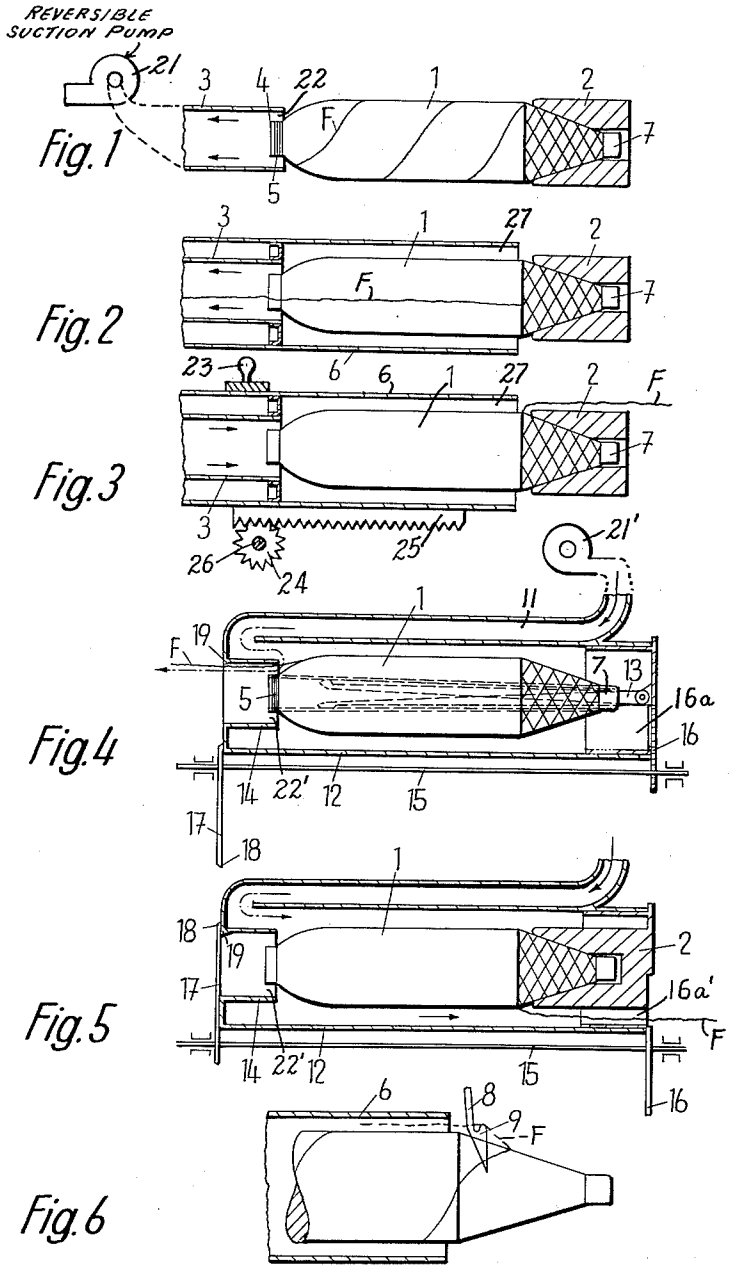
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METHOD AND MEANS FOR READYING SPINNING COPS

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METHOD AND MEANS FOR READYING SPINNING COPS

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My invention relates to textile fabricating operations that require the unwinding or re-winding of yarn supplied from spinning machines in form of cops. More particularly, the invention relates to spinning cops of the type having a slender tubular core with a thicker base or "foot" portion at one end. Such spinning cops, as they come from the spinning machine, are so wound that the yarn coil has a conical taper at the core tip and that the last-wound length of yarn extends from the conical taper in a few steeply pitched turns back over the coil surface to the foot where the yarn terminates in a number of turns wound about the foot to form a yarn reserve.

The further fabrication of such cops usually requires re-winding of the yarn, such as winding it consecutively from a number of cops into the shape of a larger yarn package, particularly in the form of a cross-wound yarn package also called "cheese." During such operation, each depleted spinning cop must be exchanged for a full cop until the larger yarn package being wound has reached its full size.

In order to expedite such cop exchanges during re-winding, it has been necessary for the attending personnel to manually seize and unwind the yarn reserve from the cop foot. However, it is difficult and requires skillful attention to pull the unwound yarn end off the cop in the desired direction axially away from the tip. This is because the coil body extends in layers from the foot toward the largest coil diameter to form a curved surface, and the attendant does not always succeed in gripping the reserve winding without inadvertently taking along some of the adjacent layers of yarn.

