May 15, 1962 S. FÜRST 3,034,737

METHOD FOR PREPARING SPINNING COPS FOR RE-WINDING

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Fig. 1.

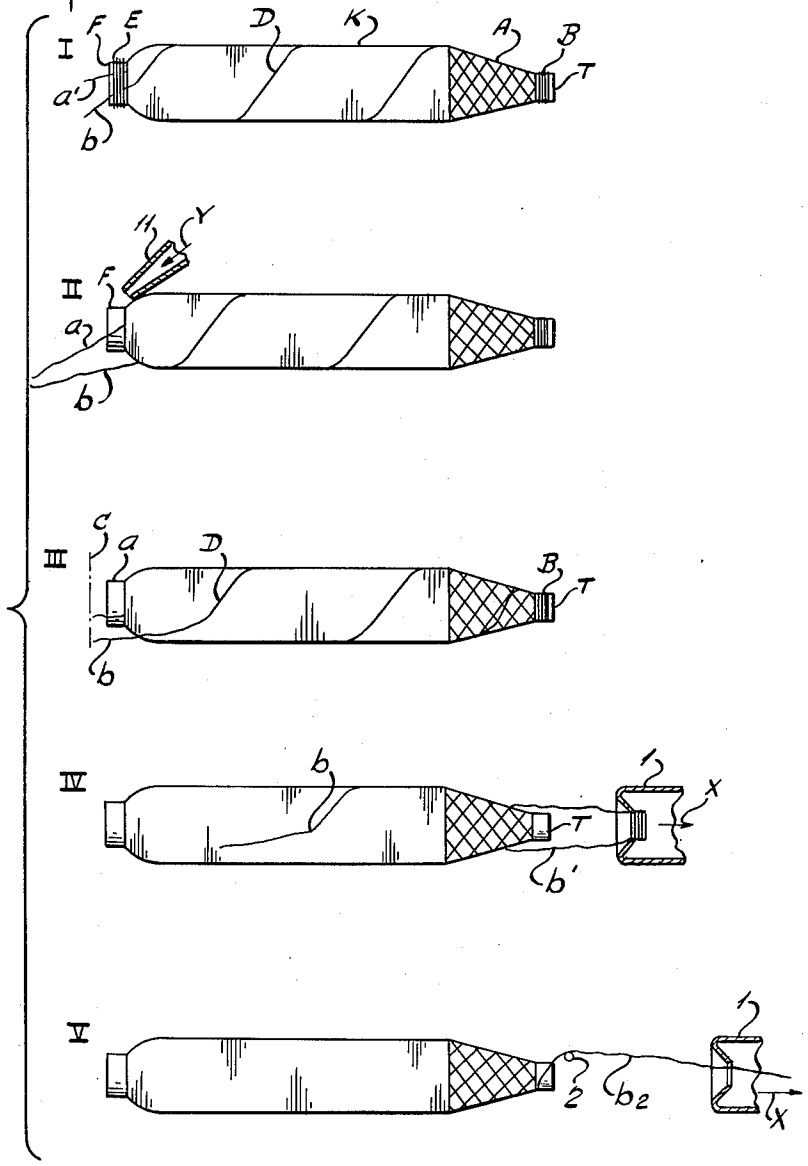

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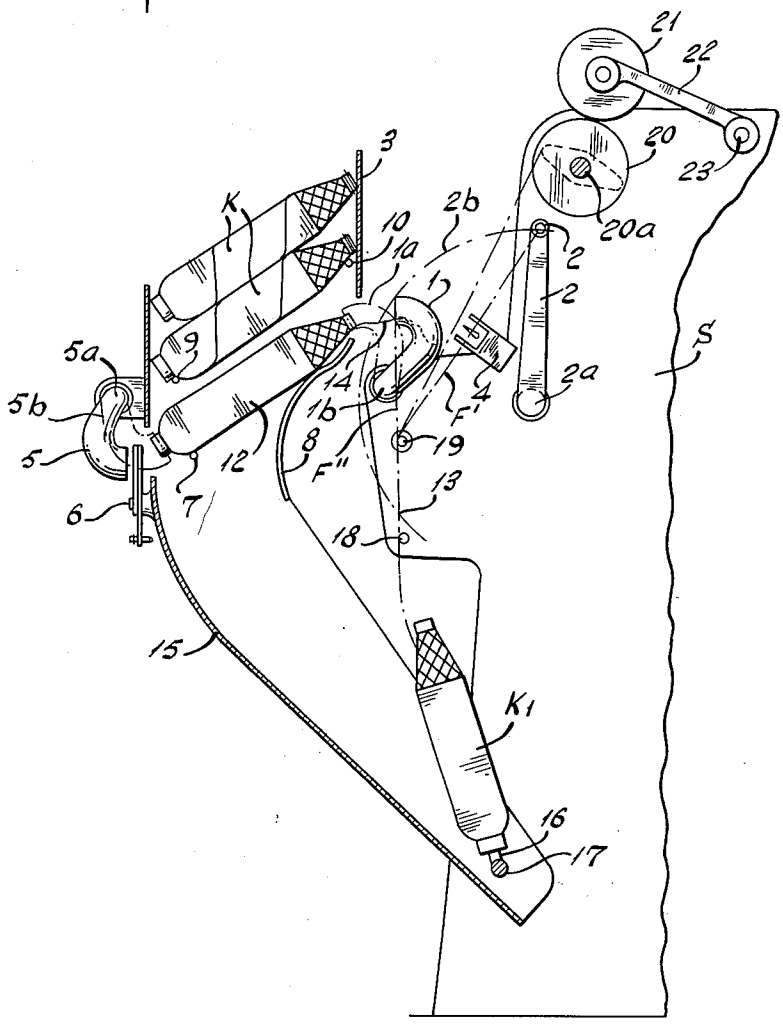
Fig. 2.



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METHOD FOR PREPARING SPINNING COPS FOR REWINDING

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My invention relates to a method for preparing spinning cops for rewinding, and for commencing the unwinding of yarn coils, such as spinning cops and the like, and is related to, and an improvement over, the invention disclosed in my copending application Serial No. 690,674, filed October 17, 1957, now abandoned, and assigned to the assignee of the present invention.

The copending application describes a method for starting the unwinding of a spinning cop on which the end portion of the yarn forms a reserve winding on the tip of the cop and passes from that winding in a few steeply pitched turns over the peripheral cop surface to the cop foot upon which another few turns of yarn are wound. In accordance with this method, the reserve winding is first seized and pulled off the tip, and thereafter the length of yarn located on the periphery of the yarn body and forming a number of turns on the foot of the cop is cut off and eliminated.

It is an object of the present invention to simplify the preparatory processing of cops and similar yarn supply coils required for such processing, and to minimize the possibility of the yarn being damaged by the preparatory operations.

To this end, and in accordance with a feature of my invention, the turns of yarn located on the foot of the cop are first resolved and cut-off, blown away or sucked away before the length of yarn leading from the foot toward the tip of the coil, and forming a reserve winding on the tip, is removed and severed. This makes it unnecessary to insert a yarn-catching member thereby minimizing any danger of damage to the yarn. The severing operation, following the step of resolving the yarn winding