

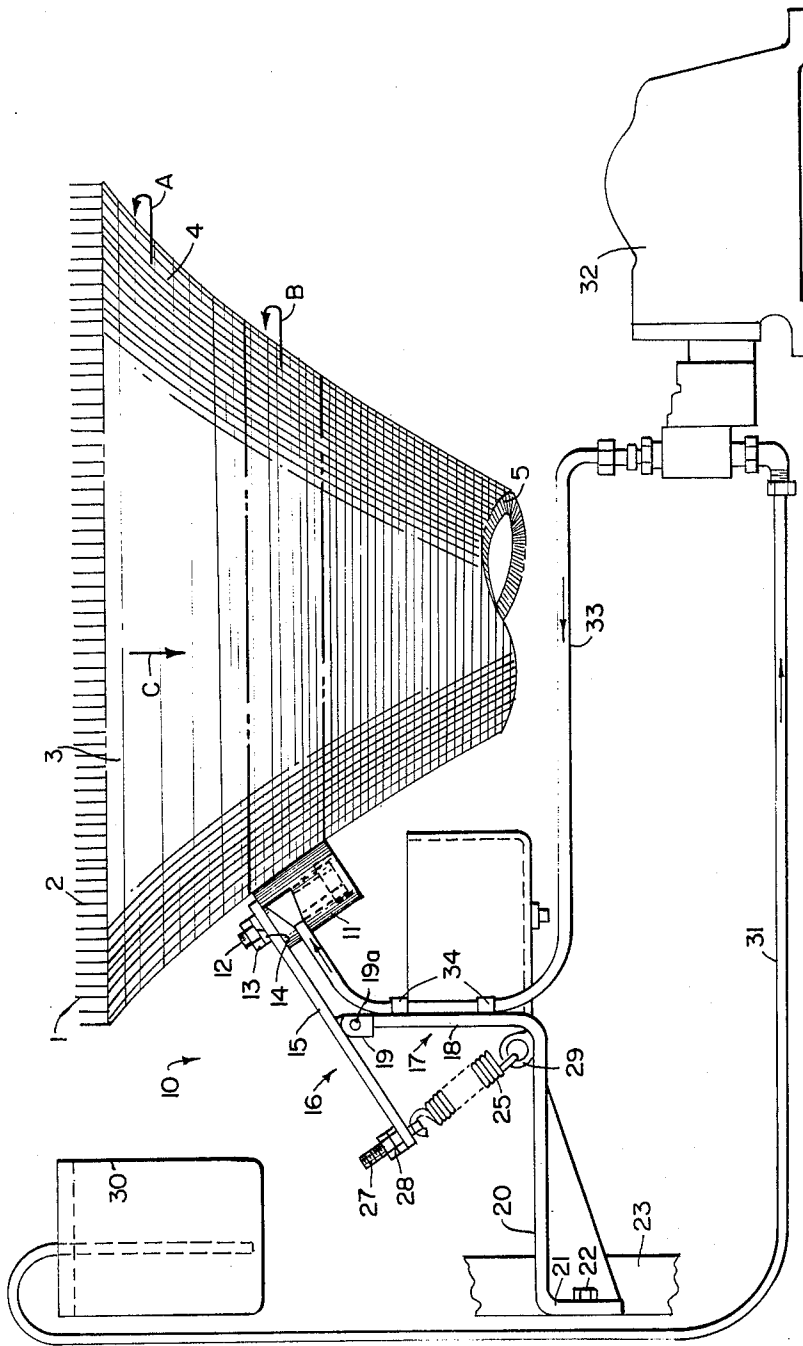
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METHOD AND APPARATUS FOR BACK COATING KNITTING PILE FABRIC

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1

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METHOD AND APPARATUS FOR BACK COATING KNITTING PILE FABRIC

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The present invention relates to a means and method of coating fabrics.

