Dec. 5, 1933. F. W. ROBINSON 1,937,595

AUTOMATIC THREAD CHANGING MECHANISM FOR STRIPING ATTACHMENTS

Filed Feb. 4, 1930

Fig. 1.

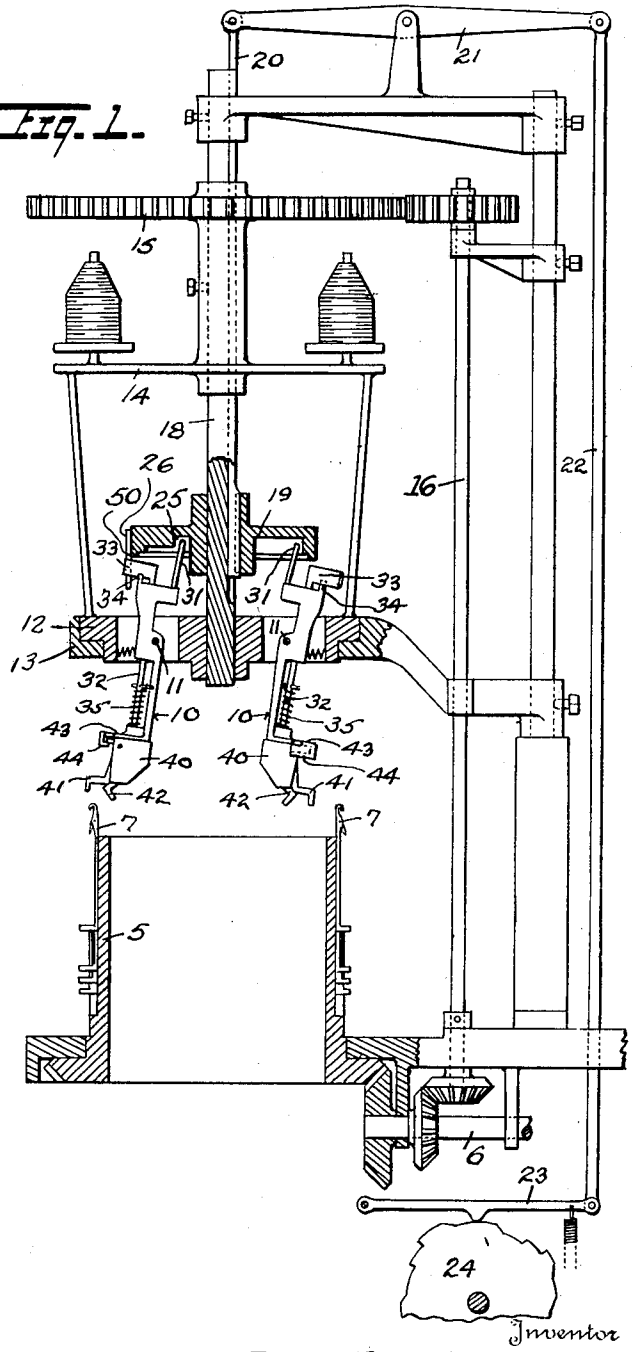


Fig. 2.

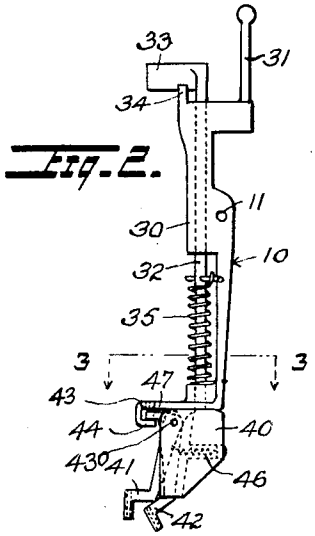


Fig. 3.

