

Nov. 16, 1971

L. MISHCON ET AL
STRIPING BOX FOR CIRCULAR KNITTING MACHINES
WITH ADJUSTABLE FINGER-ACTUATING JACKS

3,620,049

Filed April 9, 1970

3 Sheets-Sheet 1

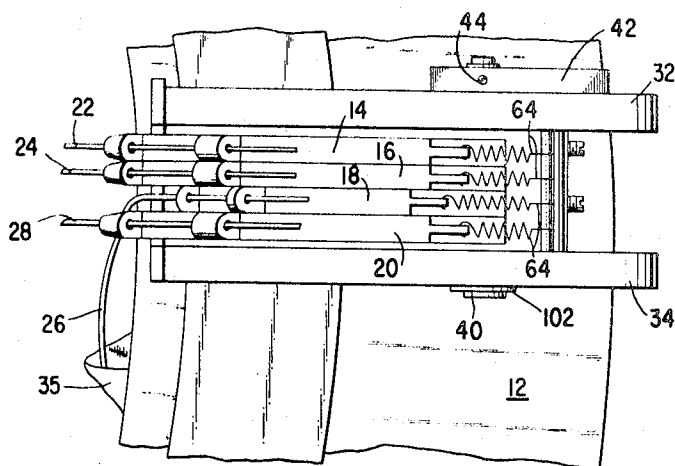


Fig. 1

