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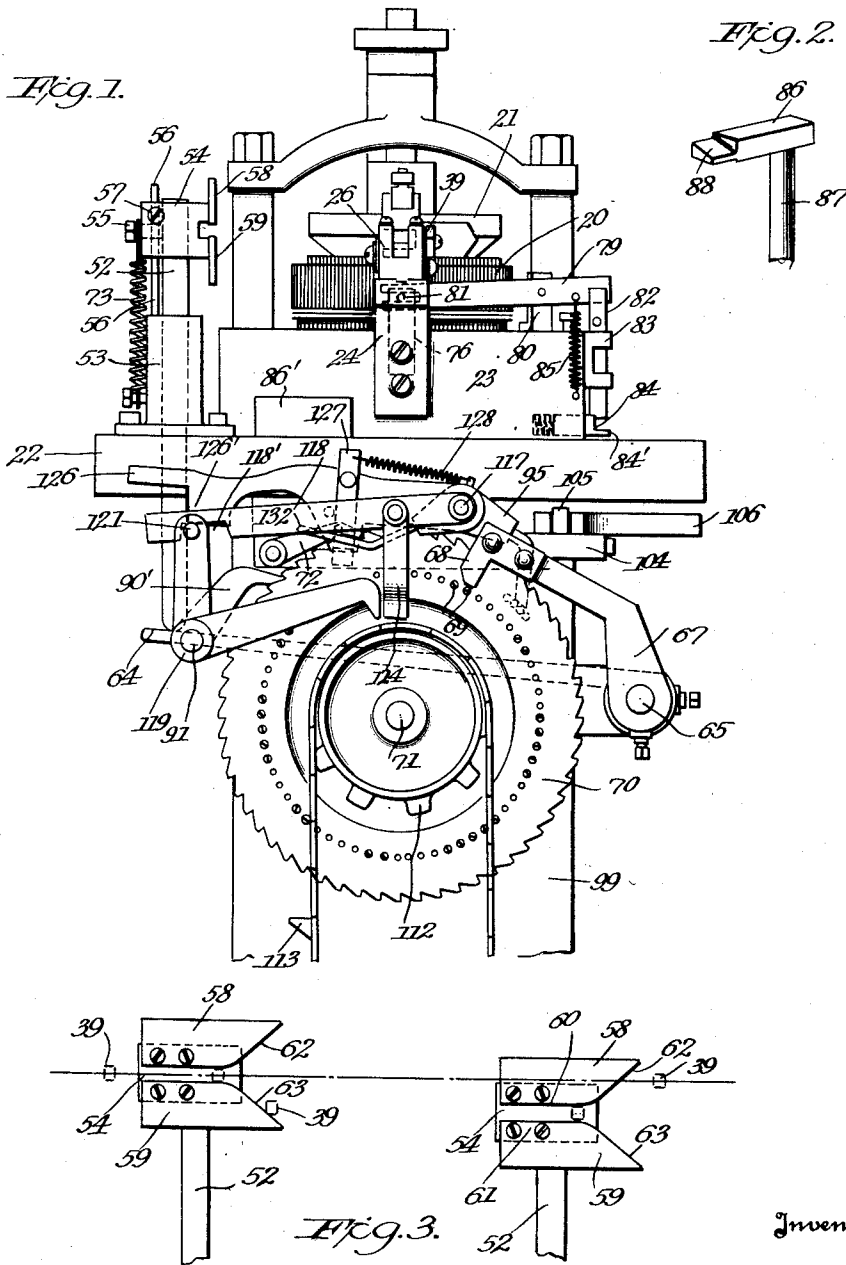
R. J. STEERE