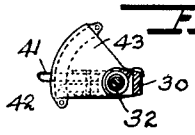
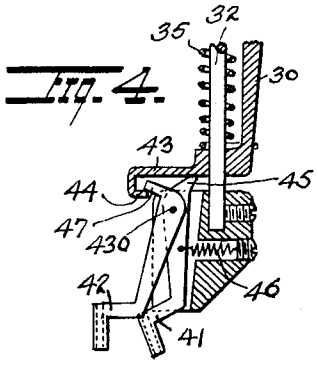


Fig. 4.



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AUTOMATIC THREAD CHANGING MECHANISM FOR STRIPING ATTACHMENTS

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18 Claims. (Cl. 66—135)

My invention relates to improvements in striping attachments for circular knitting machines, my main object being to provide for automatically actuated selected changes of the added embroidery threads producing the several stripes by determined feeding of one or another of a plurality of such threads carried by each striping thread guide device, whereby greatly increased varieties of pattern designs and color effects may be produced in a simple and economical manner.

More particularly my invention comprises improvements in the construction and operation of the several striping thread guides feeding the threads to the knitting needles, and consists in the novel structure more fully described hereinafter in connection with the accompanying drawing, the patentable features thereof being pointed out in the appended claims.

Referring to the drawing,—

Fig. 1 is mainly a diagrammatic sectional elevation of a usual circular knitting machine having a known striping attachment, only such essential parts thereof being shown as sufficient to fully disclose a preferred embodiment of my improved changing thread feeding guides and their automatic selective operation.

Fig. 2 shows separately one of the thread guides indicated in Fig. 1.

Fig. 3 is sectional elevation on the line 3—3 of Fig. 2.

Fig. 4 is an enlarged sectional elevation of the lower end of the thread guide shown in Fig. 2, but indicating a different thread guide finger moved into feeding position.

The knitting machine may be of any known circular type, that indicated in the drawing having a rotatable cylinder 5, driven from shaft 6, and carrying a complement of needles 7, to produce a knit fabric through the cooperation of associated cam mechanism and main thread feeding fingers not indicated in the drawing as old in the art and well understood and forming no part of the present improvements.

The production of vertical embroidery stripes and figures on such knitted fabric is also old in the art and well understood, and is commonly effected by guide's feeding added thread to certain needles in successive cylinder rotations, various forms of such guides being known but all commonly carrying a single thread, or a plurality of thread jointly fed by the needle engaging feeding movement of said guide.

My present improvements relate to means for changing the thread or threads thus fed by each guide, and comprise means for supplying a plurality of threads to each guide and for selectively feeding one or another thereof to the needles, and for determinedly controlling such changes in accordance with predetermined pattern designs.

The drawing shows a known form of striping attachment more fully described in my prior Patent No. 1,428,398, issued September 5, 1922, the thread guide devices 10 however embodying my present improvements, and being shown as intermediately pivotally suspended at 11 in a ring member 12 which is rotatably mounted in a fixed bearing 13 overhanging the needle cylinder 5. Member 12 has a superimposed bobbin table 14 and drive gear 15, all jointly rotatable and driven at needle cylinder speed from shaft 6 through vertical shaft 16 having suitable drive gears as shown. A shaft 18, in axial alinement with needle cylinder 5, is fixedly suspended above the latter and forms an axle bearing for ring 12, table 14 and gear 15.

A non-rotatable cam disc 19 is splined on shaft 18 and is vertically positioned thereon by means of its extended spline 20, lever 21, link 22, and lever 23 actuated by selectively positioned cam projections on a pattern drum 24; which drum has suitable intermittently timed rotative movements, as usual, adapted through the above described mechanism to position cam disc 19 for determined action of its recessed cam path 25 and fixed contact member 26 upon each guide device 10 as heretofore to impart a needle engaging swing to the latter.

Each guide device 10, as shown in the drawing, is generally similar to that of my aforesaid patent, and comprises a main portion or supporting element in the form of a medially pivoted lever 30 having an offset headed post 31 at the top, and a shank 32 rotatably mounted in main portion 30 and having a projecting angular head 33 normally held against a main portion stop 34 by the tension of a spring 35 strung upon an intermediate portion of said shank.