It has been common in the coating of fabric materials to first knit or weave the fabric and then remove the material which is knitted or woven from the fabricating machine and thereafter to feed the material into a second machine in which the fabric is coated or sized for various purposes such as reinforcement, waterproofing, etc. This practice has been followed for example in the manufacture of pile fabrics which are knitted on circular knitting machines. There have also been efforts to coat fabric materials while the material is still in the fabricating machine by applying the coating or sizing material to the fabric immediately after it is formed by such means as, for example, a wick against which the fabric rubs as it moves from the fabricating machine. Efforts have also been made to apply coating fluids to a fabric material as it is knit on a flat knitting machine by passing it over rollers which are partially immersed in the fluid which is coating the fabric.

These means and methods have not been altogether satisfactory in applying uniform back coatings to fabrics, including, for example, pile fabrics.

It is therefore an object of the present invention to provide a means and method of uniformly and precisely back coating fabrics as the fabric is knitted or formed.

A further object of the present invention is to apply uniform back coatings to pile fabrics by locking the staple fibers forming the pile to the base yarn as the fabric is formed on the fabricating machine so that the fibers forming the pile are not lost or pulled from the base fabric and the pile thereby thinned.

It is also an object of the present invention to secure the interstices of stitches in fabrics, including pile fabrics knitted on a circular knitting machine as the fabric is formed so that the stitches are immediately fixed in positions relative to one another.

A further object of the present invention is to provide an improved means and method of securing floating yarns which are often used in special fancy effect knitting processes immediately upon knitting so that the floating yarns which are normally loosely interengaged with the knitted fabric will not be pulled from the fabric during subsequent dyeing and other processes.

A further object of the present invention is to provide an improved means and method of applying a back coating on various fabrics such as pile fabrics as the fabric is being knit on a knitting machine such as a circular knitting machine.

One further object of this invention is to provide a means and method of applying a coating to the surface of a knit fabric to facilitate subsequent processing such as napping.

In the present invention the coating means is secured to the fabricating machine such as a knitting machine, and in the case of the circular knitting machine immediately below the knitting head. The coating means comprises essentially a roller which is supported for rotation on a bracket adapted to adjustably position the roller. The bracket is adapted to position the surface of the roller to engage the knit material as it is fed from the knitting head and before it is severed or detached from the knitting machine. A coating material of any suitable type is

2

applied in a constant flow to the coating roller for transfer to the knitted fabric material by a quantitatively controlled means comprising, for example, a metering pump which pumps controlled quantities of the coating material from a supply tank through a tube to the roller where it passes from the tube onto the roller in a continuously metered amount. Suitable means are secured below the roller to catch any excess material which may pass from the supply source.

These and other objects and advantages of the present invention will be more clearly understood when considered in conjunction with the accompanying drawing which represents a schematic view of the present invention embodied in a circular knitting machine.

While the present invention may be used in conjunction with any conventional machine for making fabrics, it is particularly adapted and useful in connection with a circular knitting machine of a type for example, as made by Wildeman-Jacquard Co., and further is particularly useful in the back coating of pile fabrics. For convenience the invention will be described for use in conjunction with such a machine and in the preferred treatment of pile fabrics. However a broader application is contemplated.