1,929,125

KNITTING MACHINE ATTACHMENT

Filed April 20, 1931

5 Sheets-Sheet 1



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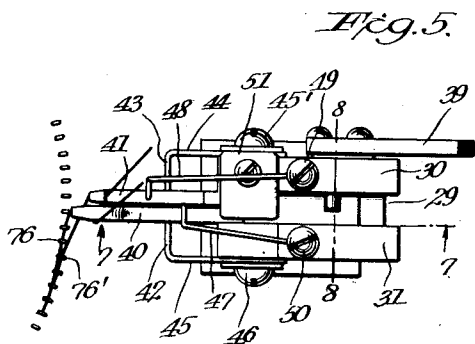
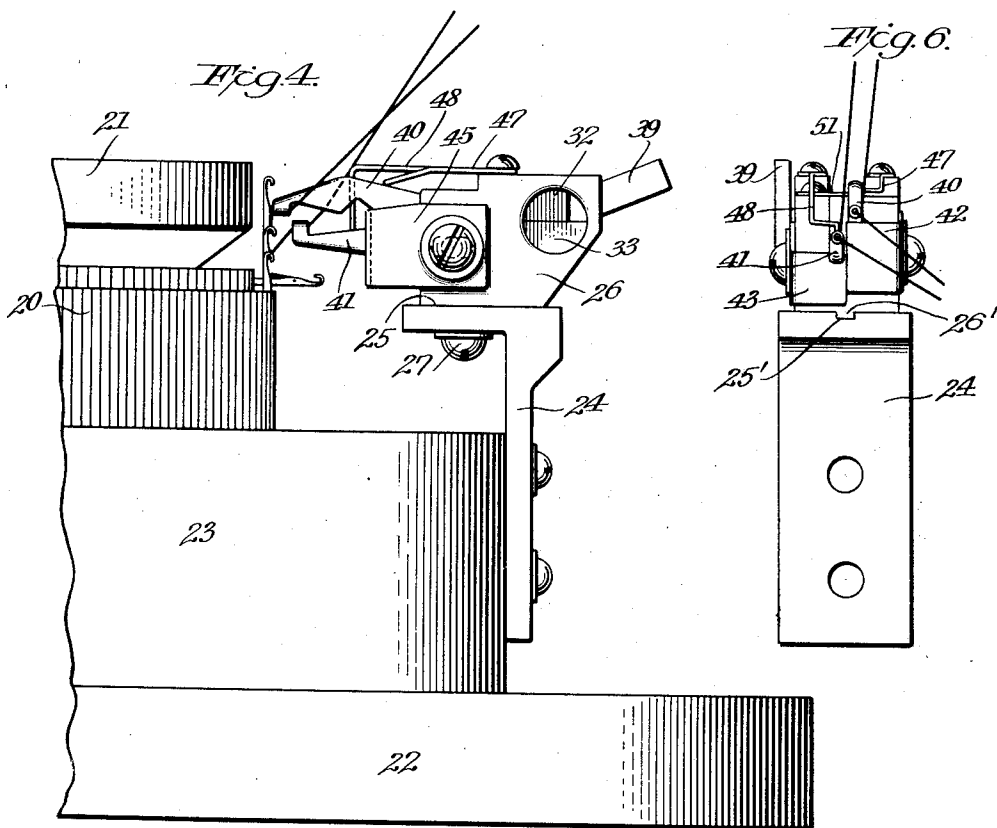
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KNITTING MACHINE ATTACHMENT

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5 Sheets-Sheet 2



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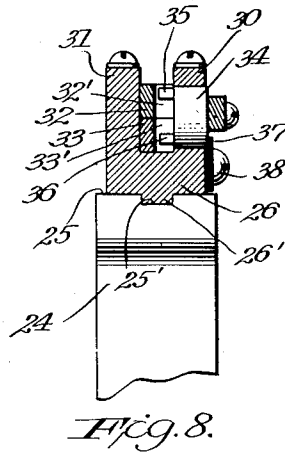
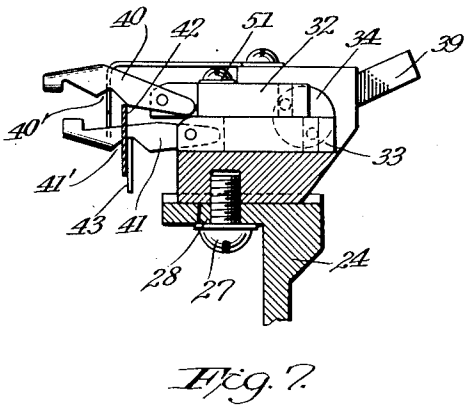
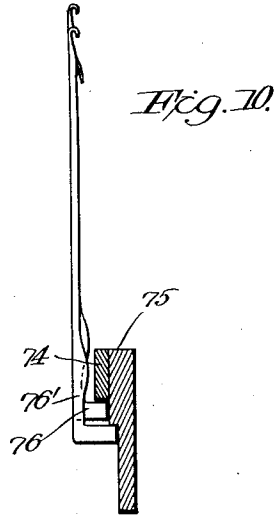
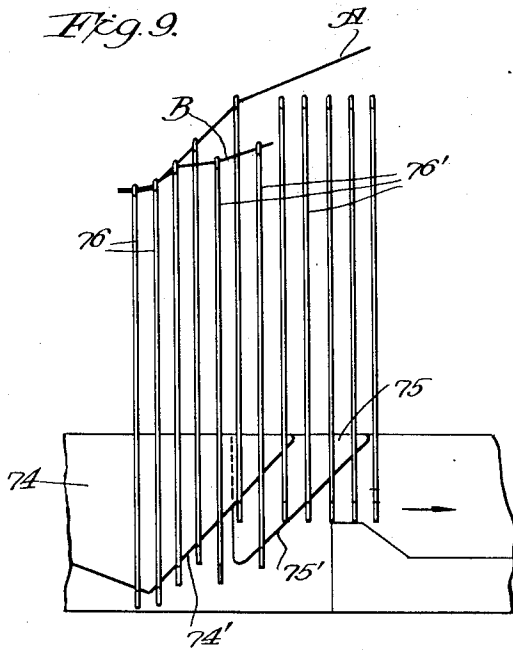
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KNITTING MACHINE ATTACHMENT

