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3,368,372

FABRIC TAKE-UP FOR CIRCULAR KNITTING MACHINE

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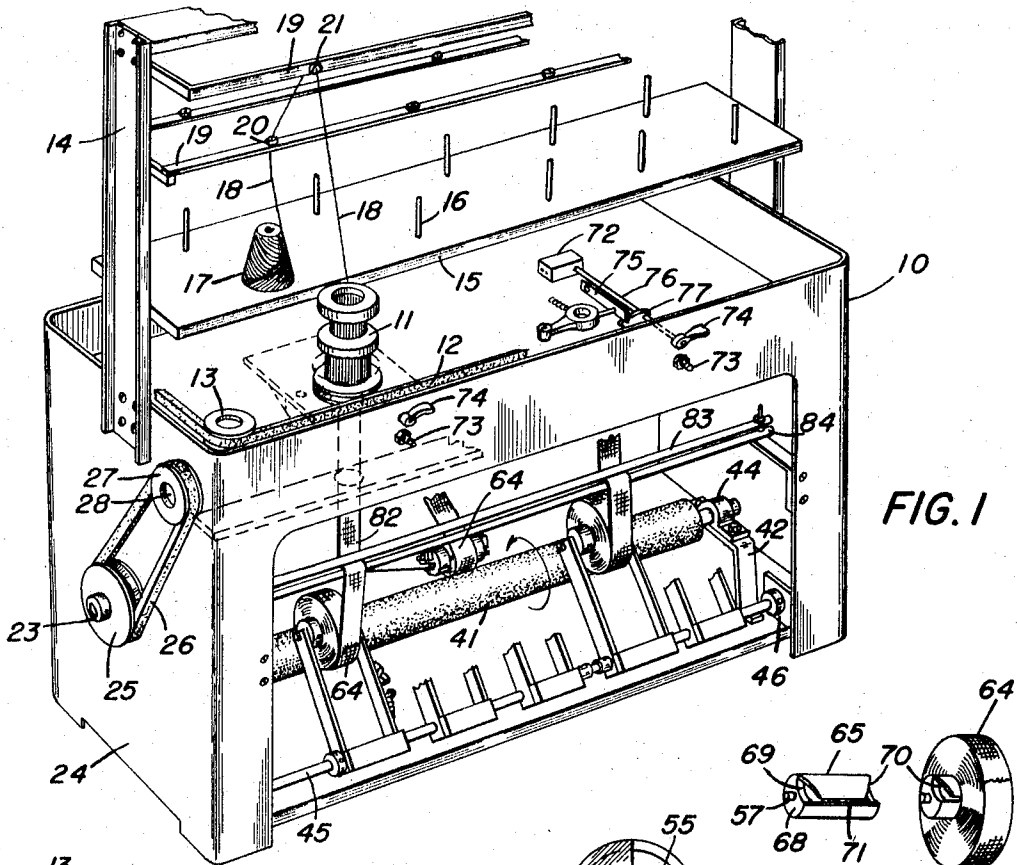