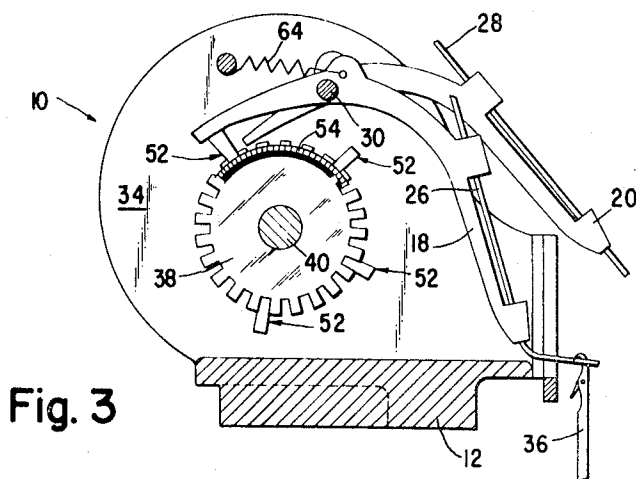


Fig. 3

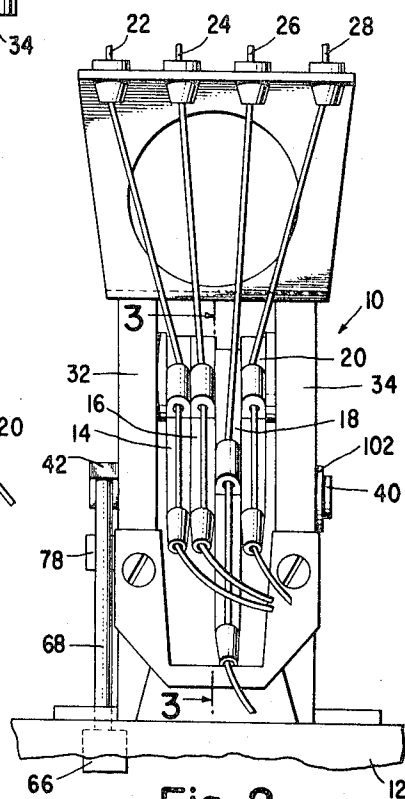


Fig. 2

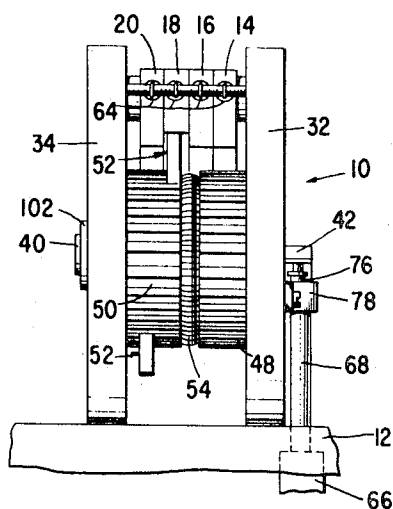


Fig. 4

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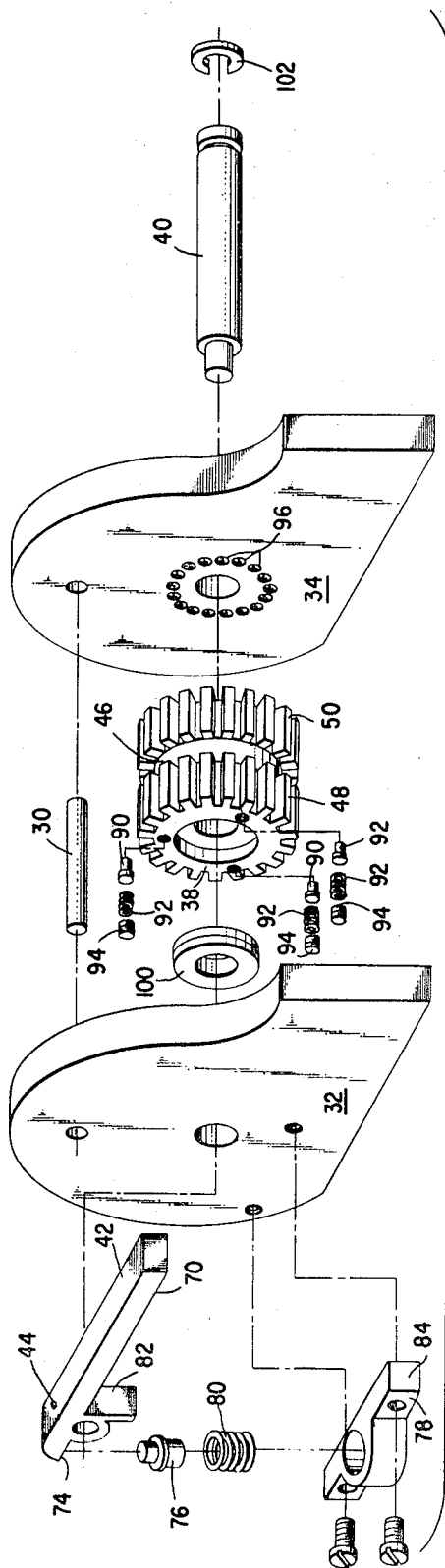