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5 Sheets-Sheet 3



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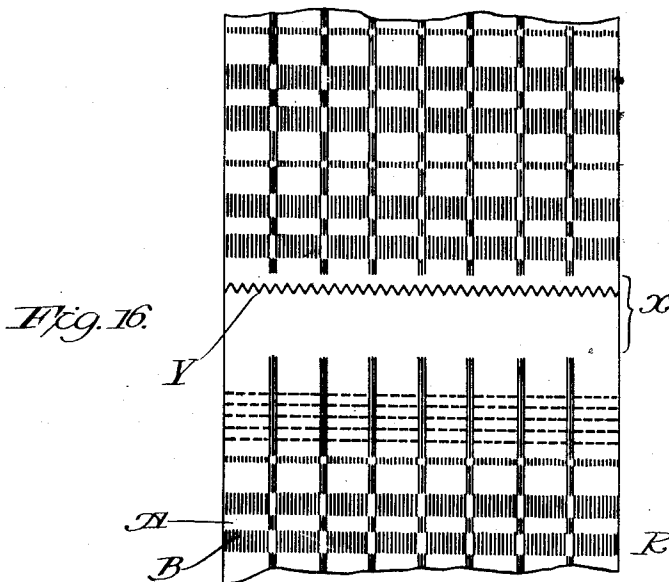
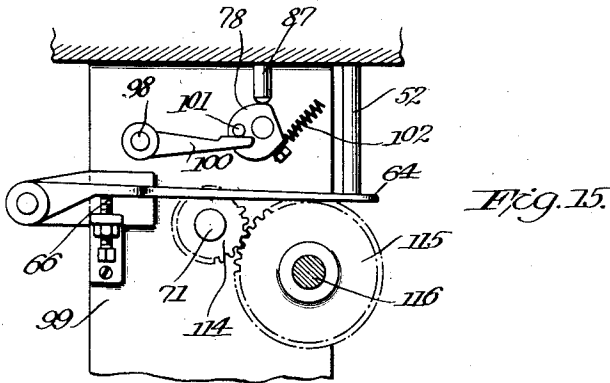
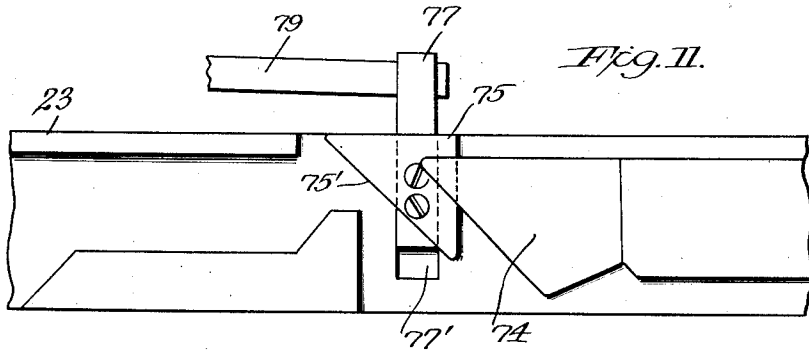
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KNITTING MACHINE ATTACHMENT

