June 26, 1934. D. M. CLARK 1,964,662

YARN CHANGING MECHANISM FOR KNITTING MACHINES

Filed April 13, 1932 4 Sheets-Sheet 1

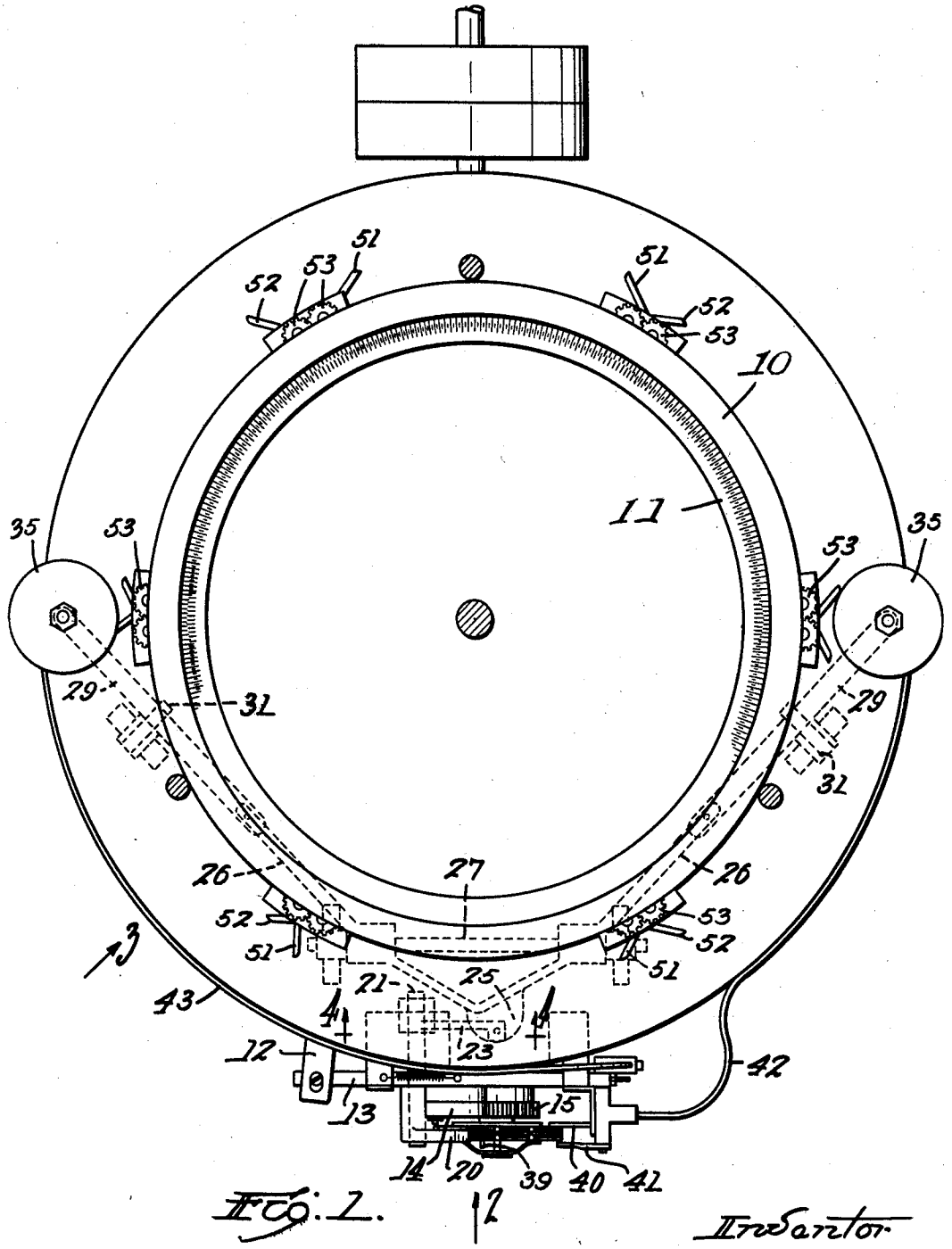


FIG. 1.