The circular machine 1 is of conventional design and style and is provided with a knitting head having a circularly arranged set of needles with the head lying in a horizontal plane and adapted to knit a tubular fabric 3. The machine is provided with a suitable mechanism for feeding staple fibers to the needles of the knitting head as the base fabric is knit to provide a pile fabric. In the drawings the machine knits a base mesh 4 with a pile 5 of staple fibers. This pile fabric in tubular form moves helically downwardly in the direction of arrow A as it is knit, with the tubular form normally moving downwardly one row of stitches for each feed on the machine on each complete revolution. While the motion of the tubular form 3 is helical, this helical motion may be resolved into components of motion B and C. Positioned below the needles forming the knitting head 2 is a coating means generally indicated at 10. This coating means comprises a smooth surfaced roller 11 preferably 1/4" in diameter and 2" long and of steel or other hard material. The roller is preferably mounted on a shaft 12 about 3" below the knitting needles for free rotation. A threaded end of the shaft 12 is secured by a suitable threaded nut 13 and washer 14 to an arm 15 which forms part of the bracket generally indicated at 16. If desired, the roller 11 may be rigidly secured to the shaft 12 and the shaft in turn journaled for rotation in a journal formed in the arm 15. The arm 15 in turn is pivotally interengaged with angle member 17 by a suitable means which may comprise a shaft 19 fixed to the arm 15 at its center and mounted at its ends in journals 19A in turn fixed to the leg 18 of the angle member 17. The leg 18 is continuous with one end of transverse leg 20, with the other end of leg 20 flared downwardly and secured by bolts 22 to the frame 23 of the knitting machine. The end of the arm 15 opposite to the end to which the roller 11 is attached has a tension spring 25 secured to it. One end of this spring is secured to the adjusting bolt 27. The bolt 27 passes through a hole in the arm 15 and has its free end threaded with an adjusting nut 28 securing the bolt to the arm 15 under tension. The other end of the spring is secured to an eyelet 29 attached to the bracket 16. This spring 25 tensions the arm 15 upwardly in a counterclockwise direction and against the outer surface of the tubular form 3, due to the frusto-conic like configuration of the knit tubular form in the area immediately below the knitting head. The adjusting bolt and nut permit adjustment of the spring tension which may be necessary in using different fibers and yarns in order to assure

3

continued contact of the roller against the tubular form 3.

Suitably supported on the frame or elsewhere is a supply tank 30 which contains a coating material. A tube 31 extends from the supply tank 30 and is connected by suitable plumbing to a conventional metering pump 32 such as manufactured by the Milton Roy Co. The metering pump draws the liquid from the supply tank 30 through the tube 31 and pumps it into a tube 33 at a rate which may be varied with accuracy over a wide range, as for example from zero up to $\frac{3}{4}$ gal. per hour. The free end of the tube 33 is secured by clips 34 to the bracket 16 with the open end of the tube 33 positioned adjacent to the roller 11 so that fluid pumped through the pump 33 will be flowed onto the roller at its upper end and flow uniformly down and along its width as the roller rotates. Preferably the tube 33 is positioned on the side of the roller opposite to that side which engages the fabric as it rotates so that the fluid pumped from the tube 33 may be uniformly dispersed by flowing over the roller 11.

In the use of the present invention the fabric material is continuously knit on the machine. In the preferred embodiment the circular knitting machine continuously fabricates a pile fabric with the fabric being formed in a tubular form 3 which moves helically downwardly from the knitting head. As it moves helically downwardly it continually presses against the roller 11 which is rotated by frictional engagement with the tubular form 3. At the 30 through the lines 31 and 33. This fluid is flowed pumps a coating material or fluid from the supply tank same time the metering pump, which is adjusted to pump fluid at a speed related to the speed of the knitting machine, onto the rotating roller 11.

The invention may be used in conjunction with any suitable coating material such as a sizing material, a latex material, a cross linking acyclic resin or other simple materials such as starch solutions and the like. The rate at which the coating material may be applied to the fabric varies considerably depending upon the knitting machine, the fabric being knit and the speed at which the knitting machine is run, in addition to the nature of the coating material being applied.

While the illustration discloses a means by which the coating material is flowed from the tube onto the rotating roll the present invention also contemplates spraying the coating onto the rotating roll rather than flowing. By using the techniques of this invention viscous materials loaded with various types of clays or chemicals may be applied to a fabric as a coating material.

While the preferred embodiment showing the invention in connection with a circular knitting machine discloses the roller on the outside of the tubular form, the invention also contemplates an arrangement in which the roller is supported by means similar to that disclosed on the inside of the tubular form for use in connection with circular knitting machines in which the pile fabric is formed on the outside of the tubular form and the backing fabric is formed on the inside.