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5 Sheets-Sheet 4



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KNITTING MACHINE ATTACHMENT

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5 Sheets-Sheet 5

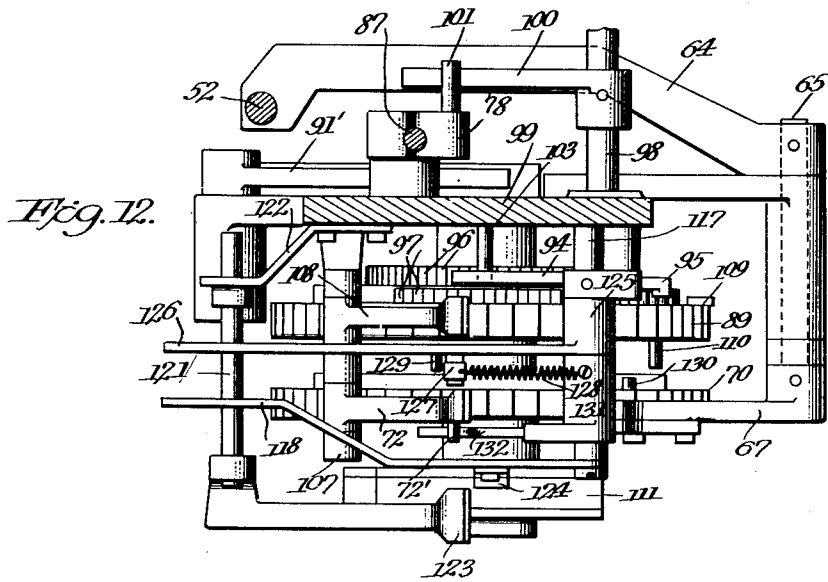


Fig. 12.

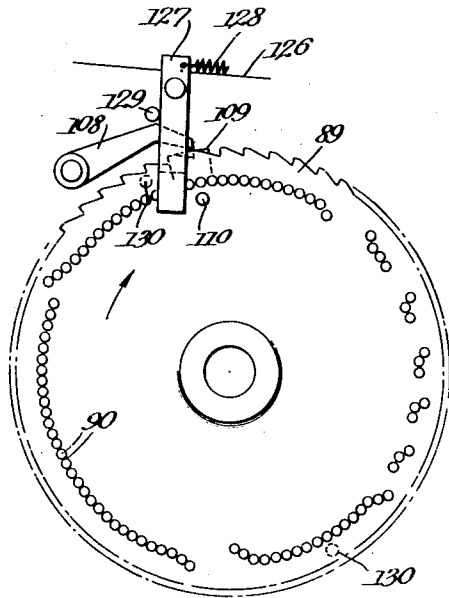


Fig. 13.

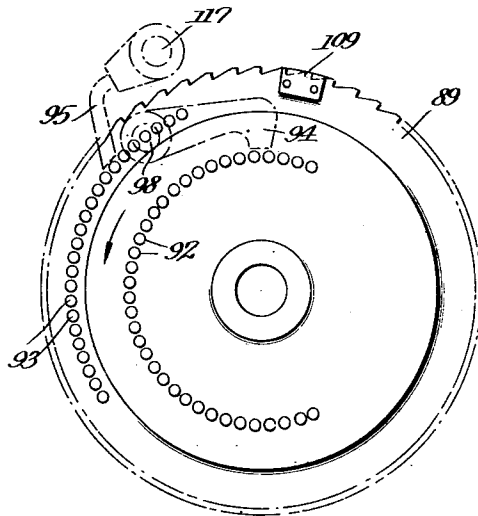


Fig. 14.

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UNITED STATES PATENT OFFICE

1,929,125

KNITTING MACHINE ATTACHMENT

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Application April 20, 1931. Serial No. 531,528

9 Claims. (Cl. 66—137)

The present invention relates to knitting machine attachments adapted, as a particular function, to cause the formation of longitudinal stripes in a reverse plated fabric.

5 A particular feature of the invention is the yarn guiding mechanism, whereby the yarn is fed for reverse plating. The guiding mechanism comprises a pair of fingers oppositely reciprocable and oppositely swingable during reciprocation to
10 present the yarn in upper and lower positions to the needles. The long butt needles are caused to miss the top yarn at intervals, which thus comes to lie behind the bottom yarn. Assuming two yarns of contrasting colors to be used, the
15 bottom yarn being thus knit on the outside forms a contrasting stripe as successive courses are knit. By reversing the relative positions of the guide fingers and bringing the yarn which was formerly in top position to the bottom position, reverse
20 plating is effected and the longitudinal stripe is continued in the contrasting color.

The invention also includes various control means for the mechanisms above mentioned.

25 In the accompanying drawings I have shown a practical embodiment of the invention as applied, by way of example, to a hosiery knitting machine of well known construction. It will be understood that the elements constituting the invention are susceptible of considerable change and that
30 the invention is applicable to other types of machines than that shown in the drawings. The invention may be utilized to advantage in various associations as will be apparent to those skilled in the art.

