June 21, 1960 L. MISHCON ET AL 2,941,383

DUAL CAM TRACK KNITTING APPARATUS

Filed May 21, 1959

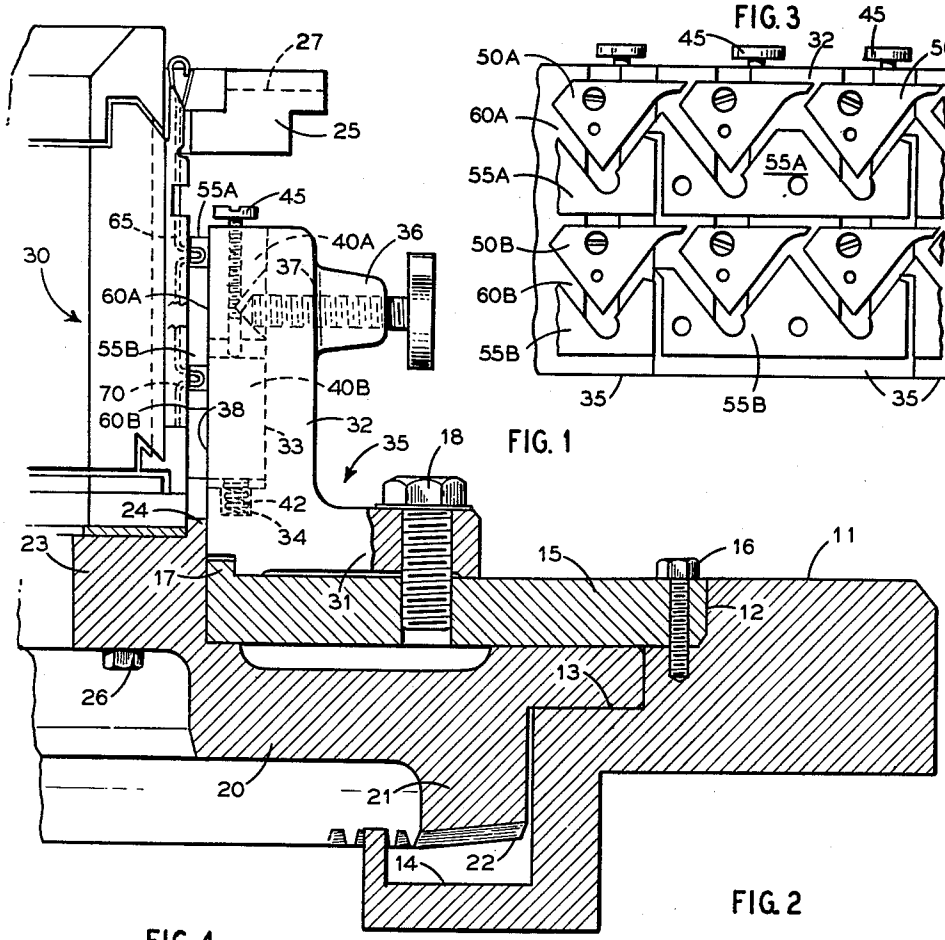


FIG. 1

FIG. 3

FIG. 4

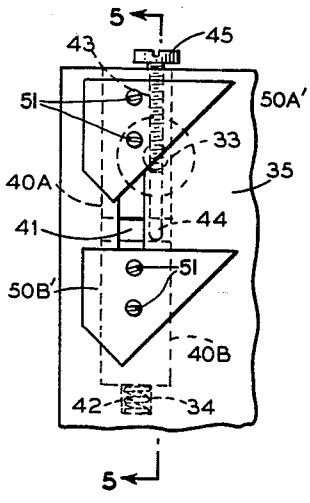


FIG. 5

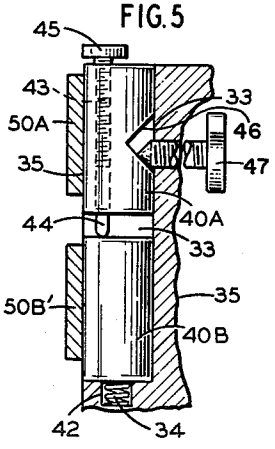
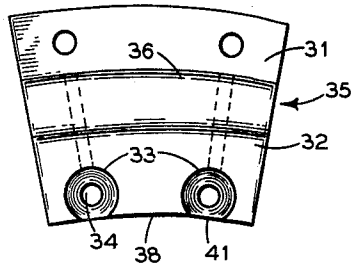


FIG. 2



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United States Patent Office 2,941,383 Patented June 21, 1960

2,941,383

DUAL CAM TRACK KNITTING APPARATUS

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Filed May 21, 1959, Ser. No. 814,802

6 Claims. (Cl. 66—38)

This invention relates to knitting and, more particularly, to a multi-feed knitting machine having a pair of cammed raceways located one above the other and each cooperable with the butts of a different series of needles to raise and lower the needles of its associated series between selected levels at each feed. The invention is also directed to a novel method of selectively raising and lowering the needles of a knitting machine.