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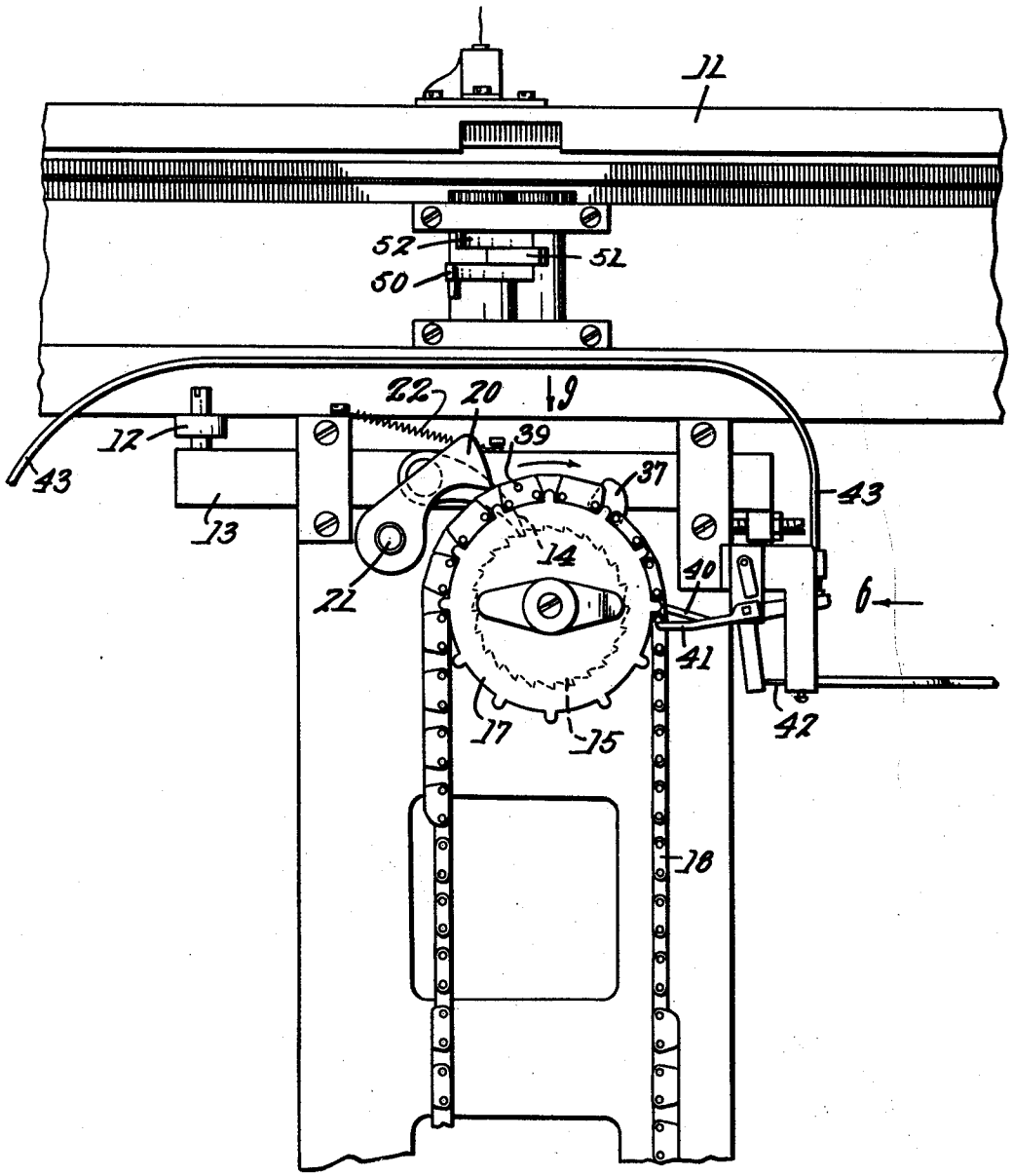


Fig. 2.

