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PROCESS AND MACHINE FOR TREATING AND SHEARING FABRIC SLEEVES HAVING A NAP

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Fig. 1.

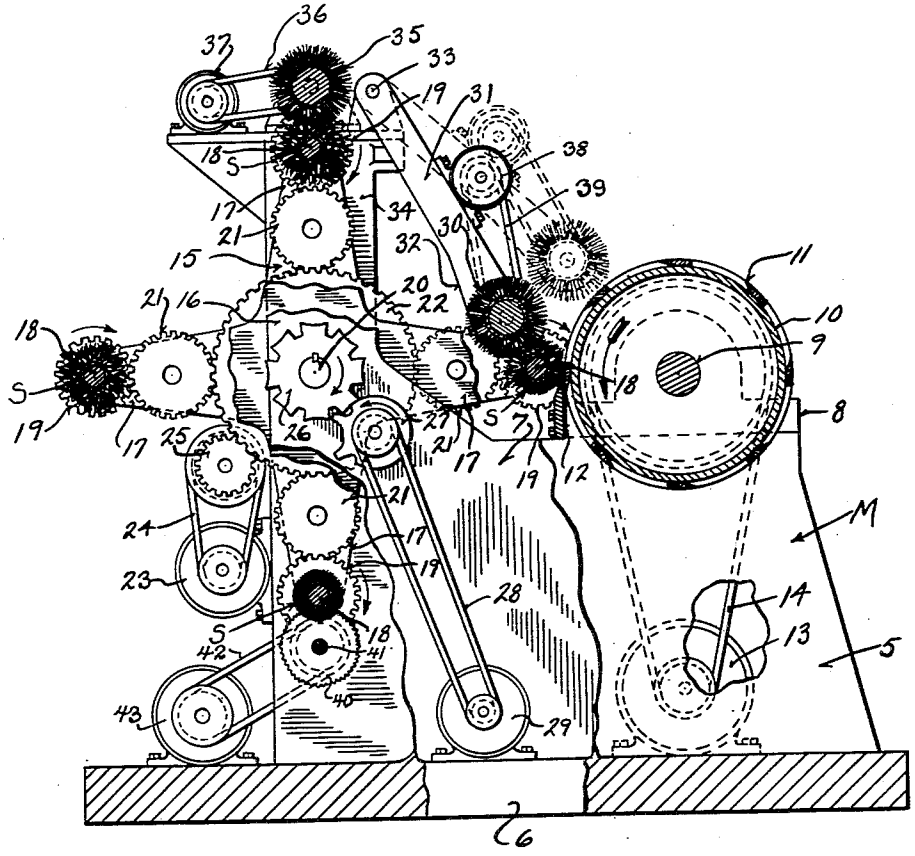


Fig. 2.



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PROCESS AND MACHINE FOR TREATING AND SHEARING FABRIC SLEEVES HAVING A NAP

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This invention appertains to a novel process and machine for treating and shearing the pile of elongated fabric cylinders or sleeves having a nap, whereby to produce an even peripheral surface, and thus permit effective use of such sleeves on paint rollers and the like. The sleeves can be, and preferably are, of the type shown in my pending application Serial Number 411,644, filed February 23, 1954, and entitled "Seamless Covers for Paint Rollers."

The sleeves can be knitted on machines the same as, or similar to, the device shown in the expired patent to Moore, No. 1,849,466, issued March 15, 1932.

It is customary in the knitting art to produce a continuous fabric sleeve of large diameter having a deep pile of natural or synthetic fibers, such as rayon, nylon, dynel, etc., and to cut this sleeve in lengths longitudinally to provide a flat piece of goods. These flat pieces can be easily treated by a so-called electrifying process to raise and straighten out the fibers in the pile, and the pile can be readily cut evenly on a shearing machine of a well known type.

Where sleeves are knitted of a small exact diameter for fitting on paint rollers, the treatment of the fibers of the pile raises a new problem and the cylindrical sleeves cannot be treated or sheared in the same manner as a flat piece, as described above.

It is, therefore, one of the salient objects of my invention to provide a novel process for effectively removing long and loose fibers and then shearing the fibers at an exact point whereby to produce a knitted cylindrical sleeve having a smooth even peripheral surface.

Another salient object of my invention is the provision of means including an elongated cylindrical wire comb of a type similar to a comb known in the carding trade as a "fancy comb" for engaging the fibers of the cylinder or sleeve for pulling and straightening out the fibers so that the same can be cut evenly by a rotatable shearing machine.