Cam disc 19 when in one vertical position is adapted to engage a concentric portion of its recessed cam path 25 with headed post 31 to retract the latter, and a shifting of said disc 19 presents an eccentric portion of said cam path 25 to act on said post 31 to swing the guide device 10 radially across the circle of needles, angular head or flag-like projection 33 then contacting with member 26 on said disc 19 to rotate said shank in the manner more fully set forth in my aforesaid prior patent, said shank heretofore having a thread guide finger at its lower projecting end to feed a single thread, or a plurality of threads jointly, circumferentially along a portion of the circle of needles, certain of which are raised at this time to receive said thread or threads.

My present improvements, as aforesaid, contemplate the selected feeding of one of a plurality of threads by said guide device 10, and for this purpose I substitute for the single thread

carrier heretofore employed, a block 40 secured to the lower projecting end of shank 32 and rotatable therewith, said blocks having a plurality of thread guide fingers, each carrying its separate embroidery thread or threads.

As shown in the drawing block 40 is indicated as vertically recessed to receive a pair of thread guide fingers 41 and 42 pivotally swingable on pivot support 430, said fingers being preferably reversely movable so as to project one at a time into needle feeding position.

In order that determined automatic selective projection of said fingers 41 and 42 may be effected as desired, main guide portion 30, as shown, has a platform extension 43 against which block 40 rests due to action of spring 35, but from which it may be moved by axial depression of shank 32. The outer edge of platform extension 43, as shown, is preferably curved in an arc radial to the axis of shank 32 and bent to form a flange 44 extending the full length of the radial swing imparted to said block 40 by turning movement of the shank 32.

Finger 41 is shown as having an inclined extension 45, and a spring 46, while finger 42 is formed with an angular projection 47 adapted to ride on flange 44, which projection as seen in Fig. 4 indicating block 40 as depressed from platform 43, will tilt or swing the finger 42 to feeding position, while spring 46 will withdraw the finger 41. When block 40 is released and raised by spring 35 to contact with platform 43, extension 45 will engage against the latter and swing the finger 41 to feeding position against retracting tension of spring 46, and projection 47 will also engage against platform 43 to move the finger 42 to non-feeding position.

In order that such change movements of fingers 41 and 42 may be simply effected automatically at pattern controlled periods I have provided cam disc 19 with a flange 50 adapted to engage against the upper edge of shank head 33 to depress the latter and move block 40 away from platform 43, flange 50 coming into action by downward movement of disc 19. It will thus be seen that by arranging the projections on drum 24, disc 19 may be shifted to different position vertically to effect determined stripe feeding movements, as first position, no stripe, lowered a step, stripe feeding with finger 41 in action, and lower a second step, finger 42 changed for finger 41, it being understood that cam groove 25 is of sufficient depth to permit such second lowering movement without interfering with its needle engaging swinging movement on the several guide devices shown.

By means of the construction thus fully set forth, it will be seen that either guide finger 41 or 42 may be automatically positioned for feeding its thread to the striping needles, providing a change of color when desired during the stripe formation, such changes being determined by suitably positioned projections on drum 24. And while I have shown my invention as applied to a form of striping attachment of the type set forth in my aforesaid patent, I do not limit myself to such form as my improvements may be readily applied to other known forms; or for any selective feeding of such fingers in guides having a greater plurality of fingers than the two shown in the drawing.

What I claim is:

1. In combination with a circular knitting machine having a needle cylinder and operating cam mechanism, a vertical striping attachment having a carrier device provided with means for automatically changing the thread fed to a selected group of needles, said means comprising a pair of thread-feeding guide fingers mounted on said carrier to reversely move thereon into and out of needle-feeding position and pattern-control means for reversely moving said guide fingers and imparting a needle-engaging swing to the feedingly positioned finger.