It is an object of my invention to eliminate such difficulties and to reliably secure a faultless unwinding and readying of the yarn end on spinning cops of the above-mentioned type.

To this end, and according to a feature of my invention, the reserve winding is unwound from the cop foot by pulling the yarn off in an axial direction, preferably by means of an air current, and the same pull or air current is subsequently applied in the same direction for also unwinding the few steeply pitched turns of yarn that extend from the foot over the coil body to the tapering tip portion of the coil. Thereafter the yarn portion thus set free and straightened is pulled in the opposite axial direction away from the tip of the cop, this being the ready direction required for the subsequent unwinding or other fabricating operation. During the operation just described, the yarn portion unwound and pulled off the foot and extending away from the foot of the cop may have considerable length and this length is not always the same with different cops. It is preferable to sever this portion of yarn, particularly by a cutting device, from the remaining yarn and extending from the foot over the coil body toward the tip.

The pulling and removal of the yarn end portion in the direction away from the tip of the cop may be effected by means of a mechanical member, for example a hook, gripper or the like. Such a member may be placed against the tip portion of the coil and may then move tangentially away from the surface of the cop coil.

Once the yarn end has been placed in readiness in the above-described manner and extends away from the cop tip, it can readily be seized by a gripper or suction member in order to be placed into a holder or to be taken away by a conveying member. Such a gripper, holder and conveying member are illustrated in copending application Serial No. 640,137 of Stefan Fürst, filed February 14, 1957, and assigned to the assignee of the present invention.

According to another feature of my invention, representing a preferred embodiment, the removal of the yarn end portion from the tip of the cop is effected by means of a current of air flowing axially away from the tip. According to a more specific feature, the same air current which first resolves the reserve winding on the foot and then unwinds the yarn portion that extends in a few steeply pitched turns from the foot to the tip, is further used, upon reversal of its direction, to pull the unwound yarn portion away from the tip of the cop.

According to a further feature of my invention, the last-mentioned operation is performed by placing the cop into a container which surrounds the cop and forms an interstitial air channel together therewith. Thereafter a current of air is blown into the container and is at first permitted to leave the container along the foot of the cop. As a result, the air current causes the reserve winding on the foot to be unwound and straightened. After completion of this step, an opening is uncovered in the vicinity of the cop tip while the opening at the foot side is closed, thus reversing the direction of the air current relative to the cop. The air current now leaves the container substantially in the axial direction of the cop at the location of the tip. As a result, the yarn portion which now is free at least up to the middle of the cop length, is taken along into the opposite direction and is carried toward the tip. In this case it is also preferable to shorten the yarn portion after the reserve winding is unwound from the cop, by severing the protruding, excessive end. If care is taken that the highest flow velocity of the air current is first produced in the vicinity of the reserve winding at the foot and is subsequently effective in the range of the yarn turns that extend from the foot toward the tip, then the proper unwinding and readying of the yarn is most reliably secured. If an additional reserve winding of yarn is also provided at the tip of the cop, then the latter winding can be taken off either by the air current or by mechanically pulling it away from the tip.

The above-mentioned and other objects, advantages and features of my invention will be apparent from the following description taken in conjunction with the drawing in which two embodiments of the method and means according to the invention are illustrated by way of example. In the drawing:

FIGS. 1, 2, and 3 show in longitudinal section a first mode of operation and a device required therefor, in three successive steps of operation respectively.

FIGS. 4 and 5 show in longitudinal section another device incorporating a second mode of operation in two different stages respectively, the device shown in FIG. 5 being to some extent modified relative to that in FIG. 4.

FIG. 6 illustrates an embodiment of a modified device for taking the unwound yarn portion off the body of the cop.

According to FIGS. 1 to 3 the spinning cop **1** is gripped and held in a conical holder **2** at the conically wound tip portion of the yarn coil. The foot portion **4** of the cop is located opposite a nozzle tube **3** whose inner width is only slightly larger than the outer diameter of the foot **4**. Wound upon the foot **4** of the cop core is a yarn reserve in form of a winding **5**. The yarn F extends from the reserve winding **5** in a few steeply pitched turns over the surface of the yarn coil up to the conical tip portion where the regular and dense layers of yarn commence.