FIG. 1

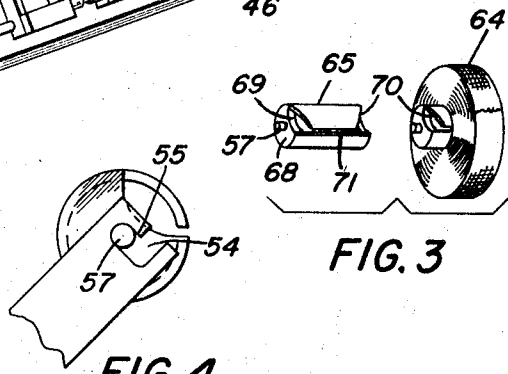


FIG. 2

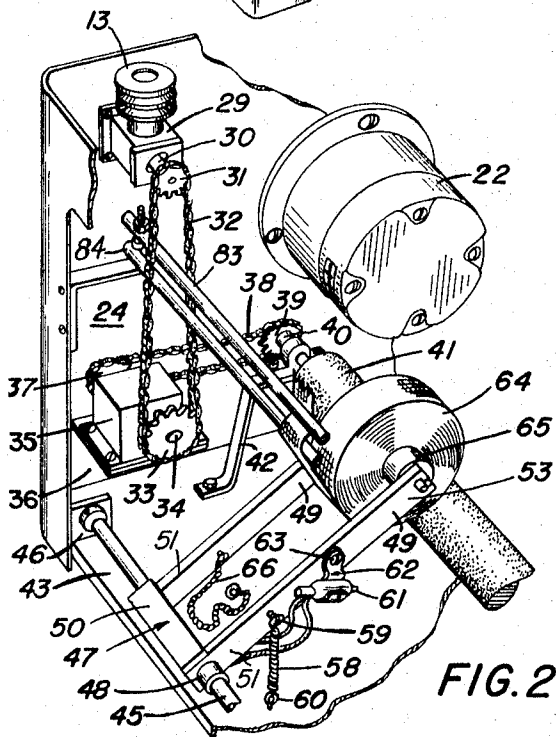


FIG. 3

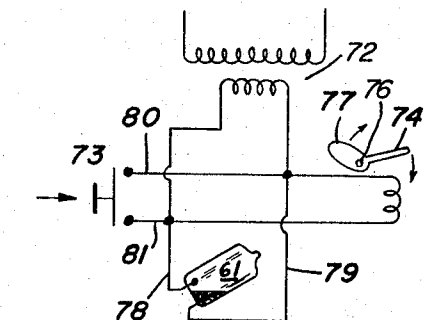


FIG. 4

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**FABRIC TAKE-UP FOR CIRCULAR  
KNITTING MACHINE**

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4 Claims. (Cl. 66-151)

This invention relates to an improved fabric take-up device for a circular knitting machine and relates more particularly to a constant speed fabric take-up device for a circular knitting machine in which a predetermined diameter of the fabric package being wound will terminate knitting on an individual circular knitting machine head of a multiple head knitting machine.

In conventional multiple head crinkled yarn circular knitting machines of the type manufactured and sold by Scott and Williams, Inc., flanged fabric take-up reels or bobbins are employed beneath each individual circular knitting head with the tension on the fabric being knit varying dependent upon the diameter or number of convolutions of the wound tubular fabric on each individually driven reel or bobbin. Suitable micro-switches or solenoids are employed each being responsive to the tension on the fabric being wound or to the diameter of the fabric package to terminate the knitting on an individual knitting head from which the fabric is wound when a reel is full size. By reason of the constantly varying diameter of the fabric being wound on each individual fabric take-up reel, the tension on the fabric will vary resulting in different stitch tensions and sizes. Also the wound fabric is not uniform and presents an inferior wound fabric package. Constant adjustment and maintenance of the individual reel drives and of the fabrics tensioning devices results in considerable downtime as well as variations in the fabric tube being knit. Considerable downtime is experienced also in doffing and restarting a new reel which requires rethreading after the reel components are reassembled.

Therefore, it is an objective of this invention to provide a fabric tube take-up device capable of applying a substantially constant and uniform tension to a fabric tube being knit and for terminating knitting on an individual knitting head when the fabric package reaches a desired diameter.

A further objective of this invention is to provide a fabric take-up device in which a substantially uniform tension may be applied to the fabric during knitting irrespective of the diameter or number of convolutions of fabric on the take-up spool.

Another objective of this invention is to provide an apparatus for winding from several knitting heads a series of tubular fabrics on individual spools irrespective of the diameter of the fabric package and terminating the winding and knitting of an individual tube after the fabric package has reached a predetermined diameter.

Another objective of this invention is the provision of a fabric take-up device for a multiple head circular knitting machine in which several fabric packages are wound individually by driving engagement with a frictional surface the speed of which may be varied depending upon the desired rate of fabric take-up or knitting to apply the requisite tension to the fabric tube being knit.

Still another objective of this invention is to provide a fabric take-up device for a multiple head circular knitting machine in which a substantially uniform tension is applied to each of the tubular fabrics being knit and flattening the fabrics as they move continuously to a wind-up device that is pivotally mounted and in juxtaposition

to a fabric winding member and whereby doffing is facilitated without the need of disassembling reels.

Other objectives and many of the attendant advantages of this invention including the simplicity, low cost and maintenance free aspects will become more readily apparent to those skilled in the knitting art who have familiarity with conventional multiple head circular knitting machines from a consideration of the following detailed description taken in conjunction with the accompanying drawings in which like characters of reference designate corresponding parts throughout the several views, and wherein:

FIG. 1 is a partial perspective view of a multiple head circular knitting machine illustrating schematically only one knitting head, a yarn supply package, knitting head stop motion, and a fabric, take-up device embodying this invention in which portions of the take-up device have been removed and only two fabric take-up members are illustrated from the front of the machine;

FIG. 2 is a partial perspective view of the drive mechanism, with portions removed, and of the fabric take-up attachment and a fabric supporting member;

FIG. 3 is an exploded perspective view of a spool and a completed wound fabric package on the spool;

FIG. 4 is an enlarged partial end view of the terminal portion of a fabric spool mounted on a fabric spool supporting arm; and

FIG. 5 is a combined electrical and mechanical schematic diagram of the conventional stop motion to which has been added in series the mercury stop motion for the fabric take-up device.

