H. SWINGLEHURST.

CAM MECHANISM FOR KNITTING MACHINES.

APPLICATION FILED JULY 13, 1911.

1,183,604.

Patented May 16, 1916.

2 SHEETS—SHEET 1.

Fig. 2.

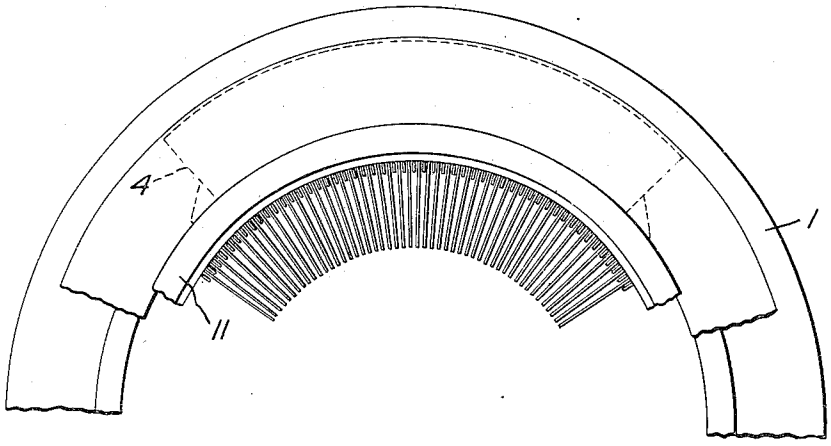
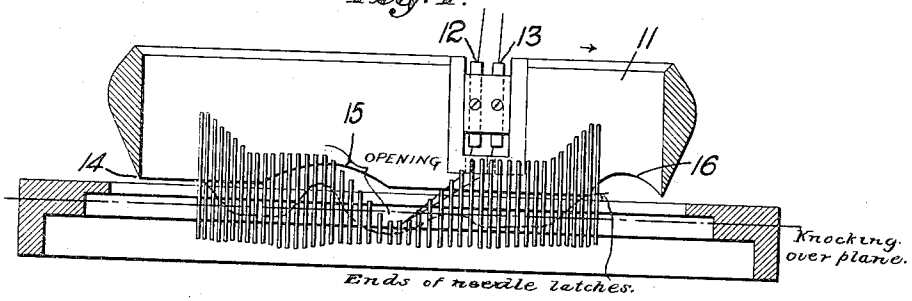
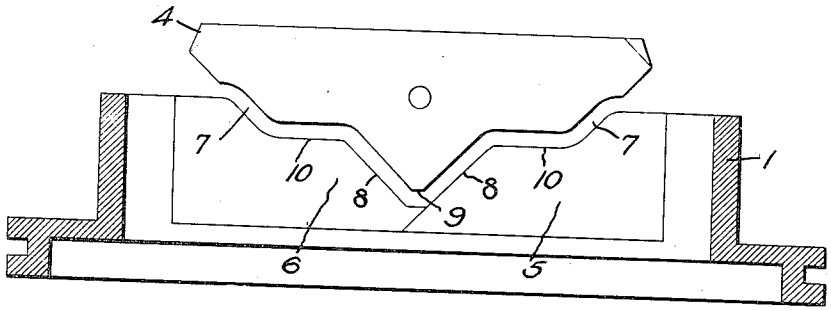


Fig. 1.





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2 SHEETS—SHEET 2.

Fig. 3.