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YARN CHANGING MECHANISM FOR KNITTING MACHINES

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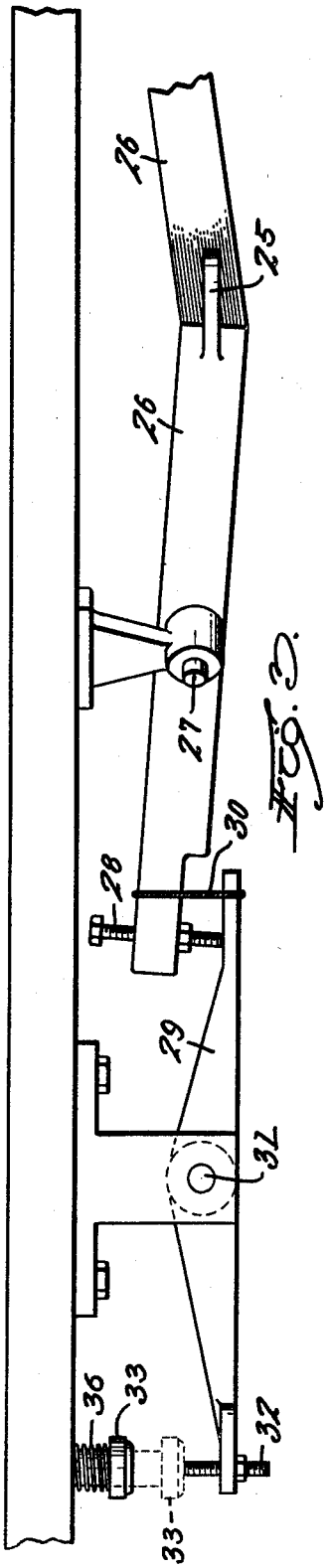


Fig. 3.

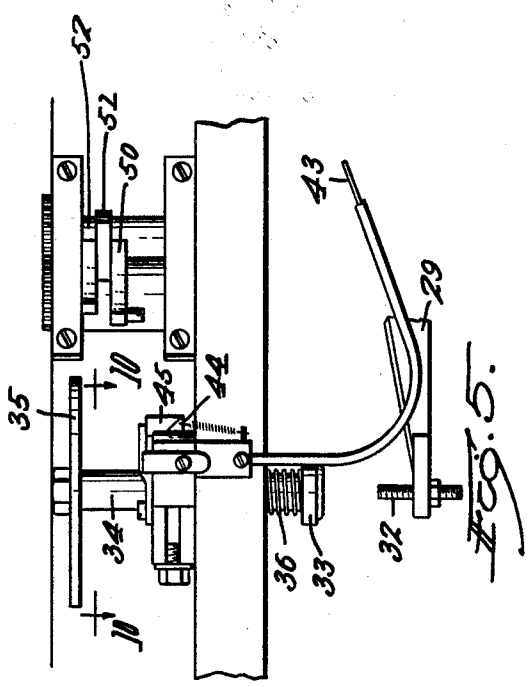


Fig. 5.

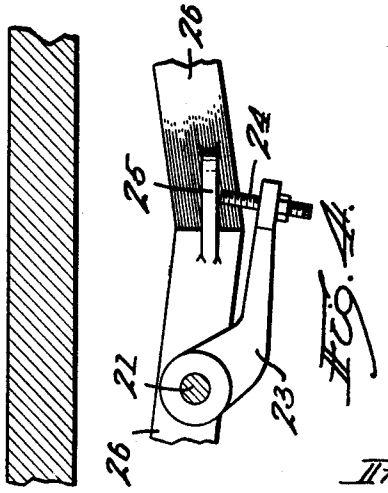


Fig. 4.

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YARN CHANGING MECHANISM FOR KNITTING MACHINES

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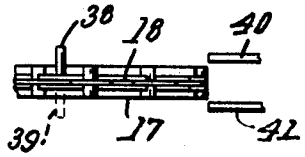


Fig. 9.