35 In the drawings:—

Figure 1 is an elevation of a cylinder and dial machine with the attachment of the present invention associated therewith;

Figure 2 is a perspective of a detail;

40 Figure 3 is a diagrammatic showing, in two positions, of certain operating mechanism appertaining to the invention;

Figure 4 is an enlarged elevation of a portion of the knitting machine and of the new yarn guiding mechanism, the latter in side view;

45 Figure 5 is a plan view of the yarn guiding mechanism in its relation to the needles;

Figure 6 is a front elevation of the yarn guiding mechanism;

50 Figure 7 is a section on line 7—7 of Figure 5;

Figure 8 is a section on line 8—8 of Figure 5;

Figure 9 is a diagrammatic view of a portion of the stitch cam and needles and includes a showing of a special cam appertaining to the invention; Figure 10 is a sectional view of the stitch
55 cam and special cam;

Figure 11 is an elevation of a portion of the stitch cam and of an adjustable special cam;

Figure 12 is a horizontal sectional view of the machine shown in Figure 1;

Figure 13 is an elevation of one face of a ratchet wheel and associated mechanism; 60

Figure 14 is an elevation of the other face of the ratchet wheel and other associated mechanism;

Figure 15 is a view in elevation of certain operating trains; and 65

Figure 16 is a face view of a length of fabric knit in accordance with the present invention.

Referring to the drawings, the machine as shown comprises a stationary needle cylinder 20, a needle dial 21, and a stationary bed 22. A rotary cam ring 23 has fixed thereto a vertically extending bracket 24 provided with a horizontal top face 25, Figures 4 to 8, provided with a groove 25' radial to the ring. Mounted on the bracket is a supporting frame or block 26 which has a rib 26' engaging in the groove 25', the frame being secured to the bracket by means of a screw 27 passed through an elongated slot 28 of the bracket and threaded in the frame. Due to the provision of the slot, the frame may be adjusted radially relative to the cylinder, as will be understood. 80

At its top portion, frame 26 is provided with a channel 29 parallel to rib 26' and bounded laterally by walls 30 and 31. Disposed in the channel are a pair of rectangular bars 32 and 33 in longitudinally reciprocable relation, bar 32 resting directly on top of bar 33. On their similar sides, the bars are provided with rectangularly transverse grooves or kerfs 32' and 33'. In a bore whose axial line passes between bars 32 and 33 perpendicular to their side faces is oscillatably mounted a cylindrical disc 34 having eccentric pins 35 and 36 positioned at equal distances on either side of the oscillating axis of the disc on the same diametric line and engaging respectively in grooves 32' and 33'. Displacement of the disc inwardly is prevented through contact of its inner face with the sides of the bars while outward displacement is prevented by means of a washer 37 secured to the frame by means of a screw 38 with a marginal portion engaging over the disc. 85

A lever 39 is secured to disc 34 by means of a pair of screws in horizontally projecting relation and it will be evident that oscillation of the lever will cause, through the intermediary of the disc and pins, opposite and equal reciprocatory movements of bars 32 and 33. 100

A pair of guide fingers 40 and 41 are pivotally 110

connected on horizontal axes to the ends of bars 32 and 33 in lateral recesses formed at the ends of the latter remote from grooves 32' and 33'. The fingers are provided on their lower edges with angular recesses 40' and 41', respectively, in which are engaged abutments 42 and 43 constituting portions of angle members 44 and 45, whose other portions are secured, through elongated slots therein, to the frame 26 by means of screws 45' and 46. Springs 47 and 48 secured at one end to the supporting frame by means of screws 49 and 50 rest with their other ends on the tops of the respective fingers causing the latter to bear downwardly upon the abutment elements 42 and 43. At their ends the fingers are provided with eyes through which the yarn is adapted to be threaded.

It will be evident that upon opposite reciprocation of bars 32 and 33 and therewith fingers 40 and 41, the fingers will be guided by the abutment means for swinging movements in opposite directions. According to Figure 7, for example, with bar 33 moving to the left, finger 40 is being cammed upwardly by abutment 42 cooperating with the angular wall of recess 40'. Finger 41, on the other hand, is forced downwardly by its associated spring as the finger is moved to bring the deepest portion of its recess 41' over the abutment. Upon reverse reciprocation of the bars opposite movement of the fingers are caused. Upward displacement of bars 32 and 33 is prevented by a screw attached clip 51 which engages above bar 32.

A post 52 extends downwardly through bed 22 and is guided for vertical reciprocation in a guide sleeve 53. A block 54 is provided with a bore in which the upper end of post 52 is engaged and held by a set screw 55 threaded in a counter bore. A rod 56 retained in a vertical bore in block 54 by means of a set screw 57 is slidable in a vertical bore in guide sleeve 53 and serves to prevent rotation of post 52 relative to the sleeve.

A pair of cams 58 and 59 are secured to block 54 in tangential relation to a circle concentric with ring 23, these cams defining a guideway bounded by vertically spaced horizontal wall portions 60 and 61, and having divergent end portions 62 and 63.