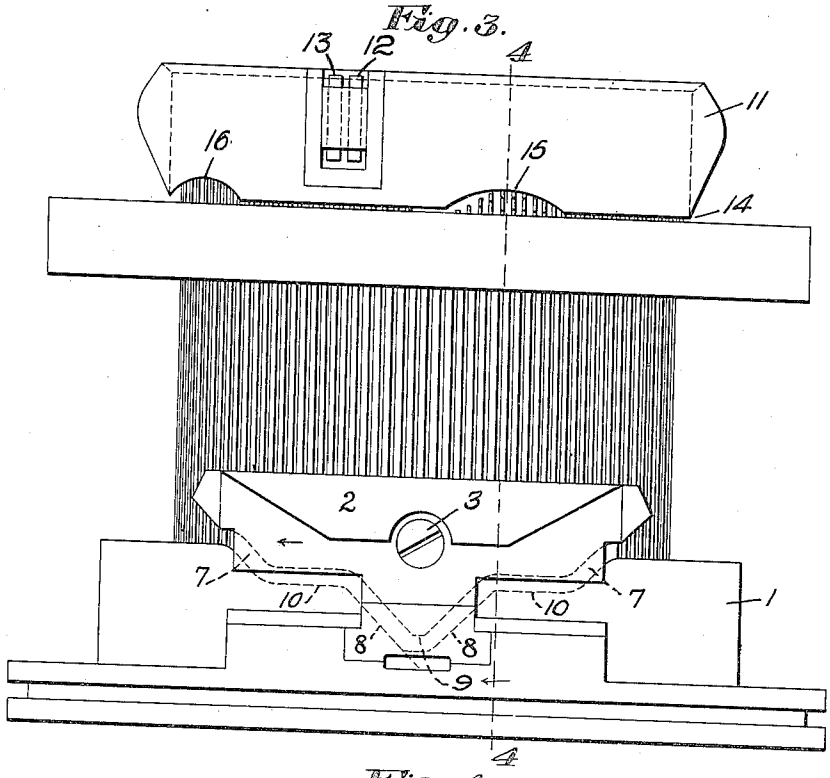
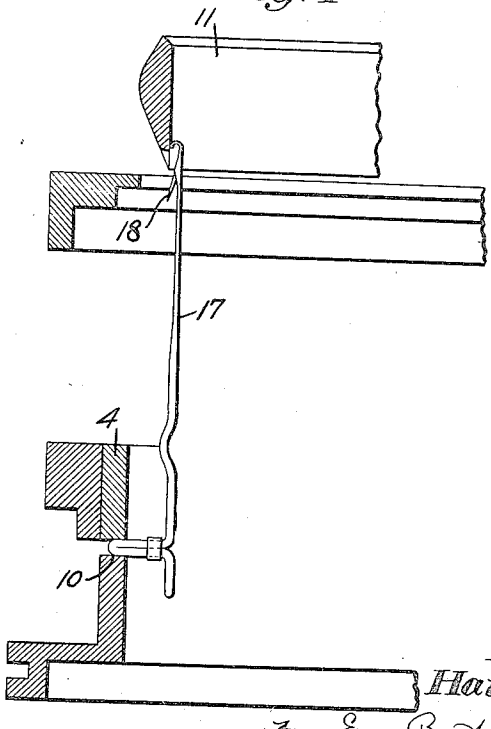


Fig. 4



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UNITED STATES PATENT OFFICE.

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CAM MECHANISM FOR KNITTING-MACHINES.

1,183,604. Specification of Letters Patent. Patented May 16, 1916.

Application filed July 13, 1911. Serial No. 638,333.

To all whom it may concern:

Be it known that I, HARRY SWINGLEHURST, a citizen of the United States, and a resident of Boston, in the county of Suffolk and State of Massachusetts, have invented an Improvement in Cam Mechanism for Knitting-Machines, of which the following description, in connection with the accompanying drawings, is a specification, like characters on the drawings representing like parts.

This invention relates to cam mechanism and controlling mechanism for knitting machines, and in certain aspects thereof is applicable to knitting machines both of the straight and circular type. I have chosen in this type of my invention to represent the same in connection with a circular knitting machine and of that type illustrated in United States Letters Patent to George D. Mayo No. 726,178, April 21, 1903. Obviously, however, my invention is not limited thereto.