As the invention is more particularly applicable to an open top jersey or circular knitting machine, although not limited thereto, it will be described, by way of specific example, as incorporated in an open top jersey or circular knitting machine.

A machine of this type comprises a vertical cylinder formed with a series of vertical slots acting as guides for vertically reciprocable needles, usually of the latch type, cooperable with radially reciprocable dial elements, such as sinkers, web holders, or dial needles to perform a desired knitting sequence. The cylinder needles, as well as the dial elements, are provided with butts engageable with suitable cams for reciprocating the needles and dial elements. Usually the cylinder and dial rotate and the cams are stationary, but the reverse relation is sometimes used.

The cylinder needles are lifted to the latch clearing (knit), tuck, or welt position by riser cams, and drawn down to various levels, such as the stitch position, by stitch cams. The riser and stitch cams cooperate to form a raceway along which the cylinder needle butts travel as they move past the several yarn feeding stations. Other cam means, associated with the dial elements, extend and retract these elements in selectively coordinated relation with the vertical movements of the cylinder needles. Pattern wheels and jacks are sometimes used in association with the riser and stitch cams to further selectively control the movements of the cylinder needles.

There is usually a set of riser and stitch cams at each yarn feeding station, and this means that, with a single cam raceway and without relative elaborate, costly and complicated special provisions, all the cylinder needles follow the same pattern of motion at any particular yarn feeding station. This fact has imposed serious limitations on the flexibility of the knitting sequence and the texture, hand and uniformity of the knit fabric.

In accordance with the present invention, the flexibility of the knitting sequence, as well as the texture, hand and uniformity of the knit fabric, is greatly enhanced by a novel cam, cam support arrangement, and cam adjustment arrangement at each yarn feeding station, and involving the provision of a pair of vertically spaced cam raceways including an upper raceway cooperable with the butts of relatively short needles and a lower raceway cooperable with the butts of relatively longer needles.

At each yarn feeding station, there is a pair of vertically aligned stitch cams independently adjustable as to elevation to which the cylinder needles are drawn down. A pair of vertically aligned riser cams are also provided at each station to cooperate with the pair of stitch cams thereat, and the riser cams of each pair may have independently selected contours so as to raise the associated needles to any selected level.

Preferably, two pairs of such stitch cams and two pairs of such riser cams cooperable therewith are mounted on each of a number of individual cam mounting blocks which are segmental in plan and have an arcuate extent covering a pair of yarn feeding stations. These blocks, when secured to a mounting plate in contiguous relation, form an annulus of cam support blocks.

Each block has a pair of circumferentially spaced vertical bores therein opening outwardly through relatively narrow slots in the face of the block nearest the needle cylinder. Mounted in each bore, one above the other, are a pair of posts, the lower post being biased upwardly by a spring in the bottom of the bore. Each upper post has a passage extending longitudinally thereof and slidably receiving a pin engaging the lower post. A thumb screw threaded into the passage engages the pin therein to adjust its degree of projection and thus the vertical spacing of the posts. Each upper post also has a substantially 90 degree V notch in its surface engaged by a second thumb screw threaded into a horizontal passage in the block and cooperable with the V notch to adjust the posts vertically of their slot. Thus, this combination of adjustments provides for independent setting of the vertical position of the pair of posts.

A stitch cam is secured to each post, and thus the stitch cams of each vertically aligned pair are independently positionable at selected levels. The cooperating riser cams are secured to the face of each block just below the upper stitch cams and the lower stitch cams.

The long and short needles may be arranged in the cylinder slots in any desired sequence, such as in alternation for example. As each short needle passes a yarn feeding station, the upper riser and stitch cams will move the needle between a first set of selected levels. As each long needle passes a yarn feeding station, the lower riser and stitch cams will move such long needle between a second set of selected levels which may or may not be identical with the first set of selected levels. For example, the short needles may tuck at a selected station and the long needles knit at the same station. Also, at the same station, one series of needles may cast off and the other series retain their drawn stitches. Thereby, great flexibility of operation is attained in a novel, simple and relatively inexpensive manner.

The stitch cams may be readily changed by lifting their posts out of the associated bore and replacing the posts with other posts having stitch cams of different design secured thereto, thus changing the draw-down level of the needles at any particular station. Also, the level to which the needles are raised at any station may be readily changed by replacing the riser cam thereat.

In a typical machine there may be provided 32 cam mounting segmental blocks comprising a total of 64 stations.

For an understanding of the invention principles, reference is made to the following description of a typical embodiment thereof as illustrated in the accompanying drawings.

