

[54] **CIRCULAR KNITTING MACHINE WITH PATTERN WHEELS AND ADJUSTABLE CAMS**

3,405,542 10/1968 Beckenstein..... 66/38
 3,403,535 10/1968 Mishcon 66/40

FOREIGN PATENTS OR APPLICATIONS

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289,908 5/1928 Great Britain..... 66/50 A
 279,651 11/1927 Great Britain..... 66/40

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[22] Filed: **May 16, 1972**

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[21] Appl. No.: **253,719**

[52] U.S. Cl..... **66/50 A**

[57] **ABSTRACT**

[51] Int. Cl..... **D04b 15/76**

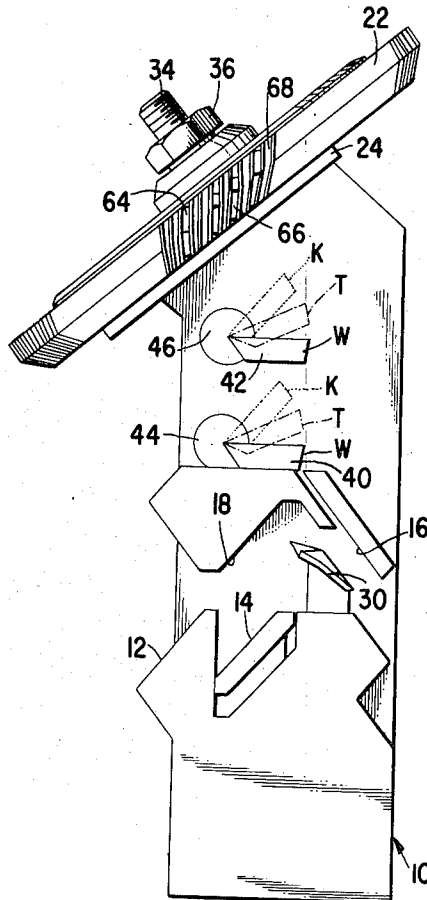
A jacquard type circular knitting machine is provided with multi-butt needles and with adjustable needle engageable cams which may be disposed to raise needles to yarn accepting positions independently of pattern mechanisms and which may be used to change the pattern in a cloth knitted on the machine.