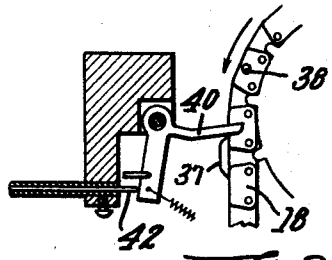


Fig. 8.

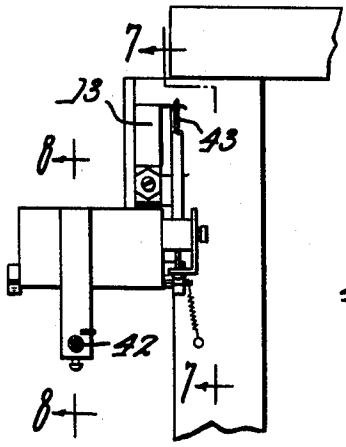


Fig. 6.

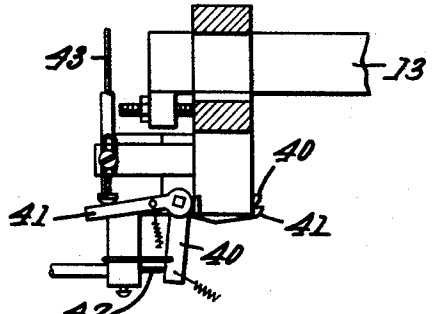


Fig. 7.

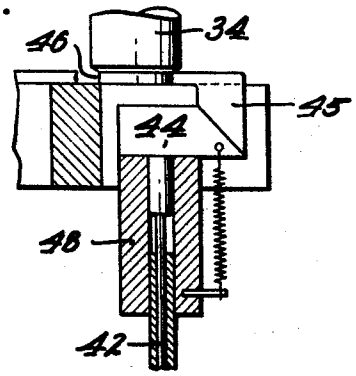


Fig. 11.

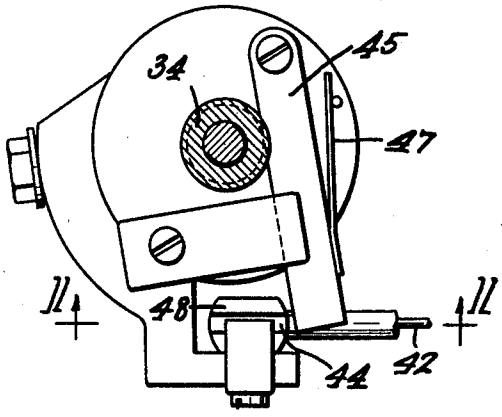


Fig. 10.

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Patented June 26, 1934 1,964,662

UNITED STATES PATENT OFFICE

1,964,662

YARN-CHANGING MECHANISM FOR KNITTING MACHINES

David M. Clark, Worcester, Mass., assignor to Edward T. Esty and James A. Crotty, both of Worcester, Mass.

Application April 13, 1932, Serial No. 604,987

4 Claims. (Cl. 66—138)

The principal objects of this invention are to provide a very simple yarn-changing mechanism applicable to a circular striping machine having a single set of yarn fingers; to provide a construction applicable to a circular knitting machine controlled by a pattern chain and by which the yarn-change is made by means added to the chain or, at least initiated thereby; to provide a construction in which the yarn-change can be made at points around the circumference of the machine, which points can be selected as desired, and to provide a simple and easily maintained mechanism to apply to a comparatively inexpensive type of knitting machine for this purpose.

Other objects and advantages of the invention will appear hereinafter.

Reference is to be had to the accompanying drawings, in which

Fig. 1 is a plan of a circular knitting machine having a single set of yarn fingers and adapted to knit so-called flat goods and shown with a preferred embodiment of this invention;

Fig. 2 is an elevation of the same, taken in the direction of the arrow 2 in Fig. 1;

Fig. 3 is an elevation taken in the angular direction indicated by the arrow 3 in Fig. 1, showing the leverage system by which the yarn-change is controlled;

Fig. 4 is a sectional view on the line 4—4 of Fig. 1 showing a detail of the same;

Fig. 5 is a side elevation of one of the yarn-changing stations showing the parts elevated to inoperative position;

Fig. 6 is an elevation taken in the direction of the arrow 6 in Fig. 2;

Figs. 7 and 8 are sectional views on the lines 7—7 and 8—8 respectively of Fig. 6;

Fig. 9 is a plan of the pattern chain as indicated by the arrow 9 in Fig. 2 and showing certain features of this invention;

Fig. 10 is a sectional view on the line 10—10 of Fig. 5 showing the features below in plan, and

Fig. 11 is a sectional view on the line 11—11 of Fig. 10.