In the drawing:

Fig. 1 is a partial radial sectional view through an open top jersey knitting machine embodying the invention, the dial elements being omitted for clarity;

Fig. 2 is a top plan view of one of the cam support or mounting blocks;

Fig. 3 is an outside elevation view of a mounting block with cams mounted thereon;

Fig. 4 is a partial elevation view illustrating the cam positioning and spacing means; and

Fig. 5 is a sectional view essentially on the line 5—5 of Fig. 4.

In the drawing, only so much of a multi-feed circular knitting machine **10**, modified to incorporate the invention, is illustrated as is necessary to a proper and complete understanding of the invention. Standard posts thereof, such as the cam means for operating the sinkers or dial elements, as well as the dial elements per se, have been omitted for the sake of clarity, as these dial elements coact with the cylinder needles in the same manner as they would in a standard machine not embodying the invention.

Machine **10** comprises an annular stationary base plate **11** having a peripheral notch **12** spaced above a wider annular ledge **13**. Outwardly and downwardly of ledge **13**, plate **11** is formed with an upwardly opening channel **14**. An annular cam supporting plate **15** has its inner edge secured in notch **12** by bolts **16**, and is formed with a cam block positioning lip **17** on its upper surface. Plate **15** has tapped holes (not shown) at predetermined locations to receive studs or bolts **18** securing the cam blocks thereto at each feed.

A ring gear **20** has a bearing engagement on ledge **13** and also bears against the undersurface and outer perpihery of plate **15**. An annular rib **21** on gear **20** extends into channel **14** and has its lower surface formed with gear teeth **22** meshing with the teeth of suitable driving gear means (not shown). The upwardly offset rim **23** of gear **20**, which bears against the periphery of plate **15**, has an annular lip **24** on its upper surface at its inner periphery, and lip **24** serves as a locating and positioning means for needle cylinder **30**. In the illustrated machine, plates **11** and **15**, as well as the cams, are stationary and the cylinder **30** on ring gear **20** is rotatable. However, the invention is applicable equally to the case where the needle cylinder is stationary and the cams and cam blocks are revolvable.

Needle cylinder **30** is of conventional construction, and is secured to rim **23** by bolts **26**. Cylinder **30** has the usual circimfuerentially spaced vertcally extending slots on its inner surface receiving cylinder needles cooperating with dial elements, such as sinkers, web holder, or needles which are radially movable, under cam control, in slots **27** of a dial plate or sinker rest **25** rotatable in synchronism with cylinder **30**.

In accordance with the invention, the cams operating on the butts of the cylinder needles are mounted on segmental or arcuate blocks **35** mounted, in circumferentially adjacent relation, around the external periphery of plate **15** against rib **17**. Each block **35** includes a base **31** secured to plate **15** by the studs **18**, and an upright portion **32**. The outer edge of base **31** is formed with a downwardly and outwardly opening notch fitting over rib **17** so that the radially outer surface of portion **32** is substantially flush with the outer peripheral surface of plate **15**.

Upright portion **32** of each block **35** is formed with a pair of circumferentially spaced, vertically extending bores **33** opening through the top of the block and having smaller diameter spring seating recesses **34** extending coaxially from the lower ends thereof. A rib **36** extends along the inner surface of portion **32** of each block **35** and, at the general level of this rib, a pair of radial tapped passages **37** are formed through portion **32** in alignment with the respective bores **33**. It will be noted that bores **33** are tangent to the outer surface **38** of portion **32** over a small arc, so that each bore **33** opens through such outer surface to form a vertical slot **41**.

Each bore **33** receives a pair of upper and lower cylindrical posts **40A** and **40B**, respectively, having a sliding fit in the bore. Lower posts **40B** seat against coil springs **42** in spring seats **34**. Each post **40A** has a longitudinal passage **43** extending therethrough eccentric to its axis and slidably receiving a pin **44** engaging the upper end of the associated lower post **40B**. Each passage **43** is tapped over at least the upper half of its length to receive a thumb screw **45** bearing against the upper end of pin **44**.

By turning screw **45**, the vertical spacing of posts **40A** and **40B** is readily adjusted.

Also, the rear surface of each post **40A** is formed with a V notch **46** engaged by the inner end of a thumb screw **47** threaded into the associated passage **38**. Notches **46** have an included angle of the order of 90 degrees. By turning thumb screws **47**, the vertical position of each upper post **40A** is adjustable, and each associated lower post is correspondingly adjusted vertically by virtue of spring **42** biasing post **40B** upwardly to engage pin **44** in turn held against upward movement in post **40A** by thumb screw **45**.

Thus, both the vertical position and the vertical spacing of each pair of posts **40A**, **40B** are adjustable by the combination of spring **42**, pin **44**, screw **45**, notch **46**, and screw **47**.

