Feb. 7, 1961 P. A. MAHLER ET AL 2,970,460

TOOTHED YARN CONTROLLER

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FIG. 1.

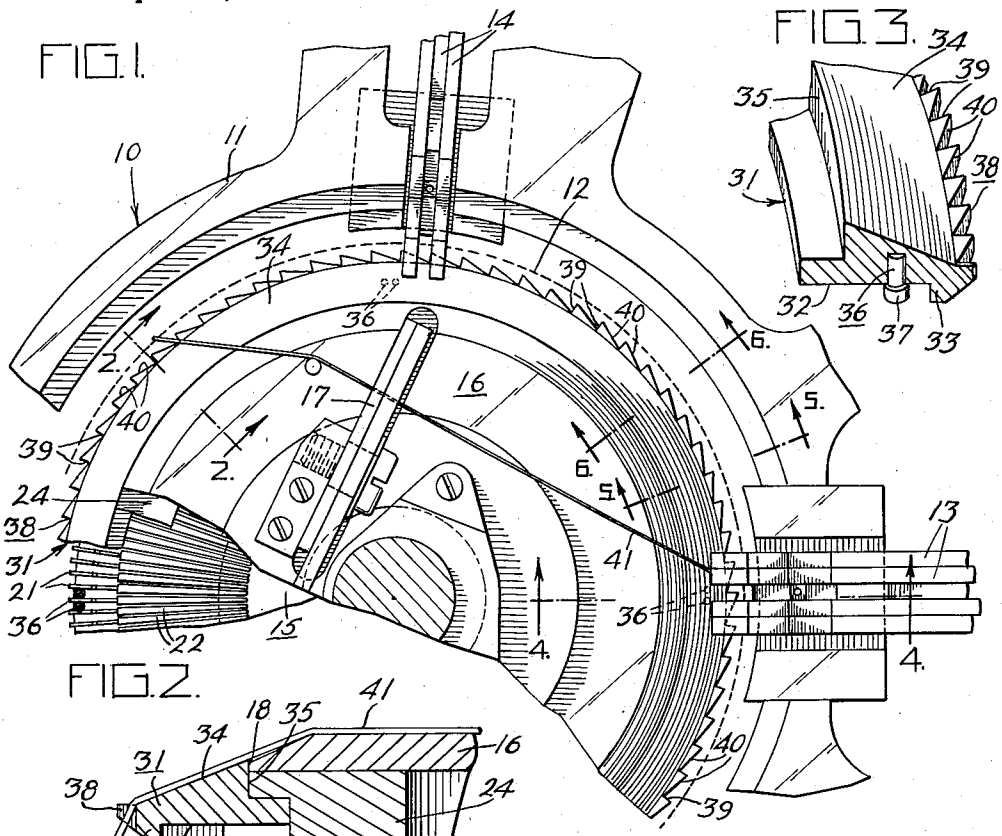
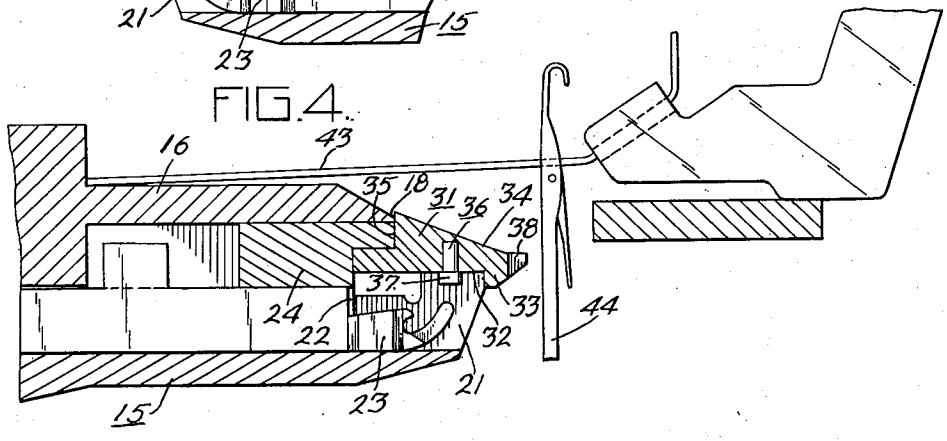


FIG. 3.

FIG. 2.

FIG. 4.



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FIG. 5.

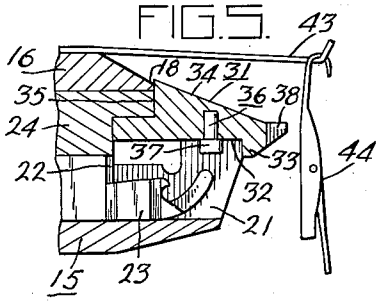


FIG. 6.