2. In combination with a circular knitting machine having a needle cylinder and operating cam mechanism, a vertical striping attachment having a carrier device provided with means for automatically changing the thread fed to a selected group of needles, said means comprising a pair of thread-feeding guide fingers mounted on said carrier to reversely move radially into and out of needle-feeding position, and pattern-control means for reversely moving said guide fingers and for imparting a needle-engaging swing to the feedingly positioned finger.

3. In combination with a circular knitting machine having a needle cylinder and operating cam mechanism, a striping attachment comprising a striping thread carrier device having a radially swingable part and a vertically movable rotative part mounted on the latter and carrying a plurality of oppositely movable thread feeding fingers, and pattern controlled means operative on said parts to radially swing and vertically move and rotate said respective parts to oppositely position one of said thread feeding fingers and impart a needle engaging movement thereto.

4. A striping thread carrier for circular knitting machines comprising a pivotally supported member, a rotatable and vertically movable shank member mounted on said pivotal member, and a plurality of thread-feeding guide fingers in said shank mounted to swing in opposite directions by vertical movement of said shank.

5. A striping thread carrier for circular knitting machines comprising a pivotally supported member having an angular platform, a rotatable and vertically movable shank mounted on said pivotal member and having a headed end normally seated against said platform, a pair of thread feeding guide fingers pivotally mounted in said headed end and spacedly positioned by engagement with said platform, said fingers being reversely positioned by movement of said head from said platform.

6. A striping thread carrier for circular knitting machines comprising a pivotally supported member, a rotatable and vertically movable shank member mounted on said pivotal member, and a pair of oppositely swinging thread guide fingers mounted in said shank and reversely swung by vertical movement of the latter.

7. In combination with a circular knitting machine having a needle cylinder and operating cam mechanism, a vertical striping attachment comprising a thread guide carrier device provided with a plurality of selectively positioned thread-feeding guide fingers, and pattern controlled means for relatively positioning said fingers and jointly swinging the same to selectively feed thread therefrom.

8. A striping thread carrier for circular knitting machines comprising a swingingly supported member carrying a plurality of thread feeding guide fingers movable relative to said swinging member to position and impart a needle engaging swing to a selected finger.

9. A striping yarn guide positionally fixed relative to a series of needles, comprising a sup-

porting element movable crosswise of the needles, a multiplicity of individual yarn feeds supported by said element, and pattern-controlled means governing selective interchange between the yarn feeds, actuation of the supporting element to bring the selected feed into feeding relation with selected striping needles, and movement of such selected feed laterally to wrap its yarn around said striping needles.

10. A striping yarn guide positionally fixed circumferentially of the needle cylinder of a knitting machine, comprising a supporting element movable crosswise of the needles, a multiplicity of individual yarn feeds supported by said element, and pattern controlled means governing selective interchange between the yarn feeds, actuation of the supporting element to bring the selected feed into feeding relation with selected striping needles, and movement of such selected feed laterally to wrap its yarn around said striping needles.

11. A striping yarn guide positionally fixed circumferentially of the needle cylinder of a knitting machine, comprising a supporting element in the form of a lever medially pivoted for radial swinging movement crosswise of the needles, a multiplicity of individual yarn feeds supported by said element, and pattern-controlled means governing selective interchange between the yarn feeds, swinging of the supporting element to bring the selected guide into feeding relation with selected striping needles, and movement of such selected feed laterally to wrap its yarn around said striping needles.

12. A striping yarn guide positionally fixed circumferentially of the needle cylinder of a knitting machine, comprising a supporting element movable crosswise of the needles, a multiplicity of individual finger-like yarn feeds pivoted to the supporting element, and pattern-controlled means governing selective interchange between the yarn feeds, actuation of the supporting element to move the selected feed into feeding relation with selected striping needles, and swinging of such selected feed on its pivot to wrap its yarn around said striping needles.