Each post **40A** and **40B** has its surface exposed through slot **41** tapped to receive countersunk screws **51** mounting a stitch cam **50A** or **50B**, respectively, on the posts. Due to the aforementioned adjustability of the vertical positioning and spacing of posts **40A** and **40B**, the vertically aligned upper and lower stitch cams **50A** and **50B**, respectively, are correspondingly readily adjustable as to elevation and vertical spacing.

Upper and lower riser cams **55A** and **55B**, respectively, are secured to surface **38** of portion **32** by countersunk screws. Cam **55A** cooperates with cams **50A** to form an upper raceway **60A** for the butts of short needles. Similarly, cam **55B** cooperates with cams **50B** to form a lower raceway **60B** for the butts of long needles. Riser cams **55A**, **55B** may lift the needles to any one of the latch clearing (knit), tuck, or welt positions, dependent upon the design of the riser cams. If the lifting surface of a cam **55A** or **55B** rises to a point, it lifts a needle to the latch clearing position whereas, if the lifting surface ends in a short flat, the needles are lifted only to the tuck position. A longer flat at a lower level results in the needles being lifted only to the welt position.

Thus, in Fig. 3, the center section of cam **55A** will lift a short needle **65** only to the tuck position, whereas the left section will lift a short needle **65** to the latch clearing position. The reverse is true of lower cam **55B** operating on the longer needles **70**. Furthermore, the stitch cams may have different sizes and shapes, as illustrated by the cams **50A**, **50B** of Fig. 3 and the cams **50A'** and **50B'** of Fig. 4.

The foregoing description pertains specifically to the incorporation of the invention in an open top jersey type knitting machine. However, it is believed apparent that the double raceway arrangement is not limited thereto but may be readily incorporated in other knitting machines such as a double bed rib machine.

While a specific embodiment of the invention has been shown and described in detail to illustrate the application of the invention principles, it will be understood that the invention may be embodied otherwise without departing from such principles.

What is claimed is:

1. In a multi-feed knitting machine of the open top jersey type including a needle cylinder formed with parallel slots along which needles are movable by cams engaging the needle butts, and cam support means in spaced parallel relation to said cylinder, said support means and said cylinder being relatively rotatable to progressively position the needles at successive yarn feeding stations; a series of relatively short needles in certain of said slots; a series of relatively long needles in others of said slots; and cams on said support means cooperating to provide a pair of spaced raceways, one for the butts of the short needles and the other for the butts of the long needles, said cams including riser cams at each yarn feed for moving the needles selectively to the latch clearing, tuck and welt positions, and stitch cams at each yarn feed for moving the needles toward the stitch position; there being one stitch cam at each yarn feed for

each raceway, and such stitch cams being aligned in the direction of needle movement; all needles which are raised to take yarn at any yarn feed and which are then drawn down by stitch cams, taking the same yarn at such yarn feed; said cam support means including plural segmental cam support blocks conjointly forming an annulus, and each block mounting at least one pair of stitch cams and at least one pair of riser cams respectively cooperable with the stitch cams.

2. A multi-feed knitting machine of the open top jersey type as claimed in claim 1 in which said blocks are interchangeably mounted around a circular support element.

3. A multi-feed knitting machine of the open top jersey type as claimed in claim 2 in which each block includes a base secured to the support element and an upright portion having a surface facing said cylinder; the upright portion having a pair of bores formed therein parallel to the direction of needle movement and spaced arcuately a distance substantially equal to the arcuate spacing of the yarn feeds, the bores opening through said surface to form slots therein; each bore having a spring seating recess opening coaxially into its bottom end; a coil spring in each recess; a pair of posts in end to end relation in each bore, the bottom post engaging the coil spring; first means for adjusting the position of the upper post along its bore; second means for adjusting the spacing of the upper and lower posts; and a stitch cam secured to each post and overlying said surface.

4. A multi-feed knitting machine of the open top jersey type as claimed in claim 3 in which said first adjusting means comprises a V notch in the upper posts and a screw threaded through the support block and engaging said notch.

5. A multi-feed knitting machine of the open top jersey type as claimed in claim 3 in which said second adjusting means comprises a passage formed longitudinally through the upper post; a pin slidable in said passage and engaging the lower post; and a screw threaded into said passage and engaging the upper end of said pin.

6. A multi-feed knitting machine of the open top jersey type as claimed in claim 3 in which said first adjusting means comprises a V notch in the upper post and a screw threaded through the support block and engaging said notch; and said second adjusting means comprises a passage formed longitudinally through the upper post; a pin slidable in said passage and engaging the lower post; and a screw threaded into said passage and engaging the upper end of said pin.

References Cited in the file of this patent

UNITED STATES PATENTS

646,474	Steber	Apr. 3, 1900
1,034,521	Scott	Aug. 6, 1912
1,200,451	Ballard	Oct. 10, 1916
2,617,282	Reichert	Nov. 11, 1952