[58] Field of Search..... 66/50 A, 38, 36 A, 66/36 B, 25, 57

[56] **References Cited**
UNITED STATES PATENTS

3,513,666 5/1970 Mishcon et al. 66/50 A

6 Claims, 3 Drawing Figures



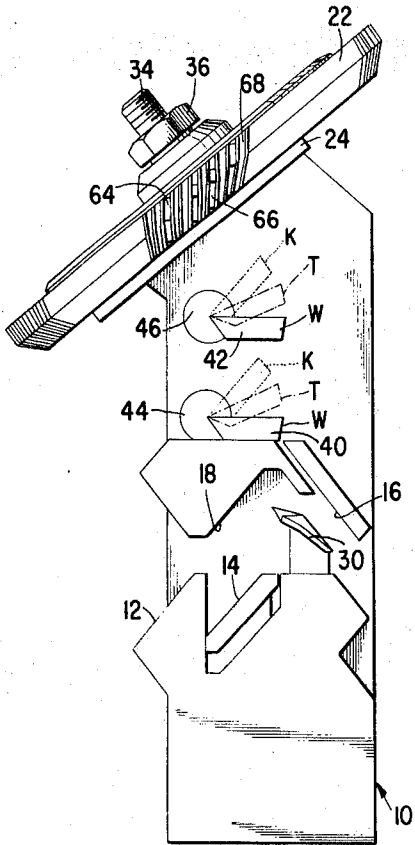


Fig. 1

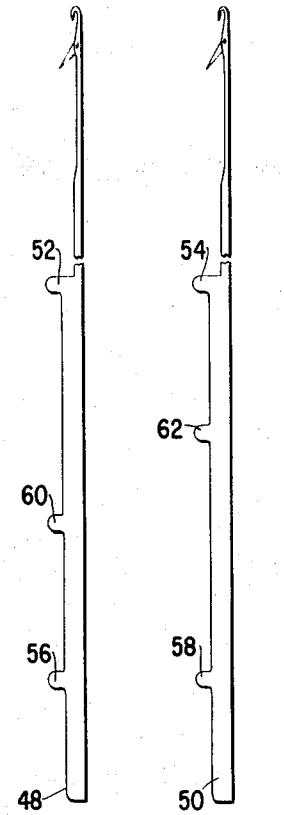


Fig. 2

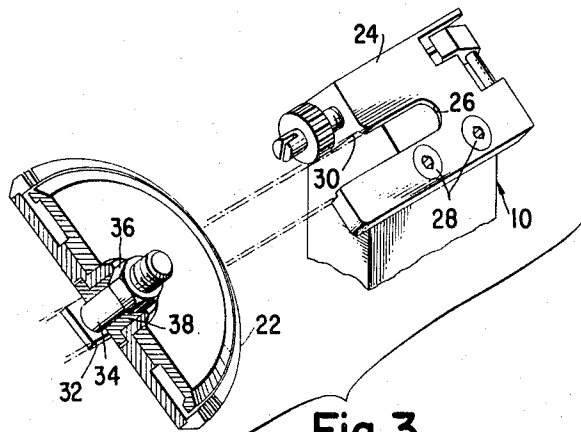


Fig. 3

CIRCULAR KNITTING MACHINE WITH PATTERN WHEELS AND ADJUSTABLE CAMS

BACKGROUND OF THE INVENTION

1. Field of the Invention

The invention relates to jacquard type circular knitting machines wherein patterning mechanisms are available for selectively raising needles to yarn receiving positions.

2. Description of the Prior Art

In a pattern wheel circular knitting machine the pattern wheels selectively actuate needles according to the presence of high or low jacks in particular pattern wheel slots or the absence of jacks therefrom to thereby determine the pattern in a fabric being knitted. A new pattern may be knitted by removing the existing pattern wheels and substituting new pattern wheels in which the jacks are differently arranged in the slots. However, such method of changing patterns is time consuming. Also pattern wheels are expensive and numerous sets of wheels have to be stocked to permit various pattern changes to be made. This method of changing patterns is very costly to the fabric manufacturer.

SUMMARY OF THE INVENTION

In accordance with the invention a jacquard type circular knitting machine is provided with camming which may be used to selectively raise needles to yarn accepting positions at selective feeds of the machine independent of the operation of patterning mechanisms. Preferably such camming consists of a plurality of individually adjustable cams at each feed, each associated with a different butt of a needle and each disposable in a welt, tuck or knit position.

DESCRIPTION OF THE DRAWINGS

FIG. 1 is an elevational view of the cam side of a cam section block constructed according to the invention,

FIG. 2 is an elevational view showing needles for use in a pattern wheel type knitting machine which is provided with camming according to the invention, and

FIG. 3 is perspective exploded fragmentary perspective view showing pattern wheel mounting means.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to the drawings, reference character 10 designates a cam section block according to the invention. Such cam section block preferably includes as part of the camming thereon needle actuating cams as described in U. S. Pat. No. 3,513,666 for "Circular Knitting Machines with Pattern Wheels" issued May 26, 1970 to Lester Mishcon. As shown, the cam section block includes a raise cam 12, adjustable placer cam 14 (shown in its welt position), stitch cam 16, guard cam 18 extending over the raise and placer cams, and wing cam 30 under the stitch cam 16.

The cam section block is adapted to support a rotatable pattern wheel 22 and is for this purpose provided with a fork 24 which is mounted on inclined face 26 of the section block with screws 28. The fork 24 includes a channeled slot 30 for receiving rectangular end 32 formed on a bolt 34 which extends through the pattern wheel. The pattern wheel is mounted on the fork 24 by sliding rectangular bolt end 32 to the end of slot 30 and tightening nut 36 on the bolt 34 against bearing seeve

38. The pattern wheel may be removed from the fork in the reverse manner.

The cam section block includes in addition to the camming already described, adjustable cams such as the cams 40 and 42. As shown in FIG. 1 the adjustable cams 40 and 42 are under the pattern wheel 22 but above the level of the other cams on the cam section block and are affixed to shafts 44 and 46 respectively. The shafts 44 and 46 may be mounted in the section block 10 and provided with associated mechanism, as shown and described in the U. S. Pat. application of Lester Mishcon for "Needle Actuating Camming for Circular Knitting Machines" Ser. No. 253,720 filed May 16, 1972, such that each of the shafts may be moved to and locked in positions corresponding to a welt, tuck or knit position for the cam affixed thereto. In the drawing, the adjustable cams 40 and 42 are shown in the welt position (W) in solid lines, and in the tuck position (T) and knit position (K) in dotted lines.