A further object of my invention is the provision of a rotatable mandrel for receiving and supporting the fabric sleeve in a predetermined relation to the bed knife and knife cylinder of a shearing machine, a rotatable wire comb for engaging the pile of the sleeve prior to the meeting of the pile with the shearing machine and means for rotating the mandrel, comb and shearing cylinder at predetermined speeds and directions relative to one another.

A still further object of my invention is to provide a machine for carrying out my process embodying a reel having a plurality of mandrels for receiving the fabric sleeves, and means for advancing the reel step by step to automatically bring a desired sleeve and mandrel in operative position relative to the comb and shearing machine.

With these and other objects in view, the invention consists in the novel construction, arrangement and formation of parts as will be hereinafter more specifically described and claimed, and illustrated in the accompanying drawing, in which drawing,

Figure 1 is an end elevational view of a machine for carrying out my improved process, parts of the machine being shown broken away and in transverse section;

Figure 2 is a perspective view of a treated and sheared fabric cylinder prior to the cutting thereof into lengths for use as paint roller covers.

Referring to the drawing in detail, wherein similar reference characters designate corresponding parts throughout the several views, the letter M generally indicates the improved machine for carrying out my process of treating and shearing elongated fabric sleeves having a nap, as indicated by the reference character S.

The sleeve S consists of a knitted base fabric 3 having incorporated therewith during the knitting thereof, fibers to form a deep pile 4. The sleeve after being knitted can be mounted on a cylindrical core or the sleeve after being cut in lengths can be placed over the desired cores.

The machine M includes a frame 5 securely mounted on a base 6 or directly to the floor of a mill, as may be desired. The frame 5 includes a pair of spaced end castings 7 and these castings carry bearings 8 for rotatably supporting a shaft 9. The shaft 9 has mounted thereon the shearing cylinder 10, and this cylinder has secured thereto spiral shearing knives 11. Also secured to the castings 8 is a vertically disposed bed knife 12 and during the rotation of the shearing cylinder 10 the spiral knives 11 sweep past the cutting edge of the bed knife. The cylinder can be driven by an electric motor 13 through the use of pulleys and a drive belt 14. The parts of the machine just described are similar to or the same as conventional shearing machines.

In accordance with my invention, I provide means for supporting the fabric pile sleeves to be treated in a predetermined position relative to the shearing cylinder and the bed knife and for rotating the sleeves and for simultaneously combing and pulling out and straightening the pile of the sleeves. This can be accomplished in different manners, and a rotatable mandrel driven at a predetermined speed can be positioned adjacent to the meeting cutting edges of the bed knife and the spiral knives 11. Likewise a rotatable wire comb is located in a predetermined position and driven at a desired speed for contacting the fibers of the pile during the rotation of the mandrel and the sleeve therewith. In order to place my process on a production basis, it is preferred to automatically feed the mandrels and the fabric sleeves successively to the shearing machine and to provide a definite station for applying the sleeves to the mandrels and for removing the finished sleeves from the mandrels. To carry this out, I employ a rotatable reel 15 and this reel includes end hub plates 16 having radially extending arms 17, preferably at quarters. The terminals of the arms rotatably support mandrels 18 for the sleeves S and these mandrels are constantly rotated at a certain speed, as will hereinafter be set forth. Each mandrel has secured thereto a pinion 19 and these pinions 19 form a part of the drive for the mandrels. The reel itself is keyed or otherwise secured to a longitudinally extending shaft 20, and this shaft and the reel rotate as a unit. The shaft is rotatably mounted in bearings carried by the end castings 7 in front of the shearing cylinder 10. The pinions 19 mesh with idle pinions 21 rotatably carried by the arms 17 of the reel, and all of the idle pinions mesh with a main drive gear rotatably mounted on the shaft 20. The main gear 22 can be rotated from an electric motor 23 securely fastened to one of the end castings 7, and this motor through pulleys and a drive belt 24 rotates a gear 25 meshing with the main gear 22. By this arrangement of parts, it can be seen that the mandrels are rotated at all times irrespective of the movement of the reel, which movement will be later set forth.