This invention is shown as applied to an old type of circular knitting machine and having only one set of yarn fingers. Enough parts of the ordinary machine are shown to indicate how this invention may be applied thereto. The usual rotatable cam ring 10 of course is employed and a single set of needles. The dial cap 11 is located as usual. The machine can be made with the usual bob plate operating means, as shown in the patent to Wildman No. 1,105,735, August 4, 1914.

The operating means is shown only in part. A cam lever 12, operated in the usual way by a cam on the gear ring, reciprocates a slide 13 which is provided with a pawl 14. A spring 22 returns the slide. At each reciprocation this pawl advances a ratchet wheel 15 one step. On the shaft 15 of this ratchet wheel is an operating wheel 17 having a pattern chain 18. This pattern chain is provided, as usual, with two or more kinds of links having different heights and capable of operating in the usual way and for the usual purpose. As is usual, an arm 20 fixed to a shaft 21 rests on this chain and is held in place merely by the weight of this arm. As the links of different sizes engage this arm, the shaft 21 is turned more or less. Of course, this shaft is capable only of oscillation.

On the shaft 21 is an arm 23 which operates some of the novel mechanism constituting a part of this invention. On this arm 23 is an adjustable screw 24 operating against a horizontal ledge 25 on a double lever 26. This lever is pivoted on a shaft 27 and the lever extends in two directions from the ledge 25. At each free end of the lever is an adjustable screw 28 which bears on another lever 29 and a cord, cable, or other flexible connection 30 connects the levers 26 and 29 together so that the operation of the lever 26 will always operate the two levers 29 on their pivots 31. At the end of each lever 29 is an adjustable screw 32 arranged vertically and adapted to receive on it a head 33 which is fixed on a column 34 carrying an operating disc 35. A spring 36 holds the column and head 33 down yieldingly.

Referring again to the operating chain 18, it will be seen that in addition to the links of three different heights shown, there is an additional link 37 higher than any of the others. As this chain travels around in the direction of the arrow and the slide 13 reciprocates, the link 37 will eventually turn the arm 20 and the shaft 21 further than it has been turned by the other links. The result of this action is to raise the screw 32 to a higher point than it has reached in the ordinary operation of the chain or to an inoperative position.

Now, leaving this situation for a moment, the chain 18 is also provided with one or more pins 38 and 39 immediately following the links 37. The distance between the links 37 coincides with the length of goods required before the yarn or color change is made at a different point around the circle. In Fig. 9 a pin 38 is shown while in

dotted lines a pin 39 is indicated. After the projecting link 37 has acted as above described, the pin 38 or the pin 39, which ever one is to be used at this point, will come around to the right-hand side in Fig. 2 and operate a lever 40 on one side or else a lever 41 on the other side. These levers are operated only one at a time and in either case a flexible rod 42 or 43 is moved by the opposite arm of the lever when the pin engages it. One lever 41 is straight and the other is angular.

We will confine ourselves to one of these flexible rods 42, the other one working in the same way. The operation of the lever 40 moves this rod 42 in its cylinder 48 and raises a latch head 44. This latch head has an inclined surface engaging a latch 45 and turning it out from the position shown in Figs. 10 and 11. The latch 45 is pivoted and it enters a circumferential groove 46 at the bottom of the column 34, holding this column up, against the action of gravity and the spring 36. When the action just described takes place, this latch 45 pushes out in opposition to the spring 47 and the column drops, as shown in dotted lines in Fig. 3.