At its lower end post 52 rests on the distal end of a lever 64 which at its other end is fixed to a rock shaft 65, downward movement of the lever being limited by an adjustable stop 66, Figure 15. Also fixed on shaft 65 is a lever 67 having a head 68 adapted to cooperate with cam elements in the nature of screws 69 fixed on a ratchet wheel 70. The ratchet wheel 70 is revoluble in concentric relation to a shaft 71 and is adapted to be driven by a pawl 72. Wheel 70 constitutes a pattern wheel, the head 68 riding on and off of the cam elements 69, which are arranged to secure the desired effect. When the head rides off, lever 64 drops and post 52 is forced downwardly by means of a tension spring 73 secured at one end to head 54 and at the other end to the guide sleeve. When the head rides up on the cam elements, the post will be elevated a certain distance.

The yarn guiding mechanism, which travels in an orbital path upon rotation of the head, and block 54 are so relatively positioned that the tail of lever 39 will strike one or the other of cam faces 62 and 63 so that the lever will be swung in one direction or the other to pass between the parallel walls 60 and 61. As shown at the right of Figure 3, the lever is in its upper position and block 54 has been lowered to bring

cam surface 62 into the path of the lever. As shown at the left of Figure 3, block 54 has been elevated to bring cam surface 63 into the path of the lever so that the latter will be returned to its upper position. If desired, the position of block 54 may be changed during each rotation of the head, although ordinarily a number of courses will be knit in each position. It will be understood that if block 54 is not moved, the lever will continue to pass between walls 60 and 61, without being affected, during the knitting of as many courses as desired and as determined by the disposition of the cam elements 69 on wheel 70.

Referring particularly to Figures 4, 8, and 9, reference numeral 74, Figure 9, designates the usual stitch cam. Somewhat in advance of the cam surface 74', I position a special cam 75 having a face 75' substantially parallel to face 74' for engaging the butts of the long butt needles 76'. The short butt needles 76 pass the special cam and are engaged by cam face 74' in the usual manner. The special cam 75 is so positioned relative to the yarn guiding mechanism that the long butt needles will be caused to miss the top yarn A but will engage the bottom yarn B. At this point, therefore, the top yarn A which has been knit on the outside will be brought to the inside since it falls behind the yarn B as indicated in Figure 9. Upon reversal in position of yarns A and B through reversal of the positions of the guide fingers, yarn B will be knit to the outside except when the long butt needles come into play, whereupon it will fall to the inside.

A typical design is shown in Figure 16, it being assumed that yarn A is white and yarn B black. It is desirable that the special cam 75 be movable out of the path of the long needle butts in order that a number of courses of plain rib knitting may be formed between adjacent stockings or, in other words, that the stripe be eliminated for a certain distance as at X, Figure 16, the loose course being indicated at Y. For this purpose, I may mount cam 75 on a block 77 which is vertically reciprocable to move the cam from the position shown in Figure 11 to a position in which its oblique edge is brought into the plane of the oblique edge of the stitch cam. Block 77 is guided in a channel 77' formed in the cam ring 23. A lever 79 is pivoted intermediate its ends to a post 80 fixed to the top of the cam ring, one of the lever ends being bifurcated and engaging a pin 81 on block 77 and the other lever end resting in a notch at the top of a slide bar 82 guided for vertical reciprocation in a bracket 83 fixed to the cam ring. The lower end of slide bar 82 rests on an outwardly and radially spring pressed detent 84 set in the cam ring.

With the parts in the position shown in Figure 1, the special cam 75 is in the position shown in Figure 11. Upon pushing detent 84 inwardly of the cam ring to release the lower end of slide bar 82, lever 79 is swung by means of tension spring 85 to elevate the special cam and lower bar 82 to rest on a bottom projection 84' of the detent.

A block 86, Figure 2, is fixed on the upper end of a post 87 slidable vertically in bed 22, the lower end of the post resting on a cam 78, Figure 15. Depending upon the position of cam 78, block 86 has two positions of vertical adjustment. In the lower position, an oblique cam projection 88 formed on block 86 is adapted to

about the end 84' of detent 84 to move the detent inwardly thus releasing bar 82 for the purpose already mentioned. The block remaining in its lower position, the cam projection 88 is passed 5 beneath bar 82 so that the special cam is not affected. Upon elevating the block, however, the lower end of slide bar 82 engages the oblique face of cam projection 88 and rides up thereon to restore the parts to the position shown in 10 Figure 1, the cam projection being without further effect until block 86 is again lowered. The means for effecting movements of cam 88 and consequent adjustment of block 86 will now be described.