The reel is rotated a quarter of a turn so as to bring a mandrel and a sleeve directly in front of the shearing cylinder and slightly above the cutting edge of the bed knife 12. With the mandrel in its operative position the axis of the cylinder shaft 19 and the mandrel are preferably in the same horizontal plane. Upon rotation of the reel a quarter of a revolution, the mandrel directly in front of the cylinder is held in such position for a desired length of time to bring about the correct treatment of the fibers of the sleeve and the shearing thereof. The driving and the holding of the reel can take various forms, and I have shown one of such forms in the drawing. As illustrated, the reel shaft 20 has keyed or otherwise secured thereto a Geneva gear 26, and meshing with this gear is a toothed gear 27. It is to be noted that the gear 27 is provided only with two closely arranged teeth, and these

teeth are so spaced relative to the teeth of the gear 26 that upon one complete rotation of the gear 27, the gear 26 and consequently the reel, will be rotated a quarter of a revolution and the gear 26 will then be held against rotation by the smooth periphery of gear 27.

The toothed gear 27 can be constantly rotated by a pulley 28 from an electric motor 29 and this motor can be mounted directly on the base 6 should such be desired.

Forming an important part of my invention is the provision of mechanical means for pulling and straightening out the fibers of the pile on the sleeve at the time of the shearing thereof and hence I provide an elongated wire carding comb 30 of a type known in the trade as a "fancy comb." The hundreds of minute wires of the comb engage the pile and effectively remove and comb the fibers. In view of the fact that the mandrels are successively brought into shearing position, it is necessary to lift the comb 30 up and out of the way of an oncoming mandrel during the partial rotation of the reel. This is accomplished by rotatably mounting the comb 30 on a swinging frame 31. This frame has its forward edge adjacent to the comb 30 provided with an inclined or cam face 32. The upper end of the frame is mounted for rocking or swinging movement on a shaft 33 carried by bearings mounted on uprights 34 forming a continuation of the end castings 7. The position of the frame 31 relative to the arms 17 of the reel is such that upon turning of the reel an arm 17 will engage the front face of the frame 31 so as to swing the frame and its comb upwardly and rearwardly. As the arm reaches the inclined or cam face 32, the frame will be raised a desired height, momentarily, so that the sleeve S to be treated will sweep under the comb and as soon as the sleeve passes the comb the frame and the comb will automatically fall to a lowered position with the comb bearing against the pile of the sleeve.

It is preferred and highly desirable to comb the fibers previous to or during the shearing operation, but if desired the comb can be located at another preferred point, and in fact the sleeves can be treated to an initial combing step prior to the movement of a sleeve to its operative shearing position. Thus, I have shown a second comb indicated by the reference character 35 rotatably mounted on suitable bearing brackets carried by the upper ends of the uprights 34. This comb 35 immediately engages a sleeve supported by a mandrel as the mandrel reaches a topmost position, and the comb 35 can be driven through the medium of a pulley 36 operated from an electric motor 37. The motor 37 can be carried by one of the uprights 34.

In order to add weight to the swinging frame 31, I preferably mount the drive motor 38 for the comb 30 directly on the frame 31, and the comb 30 can be driven from the motor 38 by a pulley belt 39.

If desired, the elongated sleeve can be cut into desired lengths before removal from the reel, and just after the treating and shearing process. The cutting mechanism can consist of a desired number of disc shaped slitting knives 40 keyed or otherwise secured to a shaft 41. The shaft can be driven from a belt 42 operated from the electric motor 43. The motor can be secured to the base 6 or any other appropriate part of the machine.

It can be seen that the mandrel at the extreme front of the machine constitutes the loading and unloading station and that a mandrel at the top of the machine constitutes a first treatment station for a sleeve and that the mandrel and the sleeve at the extreme rear end of the reel constitutes the final treating and shearing station. The lowermost reel and sleeve constitute the slitting station.

It is to be noted that the shearing cylinder 10 rotates in a counter-clockwise direction and that the mandrel with the fabric sleeve rotates in a clockwise direction. The comb 30 preferably rotates in a counterclockwise direction so that the fibers will be fluffed up in the direction of rotation of the mandrel and its sleeve. Likewise, the shearing cylinder rotates at a relatively high rate of speed, say from 500 to 900 revolutions per minute, while the mandrel and its sleeve rotate at a slower rate of speed, say from 10 to 30 revolutions per minute. The comb can be driven at a slightly higher rate of speed than the mandrel and its sleeve but at a greatly reduced speed in comparison to the shearing cylinder. Thus the comb can be driven from 20 to 100 revolutions per minute.