Fig. 5

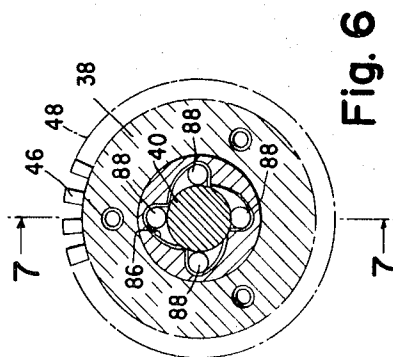


Fig. 6

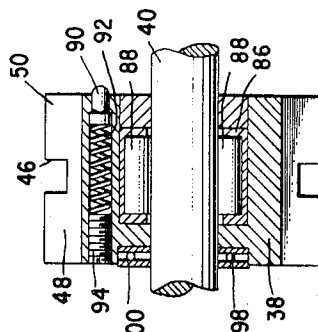


Fig. 7

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3 Sheets-Sheet 3

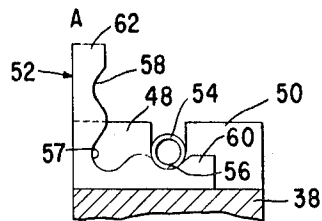


Fig. 8

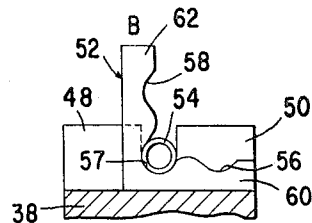


Fig. 9

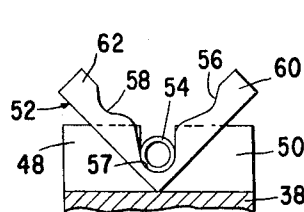


Fig. 10

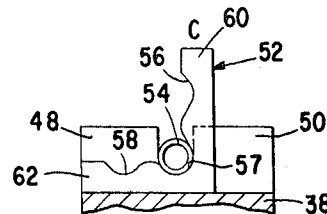


Fig. 11

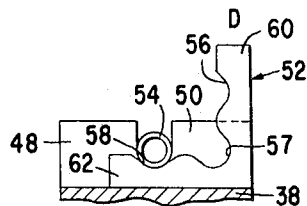


Fig. 12

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3,620,049

STRIPING BOX FOR CIRCULAR KNITTING MACHINES WITH ADJUSTABLE FINGER-ACTUATING JACKS

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U.S. Cl. 66—138

1 Claim

ABSTRACT OF THE DISCLOSURE

Finger-actuating L-shaped jacks for the toothed drum of a striping box are each recessed to receive a spring mounted in an annular groove of the drum such that a jack may be pivoted about the spring to cause one leg to project from the drum teeth on one side of the spring or the other leg from the drum teeth on the other side of the spring, and such that a jack may be moved under the spring and disposed to relocate a projecting leg in a new position on the one side or the other of the spring.

CROSS REFERENCES TO RELATED APPLICATIONS

The present invention is an improvement on the striper box construction of the copending application of Lester Mishcon and Paul M. Wolford for "Striping Box for Knitting Machine," Ser. No. 26,999, filed Apr. 9, 1970, which is assigned to the same assignee as the invention described herein.

BACKGROUND OF THE INVENTION

(1) Field of the invention

The invention relates to knitting machines and more particularly is directed to multiple feed striping boxes such as used on circular knitting machines and periodically operated by mechanisms of such machines to move selected yarns into knitting and non-knitting positions.

(2) Description of the prior art

The invention of the present application is an improvement upon the striping box constructions of U.S. Pat. No. 2,543,121 for "Knitting Machine" and U.S. Pat. No. 2,549,701 for "Apparatus for Knitted Striped Fabric" and the aforementioned patent application for "Striping Box for Knitting Machine."

Striping boxes such as disclosed in the said United States patents and patent application include a plurality of fingers which move selected yarns into and out of yarn feeding positions, the positions of the fingers being determined according to the operation of actuating drums. In this way color changes and other yarn changes in a fabric being knitted can be conveniently made according to a predetermined design.

SUMMARY OF THE INVENTION

In accordance with the invention the toothed drum of a striping box is provided with uniquely constructed finger-actuating jacks, each of said jacks being provided with a recess between legs extending at right angles to one another. The jacks are held in the striping box drum by a spring which is located in an annular groove of the drum and extends through the recesses between the legs of the jacks such that the legs may be pivoted about the spring into one position with one leg projecting from the drum teeth on one side of the spring or into another position with the other leg projecting from the drum teeth on the other side of the spring. Other recesses provided in legs of the jacks to receive the spring define additional positions for the jacks with one or the other of the legs projecting from the drum.

It is an object of the invention to avoid the necessity

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of ever having to remove a finger-actuating jack from a striping box drum in order to redefine the position of the jack in the drum.

It is another object of the invention to provide a very simply constructed finger-actuating jack capable of being readily disposed in any one of various positions in a striping box drum such that it may be used to actuate any yarn carrying finger of the striping box.

It is still another object of the invention to minimize the time required to complete a readjustment of the striping box drum jacks such as may be required when it becomes necessary to change the operational sequence of yarn carrying fingers.

Other objects and advantages of the invention will become apparent during a reading of the specification taken in connection with the accompanying drawings.

DESCRIPTION OF THE DRAWINGS

FIG. 1 is a fragmentary top plan view showing the striping box of the invention on a circular knitting machine.

FIG. 2 is an elevational view of the striping box of FIG. 1 taken from the inside of the circular knitting machine.

FIG. 3 is a diagrammatic cross sectional view on the plane of the line 3—3 of FIG. 2.