Referring more particularly to the drawings, Figure 1 is an inside elevation partially in transverse section of that embodiment of my invention herein illustrated; Fig. 2 is a plan view of a portion of the mechanism shown in Fig. 1; Fig. 3 is an outside elevation of a portion of a knitting machine embodying my invention; and Fig. 4 is a vertical transverse section on the line 4—4 of Fig. 3.

Referring, for convenience of description, to that type of knitting machine embodied in the said patent to Mayo, No. 726,178, it is to be observed that therein a single stitch cam is provided. I have discovered that this cam, which serves to draw the needles from the clearing point all the way to the knocking over point, contacts simultaneously with so many needles at or substantially at the knitting point that the yarn or yarns become displaced. The said cam acts in drawing down the needles to pull the yarn or yarns down unduly, and where two yarns are introduced simultaneously to the needles as in plating, the result is that the finer yarn is drawn down unduly and frequently is drawn below or is displaced with respect to the heavier yarn. Therefore, frequently the wrong thread is thrown to the inside of the fabric and it is uncertain whether any particular thread will be thrown to the front or back.

While my invention so far as it relates to the improvement in the single stitch cam is particularly serviceable in plating or in connection with yarn changing devices, it is also of great advantage when a single yarn is fed to the needles. Moreover my invention may be embodied in knitting cams not of the single stitch cam type as will hereafter more fully appear. The single stitch cam herein shown is intended to be used in connection with narrowing and widening instrumentalities of any suitable type, such for example as those disclosed in the said Mayo patent.

Referring more particularly to the drawings, a portion of the cam cylinder of the machine is represented at 1, in the several figures, the said cylinder being rotated and reciprocated in any suitable manner. Obviously, however, the cam cylinder or carrier may be stationary and the needle cylinder or carrier may be rotated or reciprocated. Suitably mounted upon the cam cylinder and if desired, in the manner shown in said patent, is a cam bracket 2 having secured thereto by screw 3 or otherwise a single stitch cam 4 of the general type shown in said patent, and with which cooperate the elevating cams 5, 6. Between the said cams 4, 5, 6 is the cam track, which in the said Mayo patent is of V form as clearly disclosed in Figs. 9 and 10 thereof. A consequence of the construction shown in said figures of said patent is the taking of needles from their most projected position to their most retracted position in a single draft down the leading face of the V-shaped cam-track. The yarn or yarns employed, as explained in said patent are fed from a position causing the hooks of the needles to travel down said leading incline to take over the yarn and carry it through the previous loop, substantially at the lower apex of the stitch cam. When the needles thus travel the entire distance from their most advanced position to their most retracted position, the yarn guide is necessarily at a comparatively high level and there is necessarily a comparatively long stretch of yarn between the point at which it penetrates the old loop and the point whence it is last guided by the yarn guide. This is of no importance when knitting with a single yarn, but when attempting to plate by conducting one yarn to an elevated position

with respect to another yarn as it lies in the hook of the needle at the time it penetrates the previous loop the construction of said patent is observed to operate with little certainty, which effect is attributed to the comparatively long contact of the two yarns with the throats and hooks of the needles preceding the needle engaged in knocking over its stitch. There is necessarily a little relative movement between the yarns and the needles, and friction with the two yarns may cause them to occupy at random one or another position with respect to each other. In accordance with my invention and to overcome this defect, I first direct the needles downwardly to an intermediate position, such as the tuck position and cause them to dwell thereat for a preferably brief period, and then direct them down the remaining portion of the incline to the knocking over plane, indicated on Fig. 1. In this manner, the number of needles contacting simultaneously with the yarn or yarns at the knitting point is very materially lessened the yarn guide occupying with respect to the knitting wave a lower position, much closer to the needle engaged in knocking over its stitch.