By rotating the sleeve in front of the shearing cylinder 10, and by combing the pile, I can give the napped sleeve a smooth, even peripheral surface and this is the essence of my improved process.

Changes in details may be made without departing from the spirit or the scope of my invention but what I claim as new is:

1. The process of treating a knitted fabric sleeve having a pile to produce an even smooth peripheral surface which consists in rotating an untreated pile sleeve in front of a shearing machine and combing out the fibers of the pile as the pile is presented to the shearing machine.

2. The process of producing a smooth even peripheral surface on knitted sleeves having a deep pile which consists in rotating a sleeve in front of a rapidly rotating shearing cylinder and combing out the fibers of the pile during the shearing operation by a comb rotating at a higher rate of speed than the sleeve but at a less rate of speed than the shearing cylinder.

3. The process of producing a smooth even peripheral surface on a knitted sleeve having a deep pile which consists in first rotating the sleeve at a slow rate of speed to a shearing machine at the point of meeting of the bed knife and cylinder of the machine with the cylinder rotating at a high rate of speed relative to the sleeve and second, fluffing up and combing the fibers of the pile by a rotating wire comb engaging the sleeve during the shearing process.

4. The process of producing a smooth even peripheral surface on a knitted sleeve having a deep pile which consists in rotating the sleeve, initially combing out the fibers of the sleeve by a rotating wire comb, second, holding the sleeve with the combed fibers against the bed knife of a cylindrical shearing machine and subjecting the fibers to a second combing process by a wire comb during the shearing operation.

5. The process as defined in claim 4, and with the cylinder of the shearing machine and the sleeve rotating in opposite directions.

6. A machine for producing a smooth even peripheral surface on a knitted sleeve having a deep pile comprising a bed knife, a rotating cylinder having knives moving past the bed knife, means for rotating the cylinder, a mandrel arranged adjacent to and in front of the bed knife for receiving and rotating a sleeve with a pile, means for rotating the mandrel at a less rate of speed than the cylinder, and a cylindrical carding comb engaging the fibers of the pile of the fabrics, and means for rotating the comb.

7. A machine as defined in claim 6, the mandrel and the cylinder being rotated in opposite directions.

8. A machine for producing an even peripheral surface on an elongated knitted sleeve having a deep pile comprising a frame, a vertically disposed bed knife mounted on the frame having an upper cutting edge, a shearing cylinder rotatable on the frame having knives movable past the bed knife, means for rotating the cylinder, a rotatable reel mounted on the frame in front of the bed knife and cylinder having a plurality of arms, rotatable mandrels carried by the arms, means for constantly rotating the mandrels, the mandrels being adapted to receive the sleeves to be treated and sheared, means for rotating the reel in a step by step motion by bringing the mandrel and a sleeve in operative position relative to the bed knife and shearing cylinder, and a rotatable carding comb carried by the frame for engagement with the pile of a sleeve for combing out the fibers and means for rotating the comb.

9. A machine as defined in claim 8, and means for slitting a sheared sleeve on a mandrel after the shearing process.

10. A machine for producing an even smooth peripheral surface on an elongated sleeve having a deep pile comprising a frame, a vertically disposed bed knife on the frame having an upper cutting edge, a rotatable shearing cylinder on the frame having knives movable past the bed knife, means for rotating the cylinder, a rotatable reel mounted on the frame in front of the bed knife and cylinder having a plurality of radially extending arms, mandrels rotatably carried by the knives, means for constantly rotating the mandrels, the mandrels receiving the knitted sleeves, means for rotating the reel step by step to successively bring a mandrel and a knitted sleeve in operative position relative to the bed knife and cylinder, a swinging frame mounted above the bed knife, a wire comb rotatably carried by the frame for move-

ment into and out of engagement with the pile of a sleeve in operative position relative to the bed knife and cylinder, means for rotating the comb, and means for raising the frame and comb to a non-operative position during turning movement of the reel.

11. A machine as defined in claim 10, and means for slitting a sleeve into lengths after movement of a sleeve out of its operative position relative to the bed knife and cylinder.

12. A machine as defined in claim 10, and a second rotatable wire carding comb engaging the pile of a sleeve on a mandrel prior to the movement of the sleeve and mandrel to the operative position relative to the bed knife and cylinder.

No references cited.