DEWICE FOR RELEASING THE STARTING END OF
A COIL-WOUND THREAD HELD FAST
BY A RESERVE WINDING

Fig. 1

Fig. 2
DEVICE FOR RELEASING THE STARTING END OF A COIL-WOUND THREAD HELD FAST BY A RESERVE WINDING

H. KAMP

Filed Feb. 15, 1967

3,406,920

Oct. 22, 1968

FIG. 3

FIG. 4
FIG. 5

H. KAMP

DEVICE FOR RELEASING THE STARTING END OF A COIL-WOUND THREAD HELD FAST BY A RESERVE WINDING

Filed Feb. 15, 1967

3 Sheets-Sheet 3
DEVICE FOR RELEASING THE STARTING END OF A COIL-WOUND THREAD HELD FAST BY A RESERVE WINDING

Heinz Kamp, Mönchen-Gladbach, Germany, assignor to Walter Reiners, Mönchen-Gladbach, Germany
Filed Feb. 15, 1967, Ser. No. 616,251

Clubs priority, application Germany, Feb. 17, 1966,
R 42,629
8 Claims. (Cl. 242—35.6)

ABSTRACT OF THE DISCLOSURE

Device for releasing the starting end of a coil-wound thread held fast by a reserve winding includes a sleeve member which is adapted to receive the end of a coil therein and to guide an air current therethrough in a direction substantially axial to the coil. An abrading member, such as in the form of a plurality of inwardly directed elastic tongues, is provided on the inner surface of the sleeve and is engageable with the reserve winding of the coil. The sleeve together with the abrading member, on the one hand, and the coil, on the other hand, are relatively rotatable so as to abrade the reserve winding and release the starting end of the wound thread therefrom.

Disclosure

My invention relates to device for freeing or releasing the starting end of a thread wound on a coil, such as a supply coil, which has been held fast by a reserve winding such as a tip bunch or a foot bunch. More particularly, my invention relates to such a device having an abrading element relatively rotatable with the coil, and means for directing an air current in a direction substantially axial to the coil.

As is generally known, it is necessary for various purposes in the textile industry to release or free the starting end of a thread wound on a coil which is held fast by a tip or foot bunch, so that the thread end is made ready to be gripped and thereby subjected to further processing. This is necessary, for example, in the case of thread winding machines wherein spinning cops are processed into cross-wound coils or cheeses, or for example, in the case of weaving mills wherein the starting end of the thread, which is held fast by the tip bunch, must be removed automatically to ensure that the operation is carried out automatically.

For the last-mentioned purpose, a device has become known through the German Patent 1,866,985, wherein an air current is so directed that the thread windings of the tip bunch are blown into a suction opening located opposite thereto. The action unwinding the tip bunch is aided in the device of the German Patent by the fact that the air current drives a brushwheel or rotary brush which rubs against the thread windings of the tip bunch. In the Swiss Patent 388,214, a similar device has been disclosed, which is different however in that the brush is not driven by the air current but rather is automatically driven and is applied against the tips of several coils simultaneously.

It has been found, however, that the aforementioned known devices are not adequate for releasing thread ends held fast by a tip bunch, especially with yarn that becomes easily entangled. The operation of the known devices is completely insufficient for removing the starting end of a thread held fast by a foot bunch, for example of a spinning cop, since, as is well known, the spool core of a spinning cop has a greater diameter at its lowermost end than at that location at which the thread end is held fast in the form of a foot bunch. Furthermore, other difficulties in that respect are presented because the starting end and the fall end of the foot cop are usually intertwined or twisted one with the other.

It is accordingly an object of my invention to provide a device for releasing the starting end of a coil-wound thread held fast by a reserve winding that avoids the aforementioned disadvantages of the heretofore known devices. More specifically, it is an object of the invention to provide such a device which will adequately release the ends of a coil of yarn or thread that is entangled.

With the foregoing and other objects in view, I provide a device for releasing the starting end of a thread by loosening the tip or foot bunch holding it fast, in which, for example, an abrading element is provided for destroying, tearing, pulpilizing or similarly attacking the reserve winding or wherein an abrading element loosens the tightly wound structure of the winding by exerting a turning moment on the winding in the unwinding direction thereof, and the loosened winding is then removed by an air current. In both cases, it is advantageous when the relative rotary motion between the coil and the sleeve is opposite to the winding direction of the reserve winding.

