously severing said other loop end along the yarn portion extending from the point of seizure to the cop surface, and removing the severed yarn portion from the cop surface and cop foot while simultaneously rotating the cop in the unwinding direction of the yarn portion.

7. The method of preparing spinning cops for rewinding, said cops having a reserve winding on the tip of the cop and having the yarn end wound about the cop surface and about the foot of the cop, comprising the steps of seizing the reserve winding and pulling it axially off the tip to form a closed loop having one end thereof leading from the vicinity of said core tip and the other end thereof forming said yarn end wound about the cop surface toward and onto the cop foot, clamping both said loop ends while simultaneously severing said other loop end along the yarn portion extending from the point of seizure to the cop surface, unwinding the severed yarn portion from the cop surface and pulling the rest of said yarn portion axially off the cop foot.

8. A device for preparing spinning cops for rewinding, said cops having a reserve winding on the tip of the cop and having the yarn end wound about the cop surface toward and onto the foot of the cop, comprising a holder for rotatably holding the cop, a gripper device engageable with the cop tip when said cop is mounted on said holder, means for displacing said gripper device axially away from said holder to thereby seize and axially pull off said reserve winding to form a closed loop having one end thereof leading from the vicinity of said core tip and the other end thereof forming said yarn end wound about the cop surface toward and onto the cop foot, said gripper device having clamping means for clamping both of said loop ends to said gripper device with said one loop end slack and said other loop end taut, control means for closing said clamping means when said gripper device moves away from said holder means, said clamping means having a pulling force greater than the tear strength of the yarn to thereby sever said other loop end.

9. A device for preparing spinning cops for rewinding, said cops having a reserve winding on the tip of

the cop and having the yarn end wound about the cop surface toward and onto the foot of the cop, comprising holder means for holding the cop, a tubular suction nozzle coaxially aligned with said holder means and axially displaceable toward and away from said holder means to form a closed loop having one end thereof leading from the vicinity of said core tip and the other end thereof forming said yarn end wound about the cop surface toward and onto the cop foot, said nozzle having a nozzle opening surrounding the cop tip when the cop is mounted on said holder means and said nozzle is close to said holder means, a yarn clamp in said nozzle and engageable with both loop ends of the yarn for clamping said loop ends to said nozzle, and control means for closing said clamp when said nozzle moves away from said holder means whereby said nozzle and clamp pull said reserve winding off the cop tip.

10. In a device according to claim 9, said nozzle having barb means located at said opening and engageable behind the reserve winding for pulling the winding off the tip when said nozzle starts moving away from said holder means.

11. A device for preparing spinning cops for rewinding, said cops having a reserve winding on the tip of the cop and having the yarn end wound about the cop surface toward and onto the foot of the cop, comprising a holder for rotatably holding the cop, a gripper device engageable with the cop tip when said cop is mounted on said holder, said gripper device being displaceable axially away from said holder to thereby seize and axially pull off said reserve winding to form a closed loop having one end thereof leading from the vicinity of said core tip and the other end thereof forming said yarn end wound about the cop surface toward and onto the cop foot, a yarn clamp located within said gripper device for temporarily clamping both ends of said loop within said gripper device, control means for closing said clamp when said gripper device moves away from said holder, and a yarn-severing means located between the cop tip and the foot of the cop and engageable by the downwind of the yarn around the cop surface for severing said other loop end after said reserve winding is pulled off.

12. A device for preparing spinning cops for rewinding, said cops having a reserve winding on the tip of the cop and having the yarn end wound about the cop surface toward and onto the foot of the cop, comprising a rotatable holder for holding the cop, a gripper device engageable with the cop tip when said cop is mounted on said holder, said gripper device being displaceable axially away from said holder to thereby seize and axially pull off said reserve winding to form a closed loop having one end thereof leading from the vicinity of said core tip and the other end thereof forming said yarn end wound about the cop surface toward and onto the cop foot, a yarn clamp located within said gripper device for temporarily clamping both ends of said loop within said gripper device, control means for closing said clamp when said gripper device moves away from said holder, means for severing said other loop end, and means for imparting a rotational motion to the yarn end relative to the cop on said holder for unwinding the residual yarn end from the cop surface and cop foot.

13. A device according to claim 11, comprising a tubular suction member surrounding the holder at the foot portion of the cop for eliminating the severed residual yarn end.

14. In a device according to claim 12, said means for imparting a rotational motion to the yarn end comprising a suction-air tube surrounding said holder at the foot portion of the cop, and means for imparting rotary motion to the suction air to thereby rotate the residual yarn end for unwinding and eliminating the residual yarn end from the cop surface and cop foot.

15. A device for preparing spinning cops for rewinding, said cops having a reserve winding on the tip of

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the cop and having the yarn end wound about the cop surface toward and onto the foot of the cop, comprising a holder for holding the cop, a tubular suction nozzle coaxially aligned with said holder and axially displaceable toward and away from said spindle to form a closed loop having one end thereof leading from the vicinity of said core tip and the other end thereof forming said yarn end wound about the cop surface toward and onto the cop foot, said nozzle having a nozzle opening surrounding the cop tip when the cop is mounted on said holder and said nozzle is close to said holder, a yarn clamp in said nozzle and engageable with both loop ends of the yarn, control means for closing said clamp when said nozzle moves away from said holder whereby said nozzle and clamp pull said reserve winding off the cop tip, means for severing said other loop end, and a suction-air tube surrounding said holder spindle at the foot portion of the cop for eliminating the residual yarn end from the cop surface and cop foot.

16. In a device according to claim 15, said suction tube having interior helical grooves for imparting to the air a rotation in the unwinding direction of the residual yarn end.

17. A device for preparing spinning cops for rewinding, said cops having a reserve winding on the tip of the cop and having the yarn end wound about the cop surface and about the foot of the cop, comprising a holder for rotatably holding the cop, a gripper device

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engageable with the cop tip when said cop is mounted on said holder, said gripper device being displaceable axially away from said holder to thereby seize and axially pull off said reserve winding to form a closed loop having one end thereof leading from the vicinity of said core tip and the other end thereof forming said yarn end wound about the cop surface toward and onto the cop foot, a yarn clamp located within said gripper device for temporarily clamping both ends of said loop within said gripper device, control means for closing said clamp when said gripper device moves away from said holder, yarn-severing means located between the cop tip and the foot of the cop and engageable by the downwind of the yarn around the cop surface for severing said loop end after said reserve winding is pulled off, and a yarn-engaging device adjacent to said holder at the foot of the cop for removing the residual severed yarn-end winding from the foot.

18. A device according to claim 11, comprising a tubular suction member surrounding the holder at the foot portion of the cop for eliminating the severed yarn end from the cop surface and cop foot, and a cutter located within said tubular suction member and cuttably engageable with the yarn-end winding on the cop foot.

References Cited in the file of this patent

UNITED STATES PATENTS

1,666,735 Colman ----- Apr. 17, 1928