FIG. 1

INVENTOR.

Otto T. Radtke

BY

Paul & Paul
ATTORNEYS.
This invention relates to a stripping attachment for a carding head for a pile fabric knitting machine and, in particular, to a carding head having means for feeding auxiliary sliver as well as base sliver to the knitting machine in such a way as to produce a striped pile fabric.

Carding heads for pile fabric knitting machines are well known in the art of knitting pile fabrics, such as rugs, coat linings, etc., and such devices operate to feed roving or sliver to needles knitting the base or backing fabric of the product. The roving or sliver fibers are taken by the needles and pulled through the knitted loops being formed, thereby locking the pile fibers into the base fabric.

It is the primary object of this invention to provide an apparatus and method for selectively varying the feeding of a secondary or auxiliary roving or sliver to a pile fabric knitting machine independently of the feeding of the base sliver, so that the auxiliary sliver is selectively employed with and among the base sliver fibers in the pile fabric to form a repeating pattern of stripes in the pile.

It is another object of this invention to provide a simplified mechanical attachment for a carding head so that at selected times secondary sliver can conveniently be fed to the knitting needles without requiring removal or adjustment of the main carding head apparatus.

It is another object of this invention to provide an apparatus having the advantages described above which will automatically control, according to a predetermined pattern, the feeding of auxiliary sliver to the knitting machine so that the pile fabric will have bands or stripes of pile of varying density, thereby promoting a draping effect in the finished pile fabric.

It is a further object of this invention to provide a single control means for the selective feeding of auxiliary sliver to a pile fabric knitting machine by means of a plurality of carding heads.

These objects and other attendant advantages of this invention are more fully described hereinbelow in reference to the attached drawings, wherein:

FIGURE 1 is a fragmentary diagrammatic view in perspective of a pile fabric knitting machine and carding head, together with a preferred form of the attachment of this invention;

FIG. 2 is an enlarged side elevational view of the carding head shown in FIGURE 1;

FIGURE 3 is an enlarged fragmentary view in top plan of the auxiliary sliver feed box mounted on the carding head, and

FIGURE 4 is an enlarged fragmentary view in perspective of the auxiliary sliver feed box.

The apparatus of this invention comprises an attachment for a carding head for a pile fabric knitting machine. The attachment functions to feed auxiliary sliver, at variably controlled rates, to the carding head for selective interperssion with the main sliver before it is delivered to the knitting machine.

Referring now to FIGURE 1, there is shown a conventional open top circular knitting machine, generally designated by the number 10, an auxiliary sliver feeding attachment generally designated by the number 20, and a preferred form of the pattern control mechanism of this invention, generally designated by the number 100.
is journaled within a pair of movable bearings 87a, 88a mounted within brackets 87, 88 respectively. Tension springs 89, under the control of adjusting screws 90, are mounted to the distal ends of brackets 87, 88 to bear against bearings 87a, 88a, thereby providing means to yieldingly engage the serrations of roll 83 with those of roll 84. Thus roll 83 drives roll 84. By increasing the force exerted by springs 89 on bearings 87a, 88a, the auxiliary sliver pulled between the rolls 83, 84 is flattened and spread out laterally. The auxiliary sliver is drawn from a source (not shown) through a delivery tube 91, anchored by clamp 92 on brackets 87, 88, by the rolls 83, 84, which feed the sliver to the bristles 32 of the card 24, as shown in FIGURE 2. A stationary brush 86 (FIGURES 3 and 4) is mounted adjacent to the inner end of feed roll box 82 to ensure that the auxiliary sliver is removed from feed roll 84 and directed to the card 24.

Referring now to FIGURES 1 and 2, a toothed timing pulley 110 is fixedly mounted on the extended portion of shaft 41a supporting lower feed roll 41 which, together with its axiale roll 40 and the other two pairs of rolls, feeds base sliver to the card 24 as described above. A second toothed timing pulley 116 is fixedly mounted on a horizontal shaft 117 journaled within gear box 118, and a toothed idler pulley 114 is mounted on a support 115 affixed to gear box 118. Shaft 117 is connected by conventional speed reduction gearing in box 118 to a second shaft 119 also journaled within the gear box. A pattern cam 120 is fixedly mounted to the protruding end of shaft 119, and has a specially shaped periphery or circumference, for the purpose described hereinbelow. A drive belt 112 is entrained around pulleys 110, 114 and 116 by means of which pulley 118 drives pulley 116.