Referring to the drawing and particularly to FIG. 1, there is shown a conventional Scott and Williams frame 10 for a ten-head crinkled yarn circular knitting machine in which each single knitting head 11 is mounted on a tiltable plate shown in outline form and will suffice for the purpose of this disclosure although it is to be understood there are two rows of five knitting heads each of which heads is supported on the frame for knitting a fabric tube. Conventional knitting instrumentalities are employed with each of the knitting heads being driven by the endless belt 12 that is guidably supported by a plurality of guide pulleys 13 mounted in the corners of the frame 10, only one of such pulleys being illustrated.

Vertical spaced frame members 14 are provided to support vertically spaced horizontal yarn tray 15 and yarn guide rails 19. Yarn tray 15 has spaced-apart yarn package-receiving supports 16 for supporting a cone of yarn 17 thereon. Yarn 18 will pass through the lower rail 19 in which there is a series of yarn guide members 20 leading the yarn 18 to an upper yarn guide 21 in the upper rail 19 through which the yarn will pass to the knitting instrumentalities (not shown) at the knitting head 11. The motor drive 22 has a shaft 23 that extends through the side wall 24 of the frame 10 and supports a V-drive pulley 25 thereon. The V-belt 26 drives the pulley 27 that is supported on the gear box shaft 28 which shaft 28 extends from gear box 29 suitably mounted inside the frame 10.

Shaft 30, extending inwardly from gear box 29 and driven by shaft 28, supports a chain sprocket wheel 31 thereon over which the drive chain 32 is trained at one end for rotating the chain sprocket wheel 33 mounted on shaft 34 extending from the gear box 35 that is mounted on the rail 36 supported inside the wall 24. Rotation of the gear 33 will revolve shaft 34 which in turn will revolve chain sprocket 37 at the opposite end of the gear box 35 in FIG. 2 to drive the chain 38 that is trained over the sprocket 39 for revolving shaft 40 on which the fabric winding cylinder 41 is mounted. Inverted U-shaped saddles 42 are bolted to the base 43 of the frame 10,

and on the top of each saddle 42 is mounted a bearing or pillow block 44 for bearingly supporting the shaft 40 for rotation.

The fabric winding cylinder 41 is preferably covered with a suitable material such as cork or other frictional surface that will not injure or damage the fabric in contact with the cylindrical surface but one which will provide sufficient frictional resistance to wind the fabric in direct contact with the surface of the cylinder 41.

A longitudinally extending horizontal shaft 45 is supported at each end by a collared bracket 46 mounted to the base of the frame to support thereon a plurality of individual fabric package supporting U-shaped members 47 each of which is pivotally mounted freely at one end 46 about the shaft 45. Each fabric package supporting member 47 has a pair of upwardly extending laterally spaced arms 49 secured to the base bar 50 with the lower ends 51 of the arms being provided with openings for receiving the sleeve 48 therein and through which sleeve the shaft 45 extends. The arms 49 extend upwardly and in juxtaposition to the winding cylinder 41. Each of the free ends 53 of the arms 49 on the fabric roll supporting member 47 is provided with a spool-receiving opening 54 and an offset slot 55 communicating with the opening 54 for releasably clamping the extending portions 57 of a spool shaft therein.

Each of the fabric supporting members 47 is resiliently urged toward the winding cylinder 41 by means of the helical spring 58, one end of which is secured to one of the arms 49, intermediate its length, by means of a bolt 59 or other suitable means and the other end of the spring is secured to the base 43 through the screw eye 60. Other suitable resilient or weighting means may be substituted for the spring member 58 to resiliently urge the fabric package supporting member 47 toward the revolving winding roll 41.

A mercury switch 61 is adjustably secured to one arm of each of the U-shaped fabric supporting members 47 through a supporting bracket 62 and the adjustable screw 63 for positioning the mercury switch at the desired angle for proper cut-in and cut-out of the electrical circuit depending upon the diameter or the number of convolutions of fabric 64 wound on each individual spool 65. Electrical lead wires to the mercury switch contacts are connected preferably to the existing stop motion circuit installed on conventional machines and to be described herein thereby controlling the operation of the cylinder head 11. A chain 66 is secured at one end to one arm 49 of the fabric supporting device 47 while the other end is secured to the base 43 which chain will support the device 47 and a wound fabric package for doffing. When a package is fully wound, the mercury switch 61 will be energized thereby terminating knitting on the particular knitting head supplying fabric to the fabric take-up device. An operator may then pivot the take-up device and fully wound package thereon out of action or engagement with the winding cylinder, preferably forward of the vertical position, with the chain 66 limiting the forward displacement to a suitable position in front of the machine above the floor and accessible to an operator.