During operation of the device of my invention, the coil or cop is inserted by an axial movement into the sleeve or the sleeve is slipped over the end of the cop. It has been found that the device according to my invention is particularly effective when either the sleeve or the cop or both are mounted so that they are axially displaceable relative to one another whereby a plurality of the repeated axial displacements can be superimposed upon the relative rotary motion therebetween.

In accordance with a further feature of my invention, the sleeve is provided with an inner wall having a rough surface which serves as the abrading means. The sleeve is disposed around the cop which is mounted eccentrically thereto, and the rough surface of the inner wall is engageable with the reserve winding, that may be either in the form of a foot bunch or a tip bunch, for abrading the same. The rough surface can be formed, for example, of sandpaper or can have a structure similar to a kitchen grater, and the abraded or loosened thread windings can be removed by means of suction or air current passed through the sleeve.

The abrading elements of the sleeve can also consist of bristle brushes which are directed from the inner side of the sleeve against the foot of the cop. It is, moreover, particularly advantageous in accordance with the invention, for the abrading element of the sleeve to be in the form of inwardly directed elastic tongues, because these can not soil and clog and the released starting end of the thread cannot be hooked thereon. It is also advantageous for the radial spacing of the tongues to correspond to at least the diameter of the coil core when the rotary motion takes place therebetween. These tongues strike against the foot or the tip of the cop and the tip or foot bunch wound thereon and loosen the bunch. The loosened thread windings of the tip or foot bunch are removed by the air current present in the sleeve.

To prevent damage to the main winding of the cop, it is expedient, in accordance with the invention, to construct the tongues so that at the end thereof facing a cop whose foot, for example, is inserted, a slope is provided corresponding substantially to the contour of
the main winding of the cop. In accordance with the invention, to prevent damage to the main winding, moreover, a shield is located in front of the sleeve and is non-rotatable relative to the coil whose end is received in the sleeve. The shield is resiliently mounted and extends over at least a portion of the main winding of the coil that is adjacent to the sleeve, and has a shape which corresponds in outline to that of the main winding.

The operation of the device constructed in accordance with my invention is improved by having the air current starting in the upper or foot bunch, as a result of the. The sleeve H will then be moved in the radial direction to the foot bunch 3 so that the air current can also have an effect upon the engaging surfaces between the foot bunch 3 and the abrasive surface of the sleeve H.

It can also be expedient for the cop 1 to be subjected to a slow rotary motion so that other locations respectively of the foot bunch 3 are engageable by the rough surface of the sleeve H.

In accordance with the invention, to prevent damage to the main winding, moreover, that portion F" of the starting end of the thread, which frequently is intertwined or twisted with the so-called tail end F of the winding is also removed thereby. The thread end F which extends in the form of a back winding is received on the surface of the wound package to the tip of the coil, is thus released and can be seized or gripped by a suitable nonillustrated gripping tool for further processing of the thread.

In FIGS. 3 and 4 there is shown the sleeve H which is rotatable about the cop 1 that is inserted coaxial to the sleeve H. The rotary direction of the sleeve H is opposite to the direction in which the thread is wound on the cop 1. In the embodiment of FIGS. 3 and 4, the abrading element of the sleeve H is in the form of inwardly directed elastic tongues 6, 7, 8, 9 having a radial spacing therebetween, when the sleeve H is in rotary motion, which is at least 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 of specific embodiments when read in connection with the accompanying drawings, in which:

FIGS. 1 and 2 are diagrammatic fragmentary views, partly in longitudinal section, of two different embodiments of sleeves constructed in accordance with my invention into which a coil end is inserted;

FIG. 3 and FIG. 4 are more detailed views of the device of my invention, FIG. 3 being a longitudinal sectional view taken along the line III—III in FIG. 4 and FIG. 4 being a cross-sectional view taken along the line IV—IV in FIG. 3; and

FIG. 5 is a diagrammatic view partly in section of the device of my invention in combination with a readying device having a coil supply and removal system.