13. A striping yarn guide positionally fixed circumferentially of the needle cylinder of a knitting machine, comprising a supporting element in the form of a lever medially pivoted for radial swinging movement crosswise of the needles, a vertical shank journalled in the carrier device, a multiplicity of individual yarn feeds attached to said shank, and pattern-controlled means governing selective interchange between the yarn feeds, swinging of the supporting element to bring the selected feed into feeding relation with selected striping needles, and rocking the shank to determine wrapping of the yarn served by such selected yarn feed around said striping needles.

14. A striping yarn guide positionally fixed circumferentially of the needle cylinder of a knitting machine, comprising a supporting element in the form of a lever medially pivoted for radial swinging movement crosswise of the needles, a vertical shank supported by said element with capacity for axial shifting movement and also for rocking movement, a multiplicity of individual finger-like yarn feeds pivotally attached to the shank, means operated through variant axial shifting of the shank to selectively interchange one yarn feed for another, and pattern controlled means governing shifting of the shank for selection of a feed, swinging of the supporting element to bring the selected feed into feeding relation with selected striping needles, and rocking of the shank to swing such selected feed laterally so that its yarn is wrapped around said striping needles.

15. A striping mechanism for circular knitting machines comprising a supporting element in the form of a medially pivoted lever positionally fixed for swinging movement crosswise of the needles; a vertical shank supported by said lever with capacity for endwise shifting and for rocking movement; a pair of finger-like yarn feeds pivoted for up and down movement to the lower end of the shank; connections whereby the fingers are selectively interchanged by axial shifting of the shank; a cam disk coaxially above the needle cylinder having a vertically deep cam groove in its bottom face engaged by the upper end of the lever, a circumferential projection to cooperate wth a flag-like projection at the top of the shank aforesaid, and a circumferential flange abutting the top of said flange-like projection; and pattern controlled means governing variant axial shifting of the cam disk to effect interchange of the yarn feed fingers by depression of the flag and the shank, swinging of the lever to bring the selected feed into feeding relation with selected striping needles by coaction of said lever with the cam groove, and rocking of the shank to swing the selected feed and effect wrapping of the yarn around said striping needles by actuation of the flag-like projection by the circumferential projection of the disk.

16. In a circular knitting machine a rotary circle of independent needles, means for raising needles selectively at a point on the needle circle, a plurality of pattern yarn guides adapted to rotate with said needles and lay yarns in front of the needles thus raised, in combination with a stationary element operative upon the guides to arrest temporarily the rotation of the yarn laid in front of the selected needles until caught under the hooks of said needles, and means adapted to operate said pattern yarn guides selectively to cause the laying of different yarn in front of the same needles in successive courses.

17. In a circular knitting machine a rotary circle of independent needles, means for raising needles selectively at a point on the needle circle, a plurality of pattern yarn guides adapted to rotate with said needles and lay yarns in front of the needles thus raised, in combination with a stationary element operative upon the guides to arrest temporarily the rotation of the yarn laid in front of the selected needles until caught under the hooks of said needles, a plurality of yarn-feed fingers on said pattern yarn guides, and means adapted to operate said pattern yarn fingers selectively to cause the laying of different yarn in front of the same needles in successive courses.

18. In a circular knitting machine a rotary circle of independent needles, means, for raising needles selectively at a point on the needle circle, a plurality of pattern yarn guides adapted to rotate with said needles and lay yarns in front of the needles thus raised, in combination with a stationary element operative upon the guides to arrest temporarily the rotation of the yarn laid in front of the selected needles until caught under the hooks of said needles, a plurality of yarn-feed fingers on said pattern yarn guides, and means comprising cams adapted to operate said pattern yarn guides and said fingers selectively to cause the laying of different yarn in front of the same needles in successive courses.

FRANK W. ROBINSON.