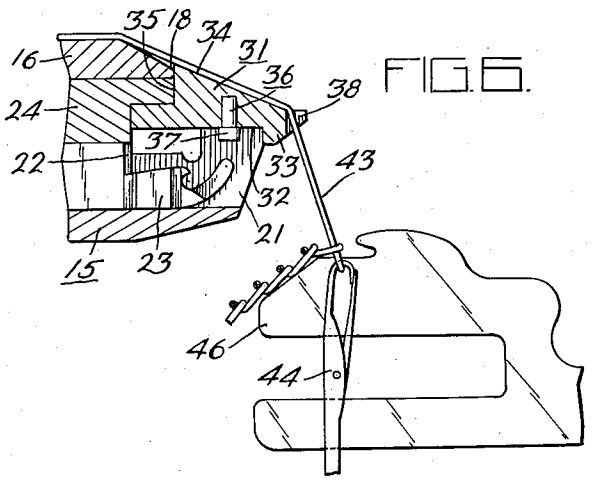


FIG. 7.

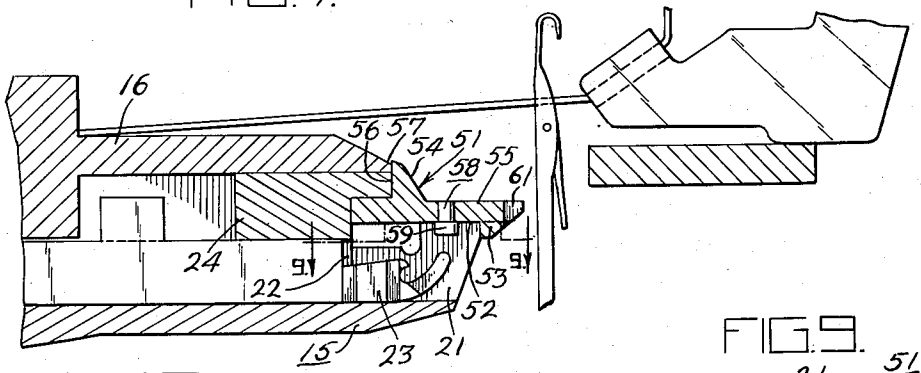


FIG. 8.

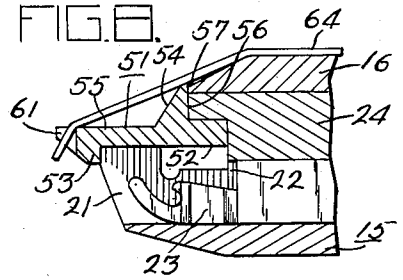
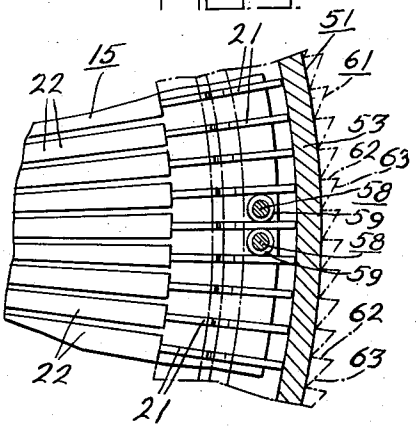


FIG. 9.



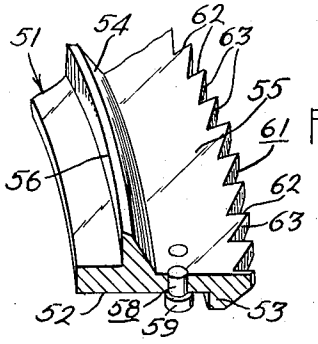


FIG. 10.

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TOOTHED YARN CONTROLLER

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Filed Apr. 15, 1960, Ser. No. 22,554

6 Claims. (Cl. 66—140)

The present invention relates to circular knitting machines and more particularly to the dial mechanism thereof. The invention relates particularly to a yarn controller mounted on the dial for rotation therewith to accurately control the knitting yarns, particularly during pressoff and also to facilitate favorable positioning of the yarn at yarn changes.

Prior to the present invention difficulty was experienced in controlling the yarn on multifeed machines at the pressoff, with the result that the yarn was not drawn over the dial cap into engagement with the clamping and severing means. Further, there is a tendency for the yarn to become caught in the clearance space between the dial and the dial cam, resulting in serious breakage in the mechanism of the dial in extreme cases, and causing snags and pulls in the knitted goods to the detriment of the finished stocking and the operation of the machine.

With the foregoing in mind, a primary object of the present invention is to provide means on the dial operable in pressoff of the stocking in multifeed machines to carry the yarn around the edge of the dial in the same position as it would be if held by a needle. As will be explained more fully hereinafter on multifeed machines at the pressoff the needles are inclined to lose control of the yarn before it is satisfactorily clamped and severed.