Referring particularly to Figs. 1 and 3, it will be noted that the initial portion of each member of the cam track leading from the upper level is indicated at 7, these portions being preferably inclined substantially as indicated in the said Mayo patent. Between the said inclined portions 7 and the inclined portions 8 which meet at the nose 9 of the cam 4, the cam track is provided with intermediate substantially horizontal portions 10 at any suitable elevation, but preferably at substantially the tuck position. By tuck position is meant that point where the latches are still held through the old loops, the needle not having been advanced far enough to clear said latches, or upon the reverse movement of the needles, when the latch has approached the old loop but has not yet been closed upon the hook. It will be observed, viewing Fig. 1, that the tuck position referred to is below the non-knitting portion of the cam track. The length of the said intermediate portions 10 may be varied within the scope of my invention, but preferably is of substantially the extent shown. It will be observed that the stitch cam 4 is elongated with respect to that shown in the said Mayo patent, in order to provide the said intermediate portions of the cam track. Accordingly the narrowing and widening devices are spaced farther apart to permit the use of the said elongated cam.

In Fig. 1, I have represented the latch ring 11 which may be mounted in any suitable manner, and preferably upon the cam carrier 1 in such manner that it may be swung upwardly out of position when desired. Associated with the said latch ring 11 I provide one or more yarn carriers and preferably two carriers 12, 13, which are adapted to be used for plating work, for which purpose the heavier yarn may be introduced through the yarn guide 12, and the lighter yarn through the yarn guide 13 to be drawn to the inner face of the work. Viewing Fig. 1, it will be observed that the yarns introduced through the guides 12, 13 contact with comparatively few needles between the knocking over point and the point at which the yarns are introduced, so that the tendency relatively to displace the yarns is very materially lessened, and in fact the difficulties to which I have referred are wholly eliminated. Obviously, however, but a single yarn guide might be used or if desired any suitable yarn changing mechanism may be employed or yarn reinforcing means be provided.

The latch ring 11 is preferably of the general type shown in the said Mayo patent, but the position of its lower edge is relatively lower, so that at all points except where it is cut away, as indicated at 15, 16, it closely overlies the opened latches of the needles to prevent their closing except when the needle is retracted. The relation of the lower edge of the latch ring to a needle at the tuck point may be substantially that illustrated in Fig. 4. When a needle is retracted from its most advanced position to the knocking-over point, or advanced with respect to a new loop to its most elevated position, as at the leading and following faces respectively of a single stitch cam, whipping or violent swinging of the latches toward their closed position may occur at moderate speeds, especially when the advancing needle permits the end of the latch to snap out of the new loop. This action heretofore has resulted in the frequent breaking of the latches against the lower edge of the latch ring or the hook of the needle in knitting machines employing a single stitch cam.

In my new construction it will be observed that while the latches are held open by the inner face of the latch ring when the needles are in their most advanced position, they are given at the leading incline 7 of the cam-track a movement to the tuck position resulting in placing the end of the open latch over the previously knit loop, the needle then resting at the tuck position, to be later given the remainder of its retracting movement. One result of this is to prevent the sudden impact of the yarn loop upon the latch from giving it an impulse to swing violently upward against the latch ring at a rate due to the impact higher than that due to the necessary relative movement of the latch past the loop down the stitch

forming path of movement, which is now much shortened. The cutaway portions 15, 16 permit the latches to swing open in the usual manner, when the needle is advanced with respect to the last loop drawn by it, at the leading part 8 of the advancing incline for instance. But the remaining upward movement of the latch to pass through and be released suddenly from the yarn loop is delayed until the following incline 7, where it takes place in the presence of the unbroken and relatively low edge of the latch ring, which limits movement of the latch to a comparatively short arc, in swinging through which it can not attain a destructive velocity.

In Fig. 4, I have indicated one of the knitting needles 17 as positioned at the cut out portion of the latch ring 11 where the latch 18 is permitted to swing upwardly to close.

From the foregoing description, it will be evident that the improved stitch cam, whether of the single type described or of any other suitable type, is peculiarly serviceable in connection with yarn plating mechanism, but that it is effective in connection with any suitable yarn feeding mechanism, and that it overcomes the defects to which I have referred. Moreover, the latch ring 11 as positioned and constructed coöperates with the stitch cam to control the latch needles and prevent breakage thereof.