The nozzle tube 3 is connected with a source of vacuum such as a suction pump, schematically designated at 21 so that, when the device is in operation, a current of air is sucked through the annular nozzle space 22 between member 3 and cop 4. Since the area of annular opening 22 is smaller than the cross-sectional area of tube 3, the flow of air through opening 22 will be at its maximum velocity, as compared to the rest of the current of air flowing across the cop 1. This axial current of air seizes the yarn end of the reserve winding 5 and loosens this winding from the foot 4 of the cop. During this operation the yarn end flutters and circulates about the foot 4 and, when the yarn reserve of winding 5 is fully unwound and straightened, the operation continues and unwinds the portion of yarn F extending over the cop surface from the foot 4 to the conical tip 7.

In order to improve the unwinding of the surface turns, a second tubular member 6, telescopically mounted on and slidable over the nozzle tube 3, is shoved over the body of the cop into the position shown in FIG. 2, thus producing an annular duct 27 through which air flowing past the surface of cop 1 is restricted. The device thus secures a reliable unwinding and straightening of the yarn end F. Telescopic tubular member 6 may be moved relative to tube 3 by suitable known means. For example, tube 6 itself may be manually manipulated, or moved axially by means of a handle 23 or rack and pinion 24, 25 from a suitable drive (not shown) connected to shaft 26. If now the direction of the air current is reversed from reversible suction pump 21, and as shown by the arrows in FIG. 3, then the unwound and straightened end portion of the yarn is blown or pulled to the opposite direction by the increased velocity of air now flowing in the annular region 27 surrounding the outer surface of coil 1, that is, the yarn end F now moves toward the tip of the cop and away therefrom, as shown in FIG. 3. Prior to changing the direction of the air current, the excessive length of the yarn end is preferably severed by tearing or cutting in the vicinity of the cop foot.

In the device according to FIG. 4, the cop is placed into an enclosed container 12 into which a current of air is blown from a blower 21' through an inlet channel 11. The cop is held in the cylindrical container 12 by means of spreading clamper arms of a chuck device 13 which enters into the quill bore of the cop core. The side of the cylinder 12 located near the tip 7 of the cop is closed by a closure plate 16. Plate 16 is fastened to and rotatable with a shaft 15 to an open position as illustrated in FIG. 5. In its closed position of FIG. 4, plate 16 covers the opening 16*a* located below chuck 13. Consequently, when plate 16 is in closed position the current of air can escape only through annular opening 22 around the foot of the cop where it resolves the reserve winding 5 and blows the unwound yarn end through the nozzle member 14 located at and about the cop foot. After the elapse of a given interval of time, the yarn has run off the cop foot as well as from the adjacent portion of the coil. In addition to plate 16, another closure plate 17, mounted on the same shaft but 180° displaced relative to plate 16, can be turned upwardly for closing the opening of nozzle member 14 as is shown in FIG. 5. By thus placing the plate 17 to closed position while simultaneously moving the plate 16 to open position, the air can no longer escape through annular opening 22' out through nozzle member 14. During closing of plate 17 the yarn end F is simultaneously cut off by the sharp edge 18 of plate 17 cooperating with an edge 19 of the cylindric container 12. In this manner, the yarn end is always limited to a predetermined length. The current of air now reverses its direction and flows from channel 11 along the cop surface toward the tip out through opening 16*a* (FIG. 4) or 16*a*' (FIG. 5). The reversed current entrains the partially liberated yarn end F and pulls it away from the tip portion of the cop to the position shown in FIG. 5.

It will be noted that the devices for holding the cop in position are different in respective FIGS. 4 and 5. As described, a spreader-arm chuck 13 is shown in FIG. 4 whereas FIG. 5 shows a conical holder device 2. Both types of holders are equally well applicable.

While in the foregoing examples the yarn end, after being unwound from the foot and from the surface turns of the cop winding, is pulled in the opposite direction toward and away from the tip of the cop by means of an air current, the latter step of operation may also be performed by mechanical gripping devices such as the one exemplified in FIG. 6. According to FIG. 6, a hook member 8 is placed against the surface of the cop in the vicinity of its conical tip portion. During unwinding of the yarn end F in the above-described manner, the yarn end rotates about the cop. Consequently, the yarn end will hit against the member 8 and can then be entrained by that member in the direction away from the tip. A hook 9 of member 8 facilitates such removal of the yarn end.