In the operation of the device it will be understood that the chain 18, is shown as composed of links of three thicknesses, aside from the link 37. These three sets of the ordinary links will operate through the arm 20 in the manner described to move the disc 35 to three different elevations. These elevations are all different from the one shown in Fig. 5 and they are at heights indicated by the three color change levers 50, 51 and 52.

It will be seen therefore that these levers will be operated by this disc which serves as a bob cam. As the cam ring rotates, the disc 35 will be shifted from one position to another and accordingly any one of the levers 50, 51 or 52 will be actuated to turn the gears 53 and control the introduction of the yarn of a different color, if desired, at a different point along the length of the goods. However, when the link 37 engages the arm 20, the two discs 35 will be elevated to inoperative position shown in Fig. 5 and none of these levers and gears will be operated.

Then when the pin 38 or 39, as the case may be, operates the lever 40 or 41, another disc 35 located at a different point around the circle will be lowered into a position to be actuated by the old part of the chain and the other will be kept elevated in inoperative position. Only one disc 35 is in operative position at a time. In this way the change can be made to take effect where either one of these discs is located. They are shown in the drawings as located opposite each other, but that is not essential. In this way the tube of fabric can be knitted on this machine so as to have the color change take place along one line where it will come in the waste that is thrown away in making one bathing suit or the like and then the change can be shifted to another point where the waste will bear the same relation to the next one.

The reason for this arrangement is that the fabric can be cut more advantageously and with a saving of waste if this is done than it could be if the faulty seam were left, as is usual, in one place throughout the tube of fabric made on this machine. This way of cutting bathing suits, utilizing this machine for shifting the seam where the color changes, is illustrated in the patent to Abraham S. Persky, No. 1,831,192.

Although I have illustrated and described only one form of the invention I am aware of the fact that modifications can be made therein by any person skilled in the art without departing from the scope of the invention as expressed in the claims. Therefore, I do not wish to be limited in this respect, otherwise than as set forth in the claims, but what I claim is:

1. In a circular knitting machine having a single set of yarn fingers, the combination with a pattern chain and a link added to the pattern chain having a greater height than any of the other links, of an arm arranged to be operated by the different links, a shaft on which the arm is fixed, a second arm on the shaft, means operated by the second arm for initiating the color-changes, means whereby when the first arm is lifted to its maximum height by the additional link, the second arm will throw out the color-change mechanism, two color-change operating discs, two means, each controlled by one of the operating discs for changing the yarn from one color to another both operated by the second arm, and means carried by the pattern chain for causing the release of one of said discs from its inoperative position after it has been brought to that position.

2. In a circular knitting machine, the combination of a pattern chain having a plurality of sets of links of different heights, an additional link higher than the others, a pin carried by the pattern chain on one side, an arm normally resting on said links, the position of the arm being determined by the links, a pair of levers, means operated by the arm for swinging said levers, means whereby when the extra link on the chain engages the arm the levers will be swung to extreme position, a pair of discs adapted to be raised to inoperative position by the extra link and levers, a series of levers adapted to be operated by one of the discs when lowered from the last named position, means operated by said levers to control the color-change, and means operated by the pin on the chain for releasing one of the raised discs, allowing it to drop by gravity into operative position.

3. In a circular knitting machine, the combination of a pair of columns arranged at different points around the circumference of the machine, a disc carried by each column and movable with it, a series of color-change levers arranged to be engaged by the discs, said levers being located at different heights, means operated by said levers to control the color-change, a cylinder adjacent to the column, a rod adapted to be operated by the pattern chain, a latch carried by the rod, said latch having means for holding the column up in inoperative position when once raised to that positon, whereby the operation of said rod will raise the latch and release the column to allow it to drop into operative position.

4. In a circular knitting machine having a pattern chain, the combination of a pair of discs arranged at different points around the circumference of the machine, color-change levers adapted to be engaged by the discs, a pair of rods adapted to be operated by the pattern chain, a latch carried by each rod, each latch having means for holding one disc up in inoperative position when once raised to that position, and means whereby the operation of said rod will raise the latch and release the disc to allow it to drop into operative position.

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