from the foot of the cop, is preferably effected in the immediate vicinity of the cop foot tip. This has the advantage that the inner yarn end, covered by the main body of yarn, can be seized and cut-off together with the outer yarn end so that it cannot become entangled with the yarn being unwound when the cop is subsequently depleted down to its last quantity of yarn.

The small quantity of yarn located on the foot of the cop is preferably eliminated by suction, as is the case with the method and device of the above-mentioned copending application. In some cases it is further preferable to rotate the cop in the unwinding direction while the turns of yarn are being resolved from the foot.

After pulling the yarn reserve from the tip of the cop, the yarn end located and seized is preferably kept in proper position by guiding or entraining members, or is moved into a ready or processing position. During the further processing of the cop, or after transferring the cop into an unwinding position within a coil winding machine, the yarn end thus kept in readiness is tied together by a knotter with the yarn end coming from the take-up spool of the winding machine. However, the invention is not limited to the unwinding of spinning cops but may also be used to advantage and in substantially

the same manner for the preparatory processing of shuttle bobbins in weaving looms, or in auxiliary machines for preparing shuttle bobbins to be subsequently used in looms.

For pulling the yarn off the cop during the preparatory work, a current of suction air can be used to advantage. However it is also possible to use a blowing jet of air which, in some cases, can be produced more cheaply and permits obtaining a more intensive conveying and yarn-directing effect.

The above-mentioned objects and features of the invention will be apparent from the following description in conjunction with the drawings, in which:

FIG. 1 illustrates the method according to the invention in five sequential steps; and

FIG. 2 is a part-sectional, schematic view of a coil winding machine incorporating a device according to the invention.