15 Mounted adjacent and inwardly of pattern wheel 70 and coaxially therewith is a similar and independently rotatable ratchet wheel 89, Figures 12 to 14. The outside surface of wheel 89 is provided with series of threaded bores 90 20 adapted to receive screws constituting cams for cooperation with a lever 90', Figure 1, connected through a shaft 91 with an arm 91', Figure 12, for raising and lowering the latter, whereby the dial needles are controlled. On its other side, 25 wheel 89, Figure 14, is provided with concentric series of threaded bores 92 and 93 for the reception of screws constituting cams for cooperation with levers 94 and 95 which are mounted for oscillation in different vertical planes as may be seen from 30 Figure 12, wherein it will be noted that the screws 96 in the holes 92 project a greater distance from the wheel face than the screws 97 in the holes 93.

Lever 94 is fixed to a shaft 98 which passes through the upright frame member 99 and has 35 secured thereto a lever 100 which engages under a pin 101 on cam 78, Figure 15. A tension spring 102, engaging cam 78, tends to rotate the cam in a counter-clockwise direction, this tendency being resisted through the engagement of pin 101 40 with lever 100 whose movement is prevented through engagement of lever 94 with screws 96. When the wheel 89 is in the position shown in Figure 14, the lower end of post 87 is on the cam rise and block 86 is in its upper position. When, 45 through rotation of wheel 89, lever 94 passes off of screws 97, lever 100 is permitted to fall a distance determined through abutment of lever 94 with a stop pin 103, Figure 12. Under these circumstances cam 78 is oscillated to bring its depression under the end of post 87, so that block 86 is permitted to fall to its lower position. Any suitable means may be provided for preventing 50 rotation of post 87 and consequent mispositioning of block 86. A member 86', which presents a vertical guide channel for the block, is shown in Figure 1.

When, through further rotation of wheel 89, lever 94 is again cammed upwardly, the parts are restored to the relation shown in Figure 15.

60 A slide frame 104, Figure 1, has a vertical pin 105 engaged by a lever 106, which is oscillated back and forth from the ring gear of the machine once for each revolution of the cam ring. A shaft 107 fixed to and projecting in rectangular 65 relation from slide frame 104, carries the pawl 72 already mentioned and also a pawl 108 for cooperation with wheel 89, Figure 12. Each reciprocation of slide frame 104 serves to advance one or the other, or both, of the wheels the distance of one ratchet tooth.

70 Referring to Figures 13 and 14, it will be seen that a tooth guard 109 is secured to wheel 89 so that at a certain point pawl 108 will ride on the guard without effecting rotation of the wheel. 75 Inwardly of the guard and on that side of the

wheel adjacent wheel 70 is fixed a pin 110 extending parallel to the wheel axis.

The length of each unit of work is determined by the length of a chain 111 which engages a sprocket wheel 112 fixed to shaft 71, the chain 80 carrying a tripper 113, Figure 1. Shaft 71 extends through frame member 99 and has fixed thereto a pinion 114 which is in engagement with a spur gear 115 fixed to a shaft 116 which carries the burr wheel (not shown). 85

A rock shaft 117 journaled in and projecting from frame member 99 has freely pivoted to its outer end an arm 118 which at its opposite end is provided on its lower edge with a recess 118', 90 Figure 1. A bell crank lever 119 pivoted on shaft 91, which is journaled in frame member 99 in perpendicular relation thereto, has an upwardly extending arm supporting a pin 121 which is parallel to the shaft and which in the position of parts shown in Figure 1, is engaged in the recess 95 118'. The inner end of pin 121 is slidable in an arcuate slot of a bracket 122, Figure 12. The bell crank lever lies in the plane of chain 111 and the extremity of its other arm is provided with a nose 123 engageable by tripper 113. A finger 100 124 rigidly secured to arm 118 depends therefrom to lie immediately in advance of nose 123 and is adapted to be engaged by tripper 113 to lift arm 118.

Lever 95 is rigidly secured to shaft 117, the 105 shaft having rockable thereon the hub 125 of a lever 126 which has a downwardly expanded portion 126' at its other end resting, as shown in Figure 1, on pin 121. Pivoted to arm 126 is a downwardly extending finger 127 urged in a counter-clockwise direction, by means of a spring 128, into abutment with a pin 129 on arm 126. On its side adjacent wheel 89, wheel 70 carries a plurality of pins 130 which have a path concentric with and greater than the path of pin 110 115 on wheel 89. In the position of parts shown in Figure 1, the lower end of finger 127 is above the path of pin 110 and may oscillate freely when struck by pins 130.

Secured to shaft 117 beyond hub 125 is a hub 120 131 which supports a lever 132 extending beneath a pin 72' carried by pawl 72. Spring 128 may be conveniently anchored on sleeve 131.