Referring now to the drawings and first particularly to FIGS. 1 and 2 thereof, there is shown a sleeve H, through which an air stream represented by the wavy lines terminates in an arrowhead is passed. The sleeve H extends over the end of a cop, in this case the foot 1 of a cop 1, and is mounted for rotation about the cop. A band of emery cloth or sandpaper is secured by any suitable means to the inner surface of the sleeve H as shown in FIG. 1, whereas the sleeve H of FIG. 2 has the shape of a kitchen grater on the inner surface thereof. The sandpaper, emery cloth or grater surface rotates respectively in an opposite direction to the direction in which the thread F is wound.

The cops 1 are respectively inserted in the sleeves H of the embodiments of FIGS. 1 and 2 eccentrically to the sleeves so that the rough surfaces inside the sleeves engage and destroy the foot bunch 3, and the abraded or unraveled thread portions of the foot bunch 3 are removed by a suction air current conducted through the openings formed in the base of the sleeve H. With the embodiment of FIG. 2, a particularly intense and rapid removal of the abraded thread portions or pulp occurs due to the fact that the air can pass through openings provided in the sleeve H.

It is advantageous to displace the sleeve H relative to the cop 1 axially in such a way that a purality of repeated axial engagements of the sleeve H with the cop 1 that displacements in the radial direction take place between the sleeve H and the cop 1 so that the air current can also have an effect upon the engaging surfaces between the foot bunch 3 and the abrasive surface of the sleeve H.
or both are axially displaceable relative to one another so that the relative rotary motion between the cop 1 and the sleeve H is superimposed with a plurality of repeated axial displacements. These axial displacements can be so great that the tongues 6 to 9 are moved out of engagement with the foot b"nch 3 or the core coil foot 1' altogether.

In FIG. 5 there is shown a device embodying my invention in combination with a readying device having mechanism for supplying coils 1 thereto and removing them therefrom. For this purpose, the hollow cores of coils 1 are stuck onto pegs or pins 21 located on a conveyor belt 22. The conveyor belt is operated by a stepping switch 23 respectively for distributing or separately feeding the coils 1 individually to the device of my invention. The stepping switch 23 has an eccentric or cam 24 which acts on a roller 25 of a pivotable double lever 26, 27 and pivots the same in a direction opposing the biasing force of a spring 28. A switching pawl 29 is located at the end of the lever 27 and meshes in a ratchet 30. By means of the pawl 29, the rotary ratchet 30 is advanced respectively a single division at a time. On the shaft of the ratchet wheel 30 there is mounted a spur gear 31 rigidly secured to the shaft. The spur gear 31 meshes with another gear 32 rigidly mounted on the shaft 34 over which the conveyor belt 22 is guided is rigidly mounted on the shaft 33. The transmission ratio between the spur gears 31 and 32 is so chosen that, as the ratchet wheel 30 is advanced one tooth, the conveyor belt 22 is advanced one coil division.

A stop 35 is located on the lever arm 26 of the double lever 26, 27 and actuates a switch 36 when the lever 26 is pivoted in the counterclockwise direction shown by the associated arrow in FIG. 5, thereby closing the circuit of the current source 37 to the motors 38 and 39. The circuit of the current source 37 remains closed as long as the roller 25 is in the central portion of the eccentric or cam 24. Another automotive motor can be connected in the circuit of the current source 37 for operating a blower to produce vacuum pressure.

An eccentric 41 mounted on a shaft 40 of the motor 38 is driven thereby to carry out a single rotation during the period that the contact 36 remains closed. A roller 42 secured to a lever arm 43 of a double lever 43, 44 engages the eccentric or cam 41. The lever arm 43 is subjected to a biasing action of a tension spring 45. As soon as the rotary motion of the motor 38 is commenced, the eccentric 41 is rotated and the double lever 43, 44 is pivoted in a counterclockwise direction. The free end of the lever arm 44 engages in a recess 46 of the support member 15. When the lever arm 44 is pivoted upwardly, the support member 15 and therewith also the shield 11 subjected to the biasing action of the springs 16 and 17 are displaced in an upward direction, as viewed in FIG. 5, for such a distance that the shield abuts the main winding of the coil 1 and the tongues 6 to 9 are shoved over the foot 1' of the coil core and over the reserve winding 3.