FIG. 1 shows, in position I, a spinning cop K in its original condition, that is, before it is to be subjected to the preparatory processing according to the invention. The body of yarn is wound upon an elongated tubular core and forms a conical portion A in the vicinity of the core tip T. Coming from the conical portion A, the yarn is wound onto the tip T where it forms a reserve winding B. The form then extends from winding B in a few steeply pitched turns D over the peripheral surface of the yarn body K to the foot F of the core where the yarn forms a number of turns E. The ultimate end *b* of the yarn extends loosely away from the cop. The inner end *a* of the yarn extends beneath the winding E and also beneath the main body of yarn.

Before a spinning cop of this type is passed to further fabrication it must be so prepared that the inner and outer yarn ends are not entangled with each other and that the outer end *b* is readily available to be subsequently pulled off over the tip or in a direction axially away from the tip as will more fully appear from the example of a coil winding machine described below with reference to FIG. 2. Such preparatory work is initiated in accordance with position II of FIG. 1. In this position the foot end of the cop is subjected to a current of air passing out of a blow nozzle 11 in the direction of the arrow *y* and aimed at the turns of yarn located at the foot F. As a result, these turns are resolved and the yarn ends *a* and *b* are so blown away from the cop that both are kept separate from each other at least in the vicinity of the core foot. Then, in position III of FIG. 1, a cut is made as is indicated by the dot-and-dash line C. As a result, the protruding yarn ends are shortened. The inner end *a* is not relevant with respect to the subsequent operations. The outer end *b*, however, is to be unwound and to be pulled toward and over the tip T. This is done in accordance with position IV of FIG. 1. An entrainer member 1, consisting in the illustrated embodiment of a suction nozzle is first placed over the tip T so that it forms a narrow annular suction gap together with the tip. Then the nozzle 1 is moved axially away from the tip T with the effect of resolving the reserve winding B from the tip and taking it along as indicated at b_1 in position IV of FIG. 1. Due to the continuing suction in nozzle 1 the yarn end *b* is then fully removed from the surface of the main body of yarn and is pulled into the interior of the nozzle. In the condition illustrated in position V of FIG. 1, the cop is ready to be unwound, the outer end of yarn being

held by suction in the entrainer member 1. The yarn end b_2 can now be held in the proper position by a guiding member 2 or it can be moved to a magazine position or ready position from which it can subsequently pass into the coil winding machine or other machine to be used for further processing, as will now be described with reference to the example of the coil winding machine shown in FIG. 2.

The machine according to FIG. 2 is provided with a magazine 3 which accommodates a number of cops K of which all but the lowermost are in the original condition described above with reference to position I of FIG. 1. The lowermost cop 12 is located opposite the suction opening of an entrainer member 1 which consists of a hollow suction tube and is pivotally mounted at 1*b* to the machine frame structure S in whose interior the suction tube 1 is connected with a blower or other source of negative pressure. The suction tube 1 is normally in the full-line position but can turn counterclockwise to the dot-and-dash position 1*a* in which a nozzle opening is located around the tip of the lowermost cop in the manner described above with reference to FIG. 1. When thereafter the suction tube turns into the full-line position 1, it entrains the located and seized yarn into the position F'. In this position, the yarn is located in the active range of a knotter 4 which connects the yarn with the yarn end coming from the take-up spool 21 of the winding machine.

Located near the foot of the lowermost cop 12 in magazine 3 is another suction tube 5 which is pivotally mounted at 5*a* and also connected with the above-mentioned source of negative pressure. When the suction tube 5 is turned into the dot-and-dash position 5*b*, its nozzle opening surrounds the foot of the cop for the purpose of resolving the turns of yarn, and separating the yarn ends in the manner described above with reference to position II in FIG. 1. When the suction tube 5 moves away from the cop into the full-line position, it provides sufficient space between the nozzle opening and the cop foot to permit a scissors-type cutter 6 to enter and to sever the yarn ends as described above with reference to position III in FIG. 1. After the yarn ends are cut off, and the outer yarn end is pulled over the surface of cop 12 and into the suction tube 1, the cop 12 remains in the illustrated position within magazine 3 until the yarn of the previously operative cop K_1 is exhausted so that the latter cop must be exchanged for the full cop 12 from the magazine.

The lowermost cop 12 rests upon a locking rod 7 which, upon exhaustion of the previously operative cop, is pulled away from cop 12 so that this cop drops onto a slideway 15 with the foot portion of the cop pointing downwardly.