The means for exercising this control in the present invention provides also for preventing the entry of yarn in between the dial and the dial cam where it may otherwise become wrapped around the dial bits.

The present invention provides a sturdy structure of simple design which may be incorporated into a conventional dial construction simply and economically.

The invention also provides means which cooperates with operating elements positioned adjacent the edge of the dial and which is constructed to prevent the yarn from wrapping around the mechanism of the dial.

All of the objects of the invention are more fully set forth hereinafter with reference to the accompanying drawings wherein:

Fig. 1 is a fragmentary plan view of a knitting machine head embodying a dial construction in accordance with the present invention;

Fig. 2 is an enlarged fragmentary sectional view taken on the line 2—2 of Fig. 1;

Fig. 3 is a detached fragmentary perspective view showing the construction of the yarn controller element as shown in Fig. 1 of the present invention;

Figs. 4, 5, and 6 are sectional views showing the operation of the yarn controller element when a yarn is inserted into the needle circle, showing the newly-inserted yarn as it passes through the positions indicated by the lines 4—4, 5—5, and 6—6 in Fig. 1;

Fig. 7 is a sectional view similar to Fig. 4 showing a modified form of dial construction embodying a yarn controller element made in accordance with the present invention;

Fig. 8 is a view similar to Fig. 2 but showing the embodiment of Fig. 7;

Fig. 9 is a fragmentary sectional view taken on the line 9—9 of Fig. 7; and

Fig. 10 is a fragmentary perspective view similar to Fig. 3 but showing the modified form of the yarn controller element of the present invention.

Referring now to the drawings, Fig. 1 shows a multiple-feed knitting machine structure 10 including a latch ring 11, a needle circle indicated in broken lines at 12, a first bank of feed fingers 13, and a second bank of fingers 14 at their respective feed stations. Within the needle circle 12 is mounted a rotory dial 15 having a stationary dial cap 16 mounting a conventional cutter and clamp 17 for the first feed station. As shown in Fig. 2, the rotary dial 15 is provided with upstanding partitions 21 and 22 which mount the transfer bits 23 for radial reciprocation under the action of the bit cams 24 mounted in the stationary dial cap 16.

In accordance with the invention, a yarn controller is mounted for rotation with the dial to project into close proximity to the needle circle for controlling the yarns as they are inserted into and withdrawn from action. To this end, as shown in Figs. 1 to 6 inclusive, a yarn ring 31 is mounted for rotation with the dial 15. The ring 31 has a flat undersurface 32 adapted to bear on the partitions 21 and which terminates at its outer extremity in a downturned lip 33 which overhangs the outer peripheral edge of the partitions 21. The lip 33 effectively prevents entry of yarn intermediate the partitions 21 and the surface 32.

The upper surface 34 of the ring 31 inclines inwardly and terminates in a shoulder 35 adapted to slidably receive the outer peripheral edge of the dial cap 16. As shown in Fig. 2, the surface 34 projects slightly above the uppermost edge 18 of the outer periphery of the dial cap 16, so as to deflect yarns passing thereover from any clearance space which might be present between the dial cap and the ring and thereby precludes entry of yarn intermediate the relatively moving surfaces of the dial cap 16 and the ring 31. The outer periphery of the ring is toothed as indicated at 38, the teeth 38 having radial walls 39 and angled walls 40. The radial walls are foremost in the direction of rotation so that they may engage the yarn as the ring 31 is rotated into engagement therewith.

In single feed machines or multifeed machines where the feeding stations are widely spaced the yarn at pressoff remains attached to the last needle with which it engaged, long enough to bring the yarn over the dial cap into the clamping and severing mechanism. In the multifeed machine illustrated in the drawing, where the feeding stations 13 and 14 are closely spaced, the yarn in engagement with the last needle to knit at the first station 13 is pressed off at the next feed station 14, before it has traversed the dial cap. As this normally happens simultaneously at all feeds, the weight of the fabric leaving the needles is sufficient to pull the unsevered ends down vertically, or approximately so, from the yarn fingers. Without the means embodied in this invention there is then no further possibility of lifting the unsevered ends to be cut and clamped. Further, this also results in the fabric becoming unravelled and consequently, complete loss of function in the machine.

In accordance with the present invention, as the yarn 41 is taken out of action, the inward movement of the feed fingers engages the yarn into the notch of the ring 31 formed between the teeth 38 and is carried by the needles and the forward radial wall 39 of the tooth about the periphery of the dial cap. When the fabric is pressed off the needles at the station 14, the downward tension on the fabric maintains the yarn in engagement with the tooth so that it is carried about the dial cap to the position shown in Figs. 1 and 2 in firm engagement with the ring

whereby the yarn spans across the dial and engages in the cutter and clamp assembly **17**. When the assembly is actuated to sever the yarn, it is free to be discharged with the fabric without snarling and without causing pulls in the fabric.