The support member 15 surrounds the outer race of a pair of ball bearings 47, 48 whereas the inner race thereof is mounted on the hollow shaft 49 which carries the sleeve H. A spacer bushing or sleeve 50 is disposed between both bearings 47 and 48, and the bearings are held in the position indicated in FIG. 5 by a nut 51 and another spacer member 52. By means of the illustrated and hereinafore described mounting of the hollow shaft 49, the latter as well as the sleeve H within the support member 15 are held rotatably yet not rectilinearly displaceably so that the sleeve H with the hollow shaft 49 alone follows the reciprocatory motion of the support member 15. The sleeve H and the hollow shaft 49 obtain their rotary motion from the motor 39 through the spur gear 53 and the end of the hollow shaft 49 which has the shape of an elongated pinion.

As mentioned hereinafore, the support member 15 and the sleeve H therewith are axially displacable above the lever arm 44. A guide sleeve or bushing 55 serves as the means for guiding the support member 15 and is rigidly secured to a plate 56 and provided with a slot 57 to allow for the movement of the lever arm 44. In order to permit the support member 15 to be axially displaceable in the guide sleeve 55 yet not rotatable therein, a key 58 is inserted in the guide sleeve 55 and a groove 59 is provided in the support member 15, the key 58 being located in the groove 59.

The eccentric or cam 41 has adjacent a large lobe 41a three additional though small lobes 41b to 41d. These cause the sleeve opposite the cop to be axially displaced several times during the operation of the device, that is, during the rotary movement of the shield 11 and the coil on the foot 1' of the cop and during the action of the suction air current which is conducted from the suction tube 60 through the bore 20, one or more of these axial movements being of such length that the sleeve H is entirely raised from the foot 1' of the cop.

In FIG. 5, the device operates on the cop shown located above 1, the thread end F" being severed and removed by suction and the starting end F' of the thread which has been held fast by the foot bunch is released. The starting end F' of the thread held in the bore 20 which is traversed by suction air can be severed in any suitable known manner by severing device such as a scissors, a knife, or the like, and can thereafter be gripped by mechanical or pneumatic means and made ready for further processing.

1. Device for releasing the starting end of a coil-wound thread held fast by a reserve winding comprising a sleeve member adapted to receive the end of a coil therein and to guide an air current therethrough in a direction substantially axial to the coil, and abrading means provided on the inner surface of said sleeve and engageable with the reserve winding of the coil, said sleeve together with said abrading means on one side and the coil on the other hand being rotatably rotatable so as to abrade the reserve winding and release the starting end of the wound thread therefrom.

2. Device according to claim 1, wherein said sleeve and the reserve winding are relatively rotatable in opposite rotary direction to the direction of winding of the reserve winding on the coil.

3. Device according to claim 1, wherein said sleeve has an inner wall with a rough surface serving as said abrading means.

4. Device according to claim 1, wherein said abrading means comprises a plurality of inwardly directed, elastic tongue elements.

5. Device according to claim 1, wherein said abrading means comprises a plurality of inwardly directed, elastic tongue elements, said tongue elements having an end facing toward the end of the coil received in said sleeve, said end of said tongue elements having a slope corresponding substantially to the contour of the main winding of the coil.

6. Device according to claim 1 including a shield located adjacent said sleeve and being nonrotatable relative to the coil whose end is received in said sleeve, said shield being resiliently mounted and extending over at least a portion of the main winding of the coil adjacent said sleeve.

7. Device according to claim 1, wherein the end of the coil is receivable in said sleeve through one end thereof, the other end of said sleeve being formed with at least one eccentric opening whereby an air current passing through said sleeve assumes a substantially helically shaped path.

8. Device according to claim 1, wherein said sleeve and the coil whose end is receivable therein are relatively displaceable in the axial direction thereof whereby a plurality of repeated displacements in the axial direction are superimposable on the relative rotatory displacement of said sleeve and coil.

(References on following page)
<table>
<thead>
<tr>
<th>References Cited</th>
<th>UNITED STATES PATENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>3,059,866 10/1962 Reiners            242—35.6</td>
<td></td>
</tr>
<tr>
<td>3,086,561 4/1963  Kimura              139—257</td>
<td></td>
</tr>
</tbody>
</table>