A cam follower 122 is connected to an arm 123 supported in bearings 121 and provided with a rack 124. The teeth of rack 124 mesh with the teeth of pinion 128 which is mounted on a shaft 129 journaled in motor speed control box 130. Bearings 121 are affixed to the outside of box 130. A spring 125, connected to a stud protruding from box 130 and to rack 124, urges the rack to the left, as shown in FIGURE 1, to maintain cam follower 122 continually in contact with cam 120. Shaft 129 is connected to a conventional rheostat (not shown) mounted in box 130 and electric power is supplied to the rheostat through a control switch 133 provided to start and stop the flow of current to the rheostat in the control box 130. Cable 136 carries the controlled electric power from the rheostat to a standard, variable speed electric motor 138. The drive shaft of motor 138 is connected through a series of conventional speed reducing gears (not shown) in gear box 140, to the shaft (not shown) on which is mounted a toothed pulley also not shown. The pulley is connected by drive belt 142 to a second toothed pulley 144 fixedly mounted on rotatable shaft 146 journaled in supporting bracket 148. Shaft 146 is connected by an arcuate flexible shaft 150 to shaft 83e (FIGURE 4) of auxiliary sliver feed roll 83. Similarly, flexible shaft 150 similarly connects shaft 146 to a second carding head (not shown) mounted to left of drive motor 138 as shown in FIGURE 1. Similarly, flexible shaft 150” (FIGURE 4) connects shaft 83e of the carding head 20 to the corresponding feed roll shaft of the next adjacent carding head (not shown). In this fashion, auxiliary sliver feed rolls of each carding head mounted around the knitting machine are driven simultaneously by the single drive motor 138 through a plurality of flexible shafts or shaft segments connecting the auxiliary sliver feed rolls of the several carding heads.

In operation, the stripping attachment of this invention, particularly auxiliary and main sliver, are placed in position to be taken by their respective feed rolls. When the knitting machine begins to operate, gear ring 14 rotates, causing rotary movement to be transmitted to the card 24 and doffer 23. At the same time, the main feed rolls are rotated by the drive means illustrated, pulling in the main sliver and feeding it to the card 24 for delivery to the doffer 23 and thence to the needles N. Rotation of shaft 41a of the lower roll 41 of the first pair of main fed rolls causes pulley 110 to rotate, driving belt 112 and rotating pulley 116. By means of the gearing connecting shafts 117 and 119, pattern cam 120 is rotated constantly at a rate proportional to that of pulley 116. Cam follower 122, spring biased against cam 120, follows the shaped periphery of the cam and thus reciprocates horizontally. By means of connecting arm 123, this reciprocatory action is transmitted to rack 124 which causes pinion 128 to oscillate a fixed distance in either direction. As oscillation of shaft 129 varies the control position of the rheostat, current flowing through cable 136 to variable speed electric motor 138 is selectively varied and the speed of the motor 138 increases and decreases accordingly.

Thus, the speed of the motor is determined by the shape of cam 120. As the speed of drive motor 138 changes, the connecting drive means comprising the gear box 140, belt 142, pulley 144, shaft 146 and flexible shaft 150 causes feed roll 83 to rotate at corresponding speeds. Roll 83 drives its meshing roll 84 and pulls auxiliary sliver at selectively variable rates of speed from the delivery tube 91 and feeds it to the rapidly moving bristles 32 of the card 24. Due to the drive shaft connections between the several carding heads mounted around the knitting machine, auxiliary sliver is fed at the same time and at the same variable rate by each of the auxiliary feed rolls of each carding head. This produces substantially uniform bands or stripes of variable density in the pile when the main and auxiliary slivers are of contrasting colors.