Spool 65 is cylindrical and has end flanges 68 each with an extending stub shaft portion 57. Each flange 68 has an arcuate recess 69 which cooperates with an oblique side 70 provided on the cylindrical surface to facilitate threading fabric in the elongated slot 71 and for doffing a wound fabric package 64.

The conventional stop motion employed on the Model Ten-Head Scott and Williams Crinkled Yarn Machine as a magnetic coil unit 72 mounted on the frame for each knitting head. A push button microswitch 73 is positioned at operator's level in the front of each knitting head on the frame 10. Actuation of the push button 73 will deactivate the selected knitting head by disengagement with the drive belt 12. A reset lever 74 on the rod 76 which rod extends from the knockoff unit 72 is adjacent to the

push button switch 73 to re-engage the releasable locking latch 75 with the knockoff lug 77 thereby positioning the knitting head in the operation position.

The mercury switch leads 78 and 79 are connected to the push button leads 80 and 81 as shown diagrammatically in FIG. 5. Upon manual actuation either of the push button switch 73 or energization of the circuit by the mercury bridging the mercury switch contacts when a full package is formed, the knockoff box coils will be energized rotating the rod 76, disengaging the lug 77 and lever 74 from the latch 75 thereby deactivating the individual knitting head. The desired diameter of the fabric package may vary but may be controlled by the position or orientation of the mercury switch 61.

The fabric 82 being knit and extending from the knitting head 11 will pass under tension and guide rod 83 and over tension and guide rod 84 which will not only tension but also tend to flatten the tubular fabric in its path of travel to the wind up spool 65. The fabric which initially is hand wound for one or more convolutions will be positioned against the fabric winding drum or cylinder 41 which revolves at a constant or uniform angular velocity thereby transmitting directly its speed of rotation (with a minimum of slippage) to the fabric revolving the spool and fabric thereon forming a compact fabric package with aligned convolutions of fabric.

It will be readily apparent that a single row of fabric take-up members corresponding to a single row of knitting heads is mounted on each side of the machine. Only one fabric take-up device is illustrated in FIG. 1 from the other row of fabric take-up members in engagement with the same or single fabric winding roll or drum 41.

It has been found preferable to utilize the stop motions or knockoff boxes on existing machines to control the action of each knitting head to minimize further modifications and alterations to be made to conventional machines when utilizing the fabric take-up and winding apparatus of this invention. It will be understood, however, that a separate stop motion may be employed or one may be employed that is connected to the yarn supply used on some earlier machines of this type. The speed of rotation of the winding roll or drum 41 may vary depending upon the denier or weight of the yarn being knit and the number of courses being knit on the knitting head. The tension on the fabric being knit may be controlled by the rotation of the revolving winding roll 41 as well as the positioning of the tension and guide rods 83 and 84. The direct driving one-to-one relationship between the fabric being wound and the winding drum has minimized downtime and maintenance over prior devices and has resulted in uniform diameter finished fabric packages as well as better and more uniform stitch length.

Obviously many modifications and variations may be made to the structure of the wind-up drum and fabric wind-up members as well as the drive means therefor without departing from the purpose and spirit of this invention and such modifications and alterations are contemplated within the scope of the appended claims.

What is claimed is:

1. In combination with a circular knitting machine having multiple knitting heads and knitting instrumentalities, a stop motion for deactivating each knitting head, means for driving said multiple knitting heads, and a fabric take-up apparatus for winding the circular knit fabric from each head, said apparatus comprising a rotatable fabric winding drum mounted below the knitting heads, means for rotating said drum driven by said driving means for said multiple knitting heads, a fabric take-up spool for each knitting head, a pivotable take-up spool supporting member for rotatably and releasably retaining a fabric collecting spool for each knitting head, each of said spool supporting members being yieldably biased into rolling contact with said drum, and wherein said drum drives a plurality of take-up spools simul-

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taneously, and means on each of said take-up spool supporting members for actuating said stop motion for each knitting head terminating knitting from a deactivated knitting head when the convolutions of fabric on an individual spool supplied from a corresponding knitting head reaches a predetermined diameter. 5

2. In combination with a circular knitting machine having multiple knitting heads and knitting instrumentalities as claimed in claim 1, said rotatable fabric winding drum having a frictional fabric-engaging surface. 10

3. In combination with a circular knitting machine having multiple knitting heads and knitting instrumentalities as claimed in claim 1, each of said pivotable take-up spool supporting members having a U-shaped supporting yoke for supporting a take-up spool adjacent the terminal ends of said yoke. 15

4. In combination with a circular knitting machine having multiple knitting heads and knitting instrumentalities as claimed in claim 1, said means for actuating said stop motion for each knitting head comprising a 20

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mercury actuatable electric means adjustably mounted on each pivotable take-up spool supporting member for deactivating a knitting head in response to a predetermined diameter of fabric wound on the take-up spool.

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