FIG. 4 is an elevational view of the striping box of FIG. 1 taken from the outside of the circular knitting machine.

FIG. 5 is an enlarged exploded view showing portions of the striping box of FIG. 1.

FIG. 6 is a cross sectional view of the drum of the striping box.

FIG. 7 is a sectional view taken on the plane of the line 7—7 of FIG. 6.

FIG. 8 is a fragmentary sectional view showing a finger-actuating jack in one position between drum teeth.

FIG. 9 is a fragmentary sectional view showing the jack of FIG. 8 in a second position between the drum teeth.

FIG. 10 is a fragmentary sectional view showing the jack in the process of being pivoted about the jack retaining spring.

FIG. 11 is a fragmentary sectional view showing the jack in a third position between the drum teeth.

FIG. 12 is a fragmentary sectional view showing the jack in a fourth position between the drum teeth.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to the drawings, reference character 10 designates one of a plurality of striping boxes mounted on a stationary carrier ring 12. The striping box 10 contains four striping fingers or yarn carriers 14, 16, 18 and 20, such fingers being of conventional construction and containing apertures through which extend yarns 22, 24, 26 and 28, respectively, from cones on a yarn stand (not shown).

The striping fingers are pivotally mounted on rod 30 between check plates 32 and 34, and are each movable between an upper inoperative position and a lower operative position. When a selected finger such as finger 18 is in its lower operative position, the yarn 26 carried thereby is operatively engageable with a needle 36 whereby the yarn may be knitted into a fabric 35. Movement of the striping fingers from their inoperative to their operative positions determine which striping yarns are incorporated into the fabric. Since the fingers may carry differently colored yarns or yarn of different textures, various striped effects can be obtained by selectively operating the striping fingers of the striping boxes which may be positioned about a machine.

Each striping box contains an inner rotatable drum 38 mounted on a shaft 40 having one end affixed to an operating lever 42 as by set screw 44. The drum 38 includes a midline annular groove 46 and like teeth 48 and 50, respectively, on opposite sides of the groove. L-shaped jacks 52 are mounted in selected spaces between the teeth of drum 38 to actuate the striping fingers 14, 16, 18 and 20. Such jacks are held in the drum by a spring 54 which registers with the groove 46 and engages the jacks in one of recesses 56, 57 or 58 formed in the jacks. Recesses 56 and 58 are correspondingly located in identical legs 60 and 62, respectively, of the jacks, and the recess 57 is located between the legs as shown in FIGS. 8 through 12. The jacks 52 may be disposed with the spring 54 in recess 56 to cause leg 62 to project from the drum in position A (FIG. 8) or the jack may be disposed with the spring in recess 57 such that the leg 62 projects from the drum teeth in position B (FIG. 9). The jacks may also be disposed with spring 54 in recess 57 and leg 60 projecting from the drum teeth in position C (FIG. 11). In addition the jacks may be disposed with the spring in recess 58 and the leg 60 projecting from the drum teeth in position D (FIG. 12). In each of the four positions, the projecting leg of a jack is disposed to actuate a different striping finger.

Each finger has connected thereto a spring 64 normally urging the rear arm of the finger downwardly and the yarn carrying end of the finger upwardly. The rear arm of a finger, if not engaged by a jack 52, rests upon the surface of the drum teeth and the yarn carrying end of the finger is in its inoperative position. The drum may, however, be moved to bring a jack into a position under the end of the rear arm and so cause elevation of the rear arm and a consequent depression of the forward part of the finger, whereby the finger is brought into its operative position (see finger 18 in FIGS. 1, 2 and 3).

The striping box is operated by an actuator 66 which is responsive to camming mechanism (not shown) of the type described for example in U.S. Pat. No. 2,543,121 mentioned hereinbefore. Actuator 66 includes push rod 68 which acts on one end of lever 42 at 70, the other end 74 of the lever being engageable with a plunger 76 slidably mounted in member 78 and biased against lever 42 by a spring 80. Spring 80, acting through lever 42, urges the push rod 68 to a position wherein flange 82 on the lever engages surface 84 on member 78, and the spring is effective to return the lever to such stop engaging position after actuation of the lever by push rod 68.