The auxiliary sliver attachment of this invention will produce, for example, a pile fabric having alternating stripes of dark colored and light colored pile, the stripes blending gradually from one color to the other. This particular blend of pile may be achieved by feeding the light colored sliver through the main sliver feed rolls and the dark colored sliver through the auxiliary sliver feed rolls. As the base, light colored sliver is fed at substantially a constant rate and the auxiliary dark colored sliver is fed at a varying rate, a greater density of sliver is fed to the needles N to form the dark portions or stripes of the pile fabric than is fed to form the light colored stripes, at which latter times the auxiliary, dark colored sliver is fed sparingly, if at all. By thus varying the density of the pile, draping of the pile fabric along the less dense pile stripes is promoted, thereby simulating natural furs. A gradual blend in the pile from one color or type of sliver to another color or type is produced by feeding the auxiliary sliver to the card 24. In this way, the auxiliary sliver is combed, spread out and interspersed with the base sliver before both slivers are fed by the doffer to the needles.

It will be apparent to those skilled in the art that by varying the peripheral contour, size and speed of rotation of pattern cam 120, the quantity of auxiliary sliver fibers fed to the needles and the degree of blending of the fibers of the slivers in the pile can be selectively controlled. For example, a pattern cam 120 having a small, single protuberance arranged with the rheostat and drive mechanism shown in FIGURE 1, in such a manner that movement of the rack 124 to the right would increase the voltage would cause auxiliary sliver to be fed to the needles only briefly thereby forming narrow stripes thereof between broad stripes of base sliver. As another example, the pattern cam may be arranged to continually feed auxiliary sliver, during a single cycle, at a progressively increasing rate thereby forming a repeating stripe blend having a progressively different color.

The slivers fed by the main carding head and by the attachment of this invention may consist of any fibers or
mixtures of fibers, either natural or synthetic, which are suitable for forming the desired pile of the fabric. By way of example, it is common practice to use such well-known fibers as wool, Dynel, Orlon, Acrylan, nylon, Verel, and mixtures thereof. The auxiliary sliver may differ from the main sliver by the type of fiber and, preferably, is also of a contrasting color. For example, if the main sliver used is dark in color, the auxiliary sliver may be contrasting light color so that the final fabric would have dark stripes alternating with light stripes.

Although this invention has been disclosed with reference to specific forms and embodiments thereof, it will be appreciated that a great number of variations may be made without departing from the spirit or scope of this invention. For example, parts may be reversed, equivalent elements may be substituted for those specifically disclosed, and certain features of the invention may be used independently of other features, all without departing from the spirit and scope of this invention as defined in the appended claims.

Having thus described my invention, I claim:

1. In a pile fabric knitting machine having at least one carding head positioned adjacent the needle circle for feeding sliver to the needles, said carding head having at least one pair of main feed rolls, means for continuously driving the main feed rolls at a selected speed to deliver a base sliver to the needles and a pair of auxiliary feed rolls for delivery of an auxiliary sliver to the needles, the combination including:

(a) a rotatable control cam for the auxiliary feed rolls,
(b) drive means for rotating the control cam, connected to and actuated by the main feed rolls,
(c) a variable speed electric motor connected to the auxiliary feed rolls to impart rotary movement there-to,
(d) electric current supply means for the motor and
(e) cam follower means responsive to the rotation of the control cam and operative to control the amount of electric current supplied to the motor to cause the auxiliary feed rolls to deliver auxiliary sliver at selectively variable rates.

2. The pile fabric knitting machine of claim 1 having a plurality of carding heads, each head having at least one pair of auxiliary feed rolls, further including means for imparting rotary movement to all said auxiliary feed rolls simultaneously.

References Cited by the Examiner

UNITED STATES PATENTS

207,272 8/1878 Haigh -------------- 19--145.7
410,823 9/1889 Denton -------------- 19--145.7
1,277,499 9/1918 Stevens -------------- 318--420
1,606,746 11/1926 Cundea -------------- 318--402
1,894,596 1/1933 Moore -------------- 66--9
2,779,176 1/1957 Moore -------------- 66--9
2,964,932 12/1960 Rose -------------- 66--9
3,122,904 3/1964 Brandt -------------- 66--9
3,153,335 10/1964 Hill -------------- 66--9
3,188,834 6/1965 Radtke -------------- 66--9

ROBERT R. MACKEY, Primary Examiner.