When knitting the leg of the stocking, wheel 89 is in the position shown in Figures 13 and 14, 125 pawl 108 riding on guard 109, the pattern wheel 70 is being advanced by pawl 72, and the special cam is in its lower position for cooperation with long needle butts. Block 86 is in its upper position wherein its cam projection 88 passes without effect beneath the lower end of slide bar 82. When, now, tripper 113 strikes finger 124, arm 118 is lifted to free pin 121 from recess 118'. The tripper strikes the nose 123 of the bell crank lever, rocking the latter to move pin 121 135 beyond the downwardly expanded portion 126' of arm 126 and permitting the arm to drop, thereby bringing the lower end of finger 127 in front of pin 110 of wheel 89. Upon continued revolution of wheel 70, one of the pins 130 strikes 140 the lower end of finger 127 on the opposite side from pin 110 swinging the lever and initiating movement of wheel 89. Hereupon, pawl 108 is brought into operative relation to the ratchet teeth and continues the drive of wheel 89. As 145 the rotation of wheel 89 continues, levers 94 and 95 pass off of screws 96 and 97. The consequent oscillation of shaft 98 permits the oscillation of cam 78 in the manner above described so that block 86 takes up its lower position and the 150

special cam is rendered inoperative. Lever 95 is weighted so that it falls immediately upon passing from screws 97, rocking shaft 117 and thereby causing lever 132 to lift pawl 72 out of operative relation with wheel 70 whose rotation is thus interrupted. When wheel 89 again reaches the position of Figures 13 and 14, it will be readily understood that pawl 72 has been released for operation and the special cam lowered to operative position through the intermediary of levers 94 and 95 which again rest on their respective cam screws.

While I have described a preferred embodiment of my invention, it will be understood that I do not limit myself to the structure shown and described, many changes being possible without departure from the scope of the following claims.

I claim:—

1. In a knitting machine, a needle cylinder, a rotary cam ring, yarn guide mechanism rotatable with said ring and comprising a pair of relatively movable guide fingers and a horizontally extending lever oscillatable in a vertical plane to move said fingers, lever operating mechanism comprising means defining a guideway with vertically spaced parallel walls divergent at one end and positioned in the path of the lever, and means to reciprocate said last named means vertically whereby the divergent wall ends are alternately positioned to engage and move the lever to pass it through the guideway.

2. Structure according to claim 1 wherein the guideway defining means are mounted on a vertically reciprocable post.

3. Structure according to claim 1 wherein the guideway defining means are mounted on a vertically reciprocable post, and the reciprocating means includes a pattern wheel provided with cam means and a lever engaging said cam means.

4. Yarn guide mechanism for knitting machines, said mechanism comprising a supporting frame, a pair of pivotal guide fingers supported in connection with the frame, said fingers being oppositely and simultaneously reciprocable relative to each other and to the frame with their pivotal axes following parallel rectilinear paths, and means for oppositely swinging said fingers during their reciprocation.

5. Yarn guide mechanism for knitting ma-

chines, said mechanism comprising a supporting frame, a pair of parallel bars supported for longitudinal reciprocation in said frame, guide fingers pivoted to said bars for movement therewith, means for oppositely and simultaneously reciprocating said bars, and means for oppositely swinging the fingers during the reciprocation of the bars.

6. Yarn guide mechanism for knitting machines, said mechanism comprising a supporting frame, a pair of parallel bars supported for longitudinal reciprocation, said bars being provided with transverse grooves on similar sides, a member oscillatable about an axial line extending between the bars and provided with eccentric pins respectively engaged in said grooves, a lever in connection with said oscillable member and operable to oscillate said member whereby the bars are oppositely reciprocated, and guide fingers connected to said bars for movement therewith.

7. Yarn guide mechanism for knitting machines, said mechanism comprising a supporting frame, a pair of horizontally extending pivotal guide fingers supported in connection with said frame, said fingers being oppositely and simultaneously reciprocable relative to each other and to the frame with their pivotal axes following parallel rectilinear paths, each finger being provided with an angular recess on its lower edge and abutment means engaged in said recesses and guiding said fingers for opposite swinging movements during their reciprocation.

8. Yarn guide mechanism for knitting machines, said mechanism comprising a supporting frame, a pair of pivotal guide fingers supported in connection with the frame, means operable to bodily move the guide fingers oppositely and simultaneously, and means for oppositely swinging said fingers about their pivotal axes during their bodily movement.

9. Yarn guide mechanism for knitting machines, said mechanism comprising a supporting frame, a pair of pivotal guide fingers supported in connection with the frame, means operable to bodily move the guide fingers oppositely and simultaneously, and cam means guiding said fingers for opposite swinging movements about their pivotal axes during their bodily movement.

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