FIG. 2 shows sample needles 48 and 50 for use in a knitting machine having removable pattern wheels and having the described camming at successive feeds. As shown such needles 48 and 50 include correspondingly located upper butts 52 and 54 respectively and correspondingly located lower butts 56 and 58 respectively. Needles 48 and 50 also include differently located intermediate butts 60 and 62 respectively. The upper butts of all needles are engageable with pattern wheels and the lower butts are engageable with cams other than the rotatably adjustable cams 40 and 42. Intermediate butt 60 of needle 48 is provided to engage adjustable cam 40 when such adjustable cam is in its tuck or knit position and so cause the needle 48 to be raised to the tuck or knit level respectively. Intermediate butt 62 of needle 50 is provided to engage adjustable cam 42 when the cam 42 is in its tuck or knit position and cause the needle 50 to be raised to the tuck or knit level respectively.

A circular knitting machine having cylinder needles of the type shown in FIG. 2, camming as shown on section block 10 at successive feeds around the machine, and one set of pattern wheels for use at said feeds, can be used to knit various patterns in a cloth. With the pattern wheels on the machine and all adjustable cams corresponding to the cams 40, 42 and 14 disposed in their welt positions, the needles in an operating machine are not actuated by the adjustable cams but are controlled by the pattern wheels acting in cooperation with the other cams in a manner described in the aforementioned U. S. Pat. No. 3,513,666 and are actuated to knit a pattern as defined by the presence in or absence from particular pattern wheel slots of high or low jacks such as the high jacks 64 and low jacks 66 shown in slots 68 of pattern wheel 22.

In such case all needles are raised by engagement of their lower butts with raise cams such as the raise cam 12, and selected needles are then raised to tuck or knit positions by the pattern wheels acting on the upper butts of the needles, after which stitch cams such as the stitch cam 16 acting on the lower butts drive all needles down to a cast-off position. The machine may be quickly set up to knit a new pattern simply by removing the pattern wheels from the machine and adjusting the rotatably adjustable cams to provide for selective raising by the rotatably adjustable cams of the needles to tuck or knit levels as may be required at various feeds to produce the new design. With only the two rotatably

adjustable cams shown in the drawing at each feed, it is possible for example on machines having only cylinder needles to produce La Coste stitches without pattern wheels. Satin stitches may be produced on such machine by having even needles tuck and odd needles knit at alternate feeds, and having the even needles knit and odd needles tuck at the other feeds. On a machine having both cylinder and dial needles, it is possible to produce other stitches, as for example Double Pique. By increasing the number of the adjustable cams at each feed corresponding to the cams 40 and 42 and providing suitable needles actuable thereby, the number of the patterns producible without pattern wheels may be increased and it is within the scope of the invention to provide cam section blocks with such additional adjustable cams. Pattern wheels may be used to advantage in combination with adjustable cams in knitting vertical stripes of a color differing from the background yarn and in knitting various other designs also of a color different from the background, tucking jacks for tying in floats being omitted from the wheels and the cams being used for this purpose as required for in the design being knitted.

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 claims may be made without departing from the true scope and spirit of the invention.

I claim:

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

1. In a multi-feed circular knitting machine, the combination comprising, multi-butt cylinder needles, each of said needles including two butts which are correspondingly located thereon, and each of said needles also including an additional butt in one position on predetermined needles and in another position on other needles, a raise cam to contact one of the said two correspondingly located butts, support means upon which

a rotatable pattern wheel engageable with the other of the said two correspondingly located butts may be removably mounted to engage and lift needles after the raise cam to a yarn receiving position, at least two angularly adjustable needle actuating cams following the raise cam, each positionable in knit, tuck and welt positions and engageable with a different one of the additional butts on each needle to thereby control needle height, said needle actuating cams being positionable to produce predetermined patterns, and needle engageable stitch cam means following the said adjustable needle actuating cams for lowering needles to a cast-off position.

2. The combination of claim 1 wherein the stitch cam means engages the same needle butt as the raise cam.

3. The combination of claim 1 wherein the adjustable cams are above the level of raise cam and stitch cam means.

4. The combination of claim 3 wherein the adjustable cams are disposed under the pattern wheel.

5. In a multi-feed circular knitting machine, the combination comprising a plurality of multi-butt cylinder needles, two of said butts being correspondingly located on each of said needles and an additional butt being located in one position on each of certain needles and in another position on each of other needles, a patterning mechanism at each of a plurality of feeds for raising selected needles to yarn accepting positions, a plurality of angularly adjustable needle controlling cams at each of said plurality of feeds for respectively engaging different selected ones of said additional butts and for varying the elevation of predetermined needles to any of a plurality of yarn accepting positions or to a yarn non-accepting position independently of the patterning mechanisms, and stitch cam means for moving needles to a castoff position.

6. The combination of claim 5 wherein the patterning mechanisms are pattern wheels.

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