Drum 38 is operatively connected to a uni-directional roller clutch comprising race 86 affixed in the drum, and rollers 88. The shaft 40 directly engages the rollers 88 and also forms part of the clutch. Whenever lever 42 is actuated by push rod 68, shaft 40 which is affixed to the lever 42 turns a fraction of a revolution and causes the clutch rollers 88 to bind in the race 86 such that the drum is immediately forced to turn with the shaft. As shown the drum 38 includes a number of detents 90 which project from one end surface of the drum, such detents being biased outwardly by springs 92 held in the drum by screws 94. A plurality of recesses 96 equal in number to the number of pairs of aligned teeth in the drum 38 are provided in check plate 34 to receive the detents 90 and cause the drum when actuated by lever 42 acting through shaft 40 to move into a precise position which is defined by engagement of detents 90 in recesses 96 and wherein a pair of slots between adjacent teeth 48 and 50 and any jack therein is disposed directly under the extreme end of the rear part of a striping finger such that the finger is moved into its operative position. After the drum 38 is positioned by the shaft 40, the lever 42 is returned to its stop engaging position by spring 80 and the shaft turns with the lever but without moving the drum which maintains a fixed position wherein the detents 90 register in recesses 96. When the drum is rotated to remove a jack from under a finger, the finger is moved

into its inoperative position by attached spring 64. As may be seen in FIG. 7 the shaft 40 is supported for rotation relative to the drum 38 on a ball bearing 98 mounted in a thrust washer 100 which is affixed in the drum. C-ring 102 supports the shaft 40 against longitudinal movement in one direction and the lever 42 prevents longitudinal movement of the shaft in the other direction.

Although striping box 10 has been described as having striping fingers 14, 16, 18 and 20 movable between an upper inoperative position and a lower operative position, it should be appreciated that the striping box construction described is not the only possible construction and that in another construction the striping fingers might, for example, be spring biased toward a lower inoperative position and be subject to actuation by jacks of the striper drum into an upper operative position.

Jacks 52 are located in particular slots of the drum and in particular locations within the slots to provide for operation of the striping levers in a predetermined sequence. As noted hereinbefore, the jacks 52 may be disposed with leg 62 in position A or in position B, and the jacks may also be disposed with leg 60 in position C or position D. The jacks may be slid under the spring 54 between positions A and B or between positions C and D, and may be pivoted (FIG. 10) about the spring 54 between positions B and C. The jack for any particular pair of slots of the drum may therefore readily be positioned to operate any one of the striping fingers 14, 16, 18 or 20, and it is unnecessary to remove a jack from the drum to change its position from any one of the four positions mentioned to any other of such positions. It will of course be understood that more than four finger-actuating positions might be provided for in a somewhat wider drum than shown by utilizing jacks having longer legs than indicated and having more than one recess in each leg for the spring 54.

While the invention has been described in its preferred form, it is to be understood that the words which have been used are words of description rather than of limitation, and that changes within the purview of the appended claim may be made without departing from the true scope and spirit of the invention.

Having thus set forth the nature of this invention, what is claimed herein is:

1. In a striping box for circular knitting machines, a plurality of yarn-carrying fingers movable between inoperative and operative positions, a rotatable toothed drum with an annular groove in the toothed surface of the drum, a jack for selectively actuating the fingers upon rotation of the drum disposed between teeth of the drum and having a pair of legs, each of which extends at a right angle with respect to the other and which are substantially equal in length, the jack being recessed between said legs, a spring in the annular groove of the drum and the recess between said legs for holding the jack in the drum and about which the jack may be pivoted to project one leg out from the drum teeth into a finger actuating position on one side of the spring or the other leg out from the drum teeth into a finger actuating position on the other side of the spring, each leg of the jack including a recess for engagement by the spring and such recesses being correspondingly located in the legs.

References Cited

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2,943,469 7/1960 Sirmay et al. 66—156

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1,164,451 9/1969 Great Britain 66—138

ROBERT R. MACKEY, Primary Examiner

U.S. Cl. X.R.

66—156; 139—333