The coil winding machine is provided with a cop holder 16 in the form of a mandrel mounted on a shaft 17. During normal unwinding operation, the cop is in the position K_1 with the mandrel 16 directed as shown. When the cop K_1 is depleted, this condition is sensed by a yarn feeler which then causes the depleted cop K_1, or rather its empty core, to be ejected by a doffer device (not illustrated). Thereafter the mandrel shaft 17 turns counterclockwise and the cop 12 is released from the magazine 3 by withdrawal of the holding pin 7, so that the cop 12 slides downward along slideway 15 and is speared up on the lowered mandrel 16 which thereafter turns back to the illustrated position with the new cop placed in position K_1.

During the downward travel of cop 12 from the magazine onto the mandrel 16, the yarn end, still being seized in the suction tube 1 passes through a slot 8 in the bottom portion of the magazine 3 and then occupies the position F''. Simultaneously with the coil exchange described above, another entrainer 2, pivoted at 2*a* and consisting of a suction tube connected with the soure of negative pressure mentioned above, turns counterclockwise along a circular path denoted by 2*b* and then returns upwardly to the illustrated position. During this reciprocating travel, the suction tube 2 causes its nozzle 2*c* to catch the yarn at the point of intersection 13 and to entrain it upwardly to the position F' where the yarn is located in the active range of the knotter. However, if desired, the yarn may also be picked up at the intersection point 14 prior to the above-described coil-exchanging operation.

The knotter 4 ties the yarn end of the supply cop K_1 together with the yarn end coming from the take-up spool 21, whereafter the winding station is again ready to continue winding the yarn from supply cop K_1 onto take-up spool 21. The lock pin 7 is then moved back to the original position and two lock pins 9 and 10 are simultaneously withdrawn so that the next upper cop passes to the lowermost position 12. Thereafter the above-described operations are repeated.

In other respects the coil winding station illustrated in FIG. 2 is in accordance with prior art so that it will suffice to describe only the essential components that cooperate in unwinding the supply cop and winding the yarn into a larger yarn package on spool 21.

The yarn of the supply cop K_1 passes along a yarn guide 18 and through a tensioner 19 over a guiding drum 20 to the take-up spool 21. The shaft 20*a* of guiding drum 20 is driven at constant speed. The take-up spool 21 is journalled on a frame 22 pivotally mounted at 23 to the supporting structure S of the machine. Due to the friction caused by the weight of spool 21 and frame 22, the rotating guide drum 20 entrains the take-up spool 21 and thus keeps it in rotation at constant peripheral speed regardless of the amount of yarn wound up on the spool. In this manner a yarn package of relatively large size, such as a cross-wound coil, can be produced from a yarn supply provided by a sequence of spinning cops. Upon depletion of a cop, the absence of yarn is sensed by the above-mentioned yarn feeler (not illustrated) between the tensioner 19 and the supply cop, and this feeler initiates the above-described coil-exchanging operations while simultaneously stopping the drive of the guiding drum 20 and causing it to perform a reverse rotation of a limited extent but sufficient to unwind some length of yarn from the take-up spool 21. This length of yarn is then tied together with the yarn end F' coming from the new supply cop K_1 in the manner already described.

I claim:

1. The method of preparing spinning coils of yarn for rewinding, said coils having a reserve winding on the tip, the yarn end extending from the reserve winding being wound about the coil surface to the coil foot and forming another winding on the coil foot, which comprises the sequence of steps of first directing a current of air in the vicinity of the coil foot to resolve the yarn winding from the foot, severing the residual yarn end at a predetermined location away from the surface of said coil and away from said tip, and thereafter seizing the reserve winding at the tip and pulling it axially off the tip.

2. The method of preparing spinning coils of yarn for rewinding, said coils having a starting end entrained beneath layers of yarn wound thereon and a reserve winding on the tip, the yarn end extending from the reserve winding being wound about the coil surface to the coil foot and forming another winding on the coil foot, which comprises first directing a current of air in the vicinity of the coil foot to resolve the yarn winding from the foot, pulling said yarn end as well as the starting yarn end of the coil axially away from the foot and then cutting both ends off near the foot, and thereafter seizing the reserve winding at the tip and pulling it axially off the tip.

3. The method of preparing spinning coils of yarn for rewinding, said coils having a reserve winding on the tip, the yarn end extending from the reserve winding being wound about the coil surface to the coil foot and forming another winding on the coil foot, which comprises first directing a current of air in the vicinity of the coil foot to resolve the yarn winding from the foot and pulling it

away from the foot, cutting the yarn end in the vicinity of the foot at a location away from said coil surface, thereafter seizing the reserve winding at the tip and pulling it axially off the tip, and then displacing the coil while retaining the yarn previously pulled off the tip, whereby a given length of yarn is placed into a predetermined ready position.

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