It will be obvious to those skilled in the art upon studying this disclosure that my invention permits of various modifications and may be embodied in devices 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. In the art of preparing a spinning cop for further fabricating operations, said spinning cop having a generally slender core with a thicker core foot at one end, and having on said core a yarn coil terminating in a reserve winding on said foot, the method of finding and unwinding the yarn end of the spinning cop which comprises the steps of first applying to the cop foot an air current substantially in an axial direction from the tip toward the foot of the cop and thereby unwinding the yarn reserve from the foot and the first turns of yarn extending at the coil surface from the foot to the tip, and thereafter applying an air current to pull the unwound portion of yarn in the opposite axial direction from the foot side toward and beyond the tip.

2. In the art of preparing a spinning cop for further fabricating operations, said spinning cop having a generally slender core with a thicker core foot at one end, and having on said core a yarn coil terminating in a reserve winding on said foot, the method of finding and unwinding the yarn end of the spinning cop which comprises the steps of first subjecting the cop foot to a current of air substantially in the axial direction from the tip toward the foot of the cop and thereby unwinding and straightening the yarn reserve from the foot and the first turns of yarn extending at the coil surface from the foot to the tip, and thereafter applying to the cop surface a current of air in the opposite axial direction to thereby pull the unwound portion of yarn in the opposite axial direction from the foot side toward and beyond the tip.

3. In the art of preparing a spinning cop for further fabricating operations, said spinning cop having a generally slender core with a thicker core foot at one end, and having on said core a yarn coil terminating in a reserve winding on said foot, the method of finding and unwinding the yarn end of the spinning cop which comprises the steps of first subjecting the cop foot to a current of air substantially in the axial direction from the tip toward the foot of the cop and thereby unwinding the yarn reserve from the foot, severing the yarn portion then protruding in said direction from the foot, then subjecting the coil surface of the cop to an air current in the aforesaid direction until all of the top-layer turns of yarn extending at the coil surface from the foot to the tip are unwound, and thereafter applying to the cop surface a current of air in the opposite axial direction to thereby pull the unwound portion of yarn in the opposite axial direction from the foot side toward and beyond the tip.

4. In the art of preparing a spinning cop for further fabricating operations, said spinning cop having a generally slender core with a thicker core foot at one end, and having on said core a yarn coil terminating in a reserve winding on said foot, the method of finding and unwinding the yarn end of the spinning cop which comprises the steps of first subjecting the cop foot to a current of air substantially in the axial direction from the tip toward the foot of the cop and thereby unwinding the yarn reserve from the foot and the first turns of yarn extending at the coil surface from the foot to the tip, and thereafter reversing the direction of the same air current relative to the cop until the previously unwound yarn portion is pulled off the tip in the reversed direction.

5. In a machine for preparing a spinning cop for further fabricating operations, said spinning cop having a generally slender core with a thicker core foot at one end and having on said core a yarn coil terminating in a reserve winding on said foot, a device for finding and unwinding both yarn ends of the spinning cop, comprising nozzle means for applying to the cop foot a current of air substantially in the axial direction from the tip toward the foot of the cop to unwind and straighten the yarn reserve from the foot and to also unwind the end formed by the first turns of yarn extending at the coil surface from the foot to the tip, a source of air current connected to said nozzle means, and means for applying a subsequent current of air in the opposite axial direction to thereby pull the unwound end formed by said first turns of yarn in the opposite axial direction from the foot side toward and beyond the tip.

6. In a machine for preparing a spinning cop for further fabricating operations, said spinning cop having a generally slender core with a thicker core foot at one end and having on said core a yarn coil terminating in a reserve winding on said foot, a device for finding and unwinding the yarn end of the spinning cop, comprising nozzle means for applying to the cop foot a current of air substantially in a first axial direction from the tip toward the foot of the cop to unwind and straighten the yarn reserve from the foot and to also unwind the yarn end formed by the first turns of yarn extending at the coil surface from the foot to the tip, a source of air current connected to said nozzle means, and means for reversing the direction of the same current of air relative to said surface of the spinning cop to straighten and extend the unwound yarn end formed by said first turns to beyond the core tip in the reversed axial direction.

7. A device according to claim 6, comprising means for severing near the cop foot the yarn reserve portion unwound from the foot, whereby the portion severed off is exhausted away by said current of air in said first axial direction.

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