The invention also contemplates the application of a coating by the means and method described to the surface of a fabric for stiffening or to otherwise improve the fabric for further subsequent treatment such as napping.

What is claimed is:

1. A method of coating a fabric material as it is being knit on a circular knitting machine comprising, positioning a roller below the needles of said machine, supporting said roller to contact said fabric material as it rotates with the axis of said roller in a plane parallel to the fabric material engaged by said roller and with roller adapted to rotate with said fabric material to successively contact all surface portions of said material, and directing a coating material to said roller from a supply reservoir spaced from said roller as said roller ro-

4

tates in continuously measured quantities whereby said coating material will be transferred to said fabric material on rotation of said roller.

2. A method of fabricating a fabric comprising, knitting a yarn on a knitting machine to form a fabric and after said fabric has moved from said needles but before it is removed from said machine applying an adherent back coating material to entire surface of said fabric from a rotating roller with said fabric moving relative to and in engagement with said roller, and continuously supplying a metered amount of said back coating material to said rotating roller from a supply reservoir spaced from said roller.
3. A method of fabricating a back coated pile fabric, comprising, knitting a yarn on a circular knitting machine while feeding staple fibers to the needles of said machine to form a pile fabric, and after said pile fabric has passed below said needles but before it is removed from said machine applying an adherent back coating material to said yarn from a roller rotating in engagement with said pile fabric while continually spraying said material onto said roller in metered amounts.
4. A coating applying device for use in combination with a circular knitting machine having knitting needles, said device comprising, a roller, means supporting said roller for rotation below said needles with substantially the entire surface of said roller positioned to continuously engage the yarn of said fabric knit on said machine as it passes below said needles and before it is removed from said machine, and means for continuously pumping said coating material uniformly onto said roller as it rotates.
5. A device as set forth in claim 4 wherein said means for continuously applying said coating material comprises, a tank for containing a supply of said coating material, a metering pump for pumping measured quantities of said coating material, and tubes operatively connecting said tank to said pump and said pump to said roller for flow of said coating material from said tank to said roller through said pump.
6. A device as set forth in claim 5 wherein said means supporting said roller comprises, a shaft on which said roller is supported for rotation, a bracket constructed and arranged to be secured to said knitting machine having an arm supporting said shaft, means for tensioning said arm toward a position wherein said roller presses against said pile fabric, and a drain tank positioned below said roller.
7. A device as set forth in claim 6 wherein said means for tensioning said arm includes a pivot support for said arm to tension it in one direction about said pivot.
8. A method of fabricating a back coated pile fabric comprising, knitting yarn on a circular knitting machine while feeding staple fibers to the needles of said machine to form a pile fabric delivered from the knitting head in a tubular form which moves helically downwardly, and after said pile fabric moves downwardly below said needles and in a section of said tubular form having a frusto-conic like configuration applying an adherent back coating material to said yarn from a roller rotating in engagement with said pile fabric while continually spraying said material onto said roller in metered amounts.
9. A method of fabricating a back coated pile fabric comprising,

5

knitting a yarn on a knitting machine while feeding staple fibers to the needles of said machine to form a pile fabric and after said pile fabric has moved from said needles but before it is removed from said machine applying an adherent back coating material to said fabric from a rotating roller with said pile fabric also moving relative to and in engagement with said roller,

and while applying said coating material to said fabric, feeding coating material to said roller in a continuously metered amount from a supply reservoir spaced from said roller.

10. A method of coating a fabric material as it is being knit on a circular knitting machine comprising, positioning a roller below the needles of said machine, supporting said roller to contact said fabric material as it rotates with the axis of said roller in a plane parallel to the fabric material engaged by said roller and with said roller adapted to rotate with said fabric material, and

5

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15

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6

applying a coating material to said roller as it rotates in continuously measured quantities by pumping said material from a reservoir container onto said roller whereby said coating material will be transferred to said fabric material on rotation of said roller.

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