Having thus described one illustrative embodiment of my invention, I desire it to be understood that although specific terms are employed, they are used in a generic and descriptive sense and not for purposes of limitation, the scope of the invention being more particularly pointed out in the appended claims.

Claims:

1. Knitting mechanism comprising in combination a cam carrier and needle carrier relatively movable with respect to each other, and yarn changing mechanism, said cam carrier including a stitch cam shaped to maintain the needles at tuck position intermediate the clearing point and the knocking over point.

2. A circular knitting machine comprising in combination a needle cylinder, a cam cylinder, means relatively to rotate the same, and yarn plating mechanism, said cam cylinder having a single stitch cam shaped to maintain a plurality of needles simultaneously at tuck position at a point intermediate the clearing and knocking over points.

3. A circular knitting machine comprising in combination a needle cylinder, a cam cylinder, means relatively to rotate the same, and means for feeding a plurality of yarns to the needles, said cam cylinder having a single stitch cam shaped to maintain a plurality of needles simultaneously at a uniform height at a point intermediate the clearing and knocking over points.

4. A circular knitting machine comprising in combination a needle cylinder, a cam cylinder, means relatively to rotate and reciprocate the same and yarn feeding mechanism capable of feeding two yarns simultaneously, said cam cylinder having a single symmetrical stitch cam adapted to maintain a plurality of needles during their descent along its leading face simultaneously at a position intermediate their clearing and knocking-over points.

5. The combination in a knitting machine of independently movable latch needles, a cam structure having a cam-track with leading and following advancing inclines separated by a portion to hold the needles in tuck position, and a latch-ring having an edge lying near the needles and over the latches at the location of said following incline.

6. The combination in a knitting machine of independently movable latch needles, a cam structure having a cam-track with leading and following advancing inclines separated by a portion to hold the needles in tuck position, and a latch-ring having a cut-away portion normally opposite said leading incline and an edge lying near the needles and over the latches at the location of said following incline.

7. In an independent latch needle knitting machine, means to prevent destructive motion of the needle latches comprising means to retract the needles and means to advance the needles for stitch-forming in two stages, the first ending and the second beginning at a position in which the latch is retained against the shank of the needle by a knit loop, in combination with a latch-ring positioned to encounter and prevent closure of the latch during said second stage of movement of the needle.

8. A knitting machine having a cam track composed of non-knitting portions for holding the needles elevated to clear their latches, and a stitch cam having a needle guiding portion for advancing the needles after knitting provided with a substantially horizontal part between the base and apex of said stitch cam and below the level of said non-knitting portion of the cam track.

9. A circular knitting machine having latch needles and a circular cam track composed of non-knitting and knitting portions, said non-knitting portions holding the needles with their latches above the knocking-over plane, and a single stitch cam having a substantially V-shaped needle guiding portion provided with opposed horizontal portions between the base and apex of said stitch cam and below the level of said non-knitting portion of the said cam track.

10. A circular knitting machine, having a

circular cam track composed of non-knitting and knitting portions, and a single, integral stitch cam having a substantially V-shaped needle-guiding portion provided with opposed substantially horizontal portions integral with the body of the stitch cam and positioned between the base and apex of said stitch cam and below the level of said non-knitting portion of the said cam track, in combination with means for simultaneously feeding two or more yarns for plating at said stitch cam.

11. A circular knitting machine having a circular cam track composed of non-knitting and knitting portions, and a single stitch cam having a substantially V-shaped needle-guiding portion provided with opposed, substantially horizontal portions between the base and apex of said stitch cam and below the level of said non-knitting portion of the said cam track, in combination with yarn changing mechanism coöperating with said single stitch cam.

In testimony whereof, I have signed my name to this specification, in the presence of two subscribing witnesses.

HARRY SWINGLEHURST.

Witnesses:

IRVING U. TOWNSEND,

ROBERT H. KAMMLER.