The invention also assists in the control of the yarn during the introduction of the yarn into the needle circle, as illustrated in Figs. 4 to 6. As shown in Fig. 4, when the yarn **43** is inserted into action, the feed finger draws the yarn from the clamp outwardly through the needle circle, for example in front of the needle **44**. The needle **44** is at its elevated position at the feed station, and as the dial and needle cylinder rotate, the needle is drawn downwardly as shown in Figs. 5 and 6 so that at the stitch-casting level, the yarn is pulled between the sinkers **46** on the opposite sides of the needle **44**. When the yarn changes are required to take place at high speed, there is a tendency for the yarn **43** to balloon, and the yarn may not engage properly with the needle **44**. As the yarn is drawn downwardly, due to the favorable angle created by this construction, it engages in the teeth **38** of the ring **31** which limits the freedom of movement of the yarn and assists in insuring faultless engagement of the yarn with the needles and the clamping and severing means.

In order to mount the ring **31** for rotation with the dial, pins **36** are arranged in pairs at spaced locations about the periphery of the ring **31**. The pins **36** are provided with depending head portions **37** which are relatively enlarged and have a circumferential dimension corresponding to the spacing between the partitions **21** so that the ring **31** is retained against rotation relative to the dial **15**.

Figs. 7 to 10 illustrate a modified form of element applied to the knitting machine **10** in place of the element **31**. In this embodiment of the invention, an element takes the form of a ring **51** having an undersurface **52** adapted to bear on the partitions **21**. The undersurface **52** terminates at its outer extremity in a downturned lip **53** overhanging the outer peripheral edge of the partitions **21** to preclude entry of the yarn intermediate the partitions and the undersurface **52** of the controller **51**. The upper surface **54** slants upwardly at a sharper angle than the surface **34** to provide outwardly thereof a flat land area **55**. At the inner periphery of the sloping surface **54**, a shoulder **56** is provided which slidably receives the dial cap **16**. It is noted that the surface **54** terminates above the upper edge **57** at the outer periphery of the dial cap to deflect the yarns away from the clearance space between the ring **51** and the dial cap **16**. Pins **58** are arranged in pairs about the periphery of the controller ring **51** and are provided with enlarged depending head portions **59** which are snugly received between the partitions **21** as clearly illustrated in Fig. 9. This construction eliminates play between the dial **15** and the controller ring **51**, and the controller ring **51** follows the movement of the dial **15** precisely. The outer periphery of the controller ring **51** is provided with teeth **61** having the forward face **62** disposed radially of the ring and the trailing face **63** at an angle thereto as indicated in Fig. 10.

The operation of the controller ring **51** is identical to that of the controller ring **31**, the land area **55** providing a flat surface adjacent the edge of the dial which may cooperate with operating elements of the knitting machine which may be positioned adjacent thereto. The controller ring **51** prevents wrapping of the yarns about the dial mechanism similarly to the controller ring **51**.

While the invention is not limited to use with any particular yarns, it does have particular utility when knitting with "unthrown" or "flat" yarns.

While particular embodiments of the present invention have been illustrated and described herein, it is not intended to limit the invention to such disclosure, but changes and modifications may be made therein and thereto within the scope of the following claims.

We claim:

1. In a circular knitting machine having a rotary dial, a stationary dial cap, and a needle circle surrounding said dial and cap; a yarn controller comprising an annular ring mounted on said dial for rotation therewith and projecting outwardly therebeyond, said ring having a plurality of teeth disposed around its outer periphery, the leading faces of said teeth being substantially radial of said dial, said ring being mounted to overlie the peripheral edge of said dial and to engage under said dial cap, the upper surface of said ring inclining inwardly and terminating at its inner end in a shoulder adapted to slidably receive the outer peripheral edge of said dial cap, said surface projecting above the uppermost edge of the outer periphery of the dial cap to deflect yarns from the clearance between said controller ring and said dial cap.

2. A yarn controller according to claim 1 wherein said inclined upper surface extends from said teeth to said shoulder.

3. A yarn controller according to claim 1 wherein said inclined upper surface extends from a point spaced inwardly from said teeth to said shoulder to provide a flat land area intermediate said teeth and said inclined surface.

4. A yarn controller according to claim 1 wherein said ring is provided with a flat undersurface bearing on said dial.

5. A yarn controller according to claim 1 including a lip depending from the undersurface of said ring outwardly of dial to overhang the outer peripheral edge thereof to preclude entry of yarn intermediate said ring and said dial.

6. A yarn controller according to claim 5 wherein said lip closely embraces said dial, and including pins depending from the ring into engagement with said dial to preclude displacement of said ring relative to said dial in the plane of the ring, said dial cap retaining said ring in engagement with said dial.

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